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| Folder ID: | 1762469 |
| Series: | Central Files |
| Dates: | $01 / 01 / 1982-12 / 31 / 1984$ |
| Fonds: | Records of the Consultative Group on International Agricultural Research <br> (CGIAR) |
| ISAD Reference Code: | WB IBRD/IDA CGIAR-4177S |
| Digitized: | $03 / 29 / 2023$ |

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 Documents 02Statement by
John W. Mellon
Director, International Food Policy Research Institute

CGIAR International Centers Week<br>November 9, 1982

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## Policy Findings

## The Global Food Situation

IFPRI research has identified two key elements of the global food situation that recast our perceptions of the problem and the policy needs required to deal with that problem. First, the fundamental force determining the global food situation over the next few decades is growth in per capita income in developing countries. Second, high rates of growth in agricultural production in developing countries are accompanied by increased food imports. Because IFPRI has developed the theoretical framework for understanding these elements, we bring a confidence to the diagnosis of the future food situation that was previously lacking.

For example, it is important not to be misled by the large short-term fluctuations in the global food situation. Production varies greatly from year to year according to changes in weather, consumption, trade, and even internal socio-conomic factors. Thus, in the early 1970s, demand for food was high, while a series of poor crop years in major producing areas contracted supplies. The result was rapidly rising food prices and a tremendous squeeze on the incomes of many poor people.

Now, however, we are in the throes of a major global recession, demand for food has been restrained, we have had a series of relatively good crops, and Europe and North America are vigorously competing to expand their food exports to developing countries. Consequently, food prices are very low and our worry is now more about food surpluses than food shortages.

Nevertheless, even in this context IFPRI's research on the dynamics of the world food situation shows the need for continued research and investment in agricultural growth in developing countries if those countries are to have wide participation in their development. Our research pinpoints the importance of not slackening long-term efforts on the food front during this temporary hiatus.

## THE INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE *

## Introduction

Mr. Chairman, members of the Consultative Group, fellow Center Directors, and other colleagues, I thank you for this opportunity to speak to you.

In this period of deepening global recession and consequent reduced investment, food policy issues assume a striking new relevance and importance. The faltering world economy has its most pernicious effects on the low-income countries and peoples of the world, who have long been denied the right to an adequate level of food consumption.

In this somewhat unhappy context I hope to bring some sense of shared pride in the accomplishments of IFPRI. As most of you know, IFPRI is a small and relatively new addition to the CGIAR system. Yet in the scant six years since its birth, IFPRI has become a premier institution, widely recognized for the quality of its research staff and the relevance of its research findings on complex food policy issues.

Recognition of IFPRI's vital role rises pari passu with recognition that the key to the world's food problem is technological change in agriculture, and that such technological change depends as much on the policy breakthroughs of the type pioneered by IFPRI as it does on the biological discoveries made by the other CGIAR institutes. To illustrate IFPRI's key role in finding solution to the world food problem, I will discuss four areas of current research breakthroughs by IFPRI researchers and two areas of future promise. I will emphasize clear conclusions, without elaboration, which are drawn from the statistical and analytical detail of our present and forthcoming research reports.

[^0]IFPRI research also suggests that, over the next few decades, global demand and supply forces will lead to a gradual rise in the real price of food. Such an increase in the real price of food will greatly increase the returns to investment in domestic agriculture, at the same time that it will penalize those countries and low income people not experiencing the benefits of accelerated agricultural growth.

It is IFPRI's unique combination of sound theory, careful data analysis and a team approach to problem solving that allows it to take a correct and leading position on these important policy issues.

## Rural Poverty and New Agricultural Technology

We are all cognizant of the damage inflicted upon agriculture and agricultural research by the belief that the "green revolution" has had a deleterious impact upon the poor. Deeply concerned about this situation, IFPRI researchers are currently engaged in a multifaceted attempt to pinpoint the indirect employment effects of agricultural production growth, and to ascertain when and how income transfers from agricultural growth can positively benefit the rural and urban poor. I can now flatly say that within the coming year IFPRI will produce a definitive analysis of the complex relationship between technological growth in agriculture and poverty that will clear up the present misunderstandings. Our basic contribution will lie once again in a team approach to resolving apparent, but misleading, conflicts in the data relating agricultural growth and poverty.

## Inadequate Emphas is to Agriculture by Governments

In Sub Saharan Africa food production growth is lagging far behind population growth. This failure in agriculture is primarily a function of the refusal of governments to allocate sufficient financial and institutional resources to agriculture, and to take necessary policy actions. IFPRI research on public expenditure on agriculture in Latin America (less than 5 percent of government budgets) suggests a similar lack of commitment, although the results are not as devastating as in Africa.

The basic problem is a failure to recognize that agriculture has a major role to play in economic development. This is a topic on which IFPRI research has already produced major insights: for example, the dependence of agricultural growth on massive investment in infrastructure, and the powerful consumption demand forces linking agricultural growth with growth in other sectors. IFPRI work in these areas represents a fundamental contribution to understanding the whole process of development. For instance, our research shows that technological change in agriculture requires a much larger total investment than originally assumed, and that such investment provides a very large stimulus to growth in nonagricultural sectors of the economy.

The economic stimulus provided by an agricultural based strategy provides a faster rate of industrialization than alternative approaches, as the examples of Japan and Taiwan eloquently illustrate. Until the efficacy and efficiency of an agriculture based strategy is elaborated and driven home, even national systems of agricultural research will lack the necessary resources for success, and their output will have little effect on food production aggregates.

It is important to recognize that IFPRI research on growth can be used to pinpoint within a broad range of alternatives the precise elements of policy needs. For example, IFPRI research on Argentina suggests that over a dozen year period that country would have had a 30 percent higher gross national product (GNP) if it had followed policies of trade liberalization and exchange rate management more favorable to agriculture. As a major agricultural exporter, however, the recommended shifts in policy would have an unfavorable short-term effect on the urban poor. Our research on food subsidies in Egypt, Brazil, and Sri Lanka, and the incorporation of such subsidies in the Argentinian model show how protection can be provided to urban poor by such subsidies while other policies assure high rates of growth.

Other IFPRI research in Malaysia and India has tried to quantify the exact multiplier effects of technology based growth in agriculture. This research shows that for each dollar of value added by growth in food production, some $\$ 0.80$ of value is generated in other sectors of the rural economy. These demand linkages of agricultural growth are vital, inasmuch as they provide much of the potential for the generation of rural nonagricultural employment. In most developing countries such rural employment is desperately needed to maintain farm prices, to increase the incomes of the poor, and to provide a grassroots stimulus for further economic growth.

## Supply Instability

IFPRI has pioneered in analyzing the sources of increased instability in food production. Recent IFPRI research on India has shown that the new seed-fertilizer technology has been accompanied with a disturbing increase
in production variability. IFPRI researchers are currently trying to devise policy mechanisms for redressing the effects of this increased instability.

IFPRI's close and continuing relationship with the biological institutes of the CGIAR system has allowed us to pursue the sources of food production instability with effective insight. Our macro-approach allowed us to provide the basic research information needed for a convincing case for the IMF cereal import facility. You have seen our analysis of that contribution. We are now proceeding to the more difficult question of the optimal size and location of national stocks in the context of unstable national production and current international facilities. It is IFPRI's ability to combine work in trends, trade, consumption, and production that has enabled it to produce major breakthroughs in this area.

## New Policy Thrusts

I now would like to call your attention to two currently pressing areas of research for which IFPRI is particularly well suited to contribute. These two areas are investment in irrigation and the character of agricultural research systems.

## Irrigation Investment

A misleading diagnosis of the world food outlook, the sources of agricultural growth, and the role of agriculture in growth and equity is leading to omnious signs of future reduction in irrigation investment, particularly in Asia. We have of course been through this cycle before. A coordinated research effort placing rice production needs in the context of other crops and the preferred physical environment,
trade potentials, and shifting consumption of rice should lead to a clear fully articulated policy position calling for continued investment in irrigation. Without research in these areas we believe that a decline in irrigation investment will occur and will have a serious deleterious affect on food availability in the next decade. The implications to allocation of research resources to rice, types of rice production situations, and to other cereals are immense. IFPRI has a solid base of research on which to build this work - a base we have been carefully constructing for the past four years.

## The Size and Form of Agricultural Research

It is becoming increasingly clear that the malaise of agricultural research systems in the least developed countries arises from causes outside of research policy itself. Joint IFPRI/ISNAR research has documented the extraordinarily rapid rate of growth in real expenditure on national agricultural research systems. The present disappointing returns to that investment are a direct result of counterproductive rural development strategies, particularly on the part of the foreign assistance donor community. But, developing countries themselves are the source of part of this problem, because of the nature of their overall development strategies.

IFPRI is bringing together its work on the production potential and trade outlook for the various commodities, in order to undertake an in-depth analysis of agricultural research systems. We should in a few years have a major breakthrough. Again our potential for low cost advances are considerable, given the high degree of complementarity of work in this area with other elements of IFPRI's ongoing research program.

## Looking Ahead

Two pressing needs face IFPRI.
First, we need a major meetings program to carry our research findings directly to policymakers and into practice. We have the administrative structure for such programs and we are mounting small efforts in this direction. Most needed at this point is funding for meeting with key officials in countries to which our research has the most direct relevance. I would be grateful to any donor prepared to provide special project funding for such a direct outreach effort. We have the key research findings ready to go and we have pinpointed the receptive audiences.

Second, we need to pay more attention to the pressing food problems in Africa. Recent cutbacks of 20 percent in our senior research staff have greatly reduced our efforts to advance on this front. That advance cannot be efficiently done by transfer of our research resources from Asia, since our research in Asia must continue to provide the initial basis for testing empirical relationships important to Africa. We presently receive numerous requests from African policymakers to extend to Africa the research carried out in other areas. For this reason, we give highest priority to restoring our work on Africa. We have identified the key personnel and only await the financing necessary to carry out those activities.

## Bringing IFPRI To Its Minimum Efficient Size

As a former Chief Economist of one of the largest foreign assistance donors, I am under no illusions about the difficulty national governments have in maintaining--let alone increasing--their contributions to the CG system. I have stated in other fora, however, the serious problem that has arisen because the programs supported by
multi-laterial institutions have become the dominant users of the CG system, while they concurrently maintain the proportion of their financial contributions at a level more consistent with their much lower weight of a decade ago. Until a basic change is made in proportionate weight among the sources of financing for the CG, the important work now being pursued at the international agricultural research centers will remain inadequate to meeting the growing food production problem in the developing countries of the world.

Having recognized the basic problem, I nevertheless want to direct my remarks to the issue of how the constraints on IFPRI's CG donated core budget weakens IFPRI's ability to continue making a salient contribution to solution of food policy problems.

We have just completed a development plan for IFPRI which articulates our objectives, means and needs. That is available to you and I will not elaborate on it here. I would, however, like to comment on our long standing position of a 25 person senior research staff as our minimal efficient size. We have had a series of misunderstandings with the CG Secretariat on this important issue leading to a highly destructive cut in our research staff.

Two points need to be emphasized: (1) IFPRI's research breakthroughs depend on a team approach which requires a mix of background from six geographic regions and four to six sub-disciplinary areas of research; (2) An international research institute has a necessarily heavy load of servicing functions with respect to its large donor and
user community.
The arithmetic of these two considerations has consistently led us to the conclusion that we need a senior research staff of 25 persons to fulfill our responsibilities to the CG system's mandate. We experienced a dramatic increase in our productivity when our numbers rose to 21 in 1980 - you have observed the recent spurt of output that followed this period. We are now experiencing an equally dramatic decline in our productivity as we cut back to 17 persons on the CG core support. At present we have major lacunae in key geographic areas and sub-disciplines. We have no resiliency to absorb a sudden departure of personne1. Nor can we respond to new research opportunities. We continually lack the key personnel needed to meet a donor country request, which causes our support to drop.

It is the team approach and the complementarity among the parts that determine our size, not the specifics of the research program. Within our minimal size we allocate positions on the basis of priority, as determined by our Board, the TAC and our constituency. We are always careful not to undertake a research assignment if it lies outside the range of our interacting, team abilities.

I cannot emphasize enough what a unique institution you have created in IFPRI. A team approach of this type is rare indeed in the social sciences and unmatched with respect to food policy or even agricultural development.

In response to the present tight funding situation, IFPRI has defined its core program tightly and is making a major effort to raise special project funding for a major portion of the core program. We do not accept funds for work other than the TAC approved core program. In 1983 special project funding will reach some 25 percent of the total core budget. That is of course a compliment to the relevance of our present research work.

Special project funding, however, has consequences that greatly concern me. Such funding reorients our staffing incentives towards the ability to raise money, an ability not necessarily coterminous with the ability to do research. Raising funds for special projects also takes the valuable time of our most senior researchers and biases our research towards discrete projects and away from creating the mortar needed to tie our research into major breakthroughs. We find that 25 percent of our core budget from special projects is the maximum we can sustain without unfortunate distortions.

IFPRI currently receives some 2 percent of the CGIAR system budget. We need an increase in that proportion if we are to make our essential contribution to the system's objective. We firmly believe the allocation of only 2 percent of the CG budget to the analysis of policies constraining the application of technology generated by the remaining 98 percent of the budget is itself an uneconomic allocation of resources. I raise this issue because IFPRI's share of the system resources dropped sharply in 1982. We recognize that questions of budgetary allocation are referred to the TAC for techncial advice. However, it is important to recognize that IFPRI is new in the system, and that there has been controversy as to whether it could perform the complex tasks assigned to it. I don't think there has ever been controversy about the importance of these tasks; and, the TAC has recently expressed itself on this matter by clearly commending IFPRI's staff and work.

We at IFPRI take special pride in the fact that three developing countries allocate 10 percent of their contribution to IFPRI. We believe this reflects the importance developing countries attach to policy research designed to realize the growth with equity potentials of biological innovation in agriculture. We now have 14 donors. We need a vote of confidence from five or six more. I hope you will give us that in 1983.

# STRENGTHENING AGRICULTURAL RESEARCH IN THE DEVELOPING COUNTRIES: PROGRESS AND PROBLEMS IN THE 1970s 

by<br>Peter Oran<br>International Food Policy Research Institute<br>Washington, D.C.

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## INTRODUCTION

Concern at the lagging growth of agricultural production during the 1960s in Third World countries faced with increasing food deficits, and severe foreign exchange and employment problems, has led to the acceleration of efforts to expand the use of superior agricultural technology by farmers in those countries. Initially the emphasis was on technology transfer, but because virtually all developing countries are in tropical or subtropical latitudes, and most advanced agricultural technology was developed for temperate crops and conditions, those efforts were frustrated by the absence of well-adapted improved varieties and cultural techniques.

Consequently, greater emphasis was placed in the 1970s by development planners on agricultural research as a means of generating technology more suitable to conditions in the tropics and subtropics; an emphasis given impetus by evidence of high rates of return to investment in research in developed countries, and by successful internationally supported research on wheat and rice in developing countries towards the end of the 1960s.

Three main groups of institutions contribute to the global agricultural research system that works, or can work on, problems of agriculture in the tropics or subtropics. These are (1) national research systems in the tropical countries. Almost all of these are Third World countries, although some such as China have important areas outside the tropics; (2) the 13 International Agricultural Research Centers or programs supported by the Consultative Group on International Agricultural Research, plus a few other international centers (e.g., IFDC, ICIPE) or regional centers (e.g., AVRDC, CATIE, and SEARCA) not funded by the CGIAR; and (3) national research systems in industrialized countries.

These groups are interactive, complementary, and symbiotic. Each contributes to world agricultural development in a somewhat different way, and the sum of their contributions is greater than that of each component. However they are not fully substitutable; each has its own role in the global system and there is a delicate balance among them. This paper summarizes the considerable progress made during the past decade in expanding national and international agricultural research, and particularly in remedying past neglect of national research systems in Third World countries. However it draws attention to some emerging problems related to the support of international research institutions, and stresses the need for care in maintaining the balance among the components of the global system.

## NATIONAL AGRICULTURAL RESEARCH SYSTEMS IN THIRD WORLD COUNTRIES

## a. Growth of research expenditures 1970-80

Agricultural research expenditures by Third World countries have risen substantially in real terms during the 1970 s.

A recent joint study by IFPRI and ISNAR (1981), updated to take account of additional information obtained this year, shows that the aggregate expenditures of 67 developing countries have increased from U.S. \$394 million in 1970 to about U.S. $\$ 1,060$ million in 1980 (Table 1). $1 /$ These figures are expressed in constant 1975 dollars, adjusted for earlier and later years by the use of the IMF tables. These countries represent 88 percent of Third World population, excluding the People's Republic of China.

The annual growth rates represented by these expenditure figures are 9.6 percent compound for the period $1970-75,11.3$ percent compound for the 1975-80 quinquennium, and 10.5 percent for the decade 1970-80. Forty-one of the countries have data for ten year time series, and information for the remainder is considered reasonably reliable, even though time series for the whole period are not available.

A high proportion of this information is derived from recent missions undertaken by World Bank, IICA, IADS, ISNAR, or IFPRI staff in collaboration with national institutions; commissioned studies such as those by Iowa State University in Latin America for IDB or the University of Minnesota for AID in Asia; or recent papers given by national staff at international meetings: for example, that organized by IDRC in Singapore in June 1981.2/ Some stems from replies to questionnaires sent out by FAO, IFPR̄I, IICA, Yale University, and others. It is therefore considered that the data base is both more reliable and more comprehensive than was the case when IFPRI compiled its Working Paper No. 30 on a similar subject in 1978.

The growth of national agricultural systems in the Third World is thus both fairly high (much faster than agricultural GDP in most countries) and has accelerated in recent years. It is encouraging to note that the average for all the Third World countries studied, which stood at around 0.3 percent of their agricultural GDP in 1975, now exceeds the target of 0.5 percent of agricultural GDP in real terms suggested by the 1974 U.N. World Food Conference in Rome. Several developing countries now exceed or approach the 1 percent figure, which is about the average for the industrial economies. However, it should

1/Oram P. and Bindlish V. Resource Allocations to National Agricultural Research: Trends in the 1970s. IFPRI/ISNAR Joint Study, November 1981.
2/Daniels D. and Nestel B. Resource Allocation to Agricultural Research. IDRC, 1981. (Proceedings of a workshop in Singapore 8-10 June, 1981, sponsored by IDRC and IFARD.)
be noted in passing that while the ratio of research expenditure to agricultural GDP may be indicative of willingness to provide funds to national research systems, it is not a particularly good measure of their effectiveness. Most of the Asian countries still have levels of expenditure well below 0.5 percent of their agricultural GDP, yet several of them -- including Bangladesh, India, Indonesia, and the Republic of Korea -- have numerically strong, well-organized and coordinated, and increasingly well-trained national research systems. By contrast several African and some Latin American countries with expenditures well in excess of 0.5 percent of agricultural GDP are relatively weakly staffed and have very fragmented research systems. The differences in expenditures seem to reflect the costs of training and retaining staff, local salary levels and living costs, and perhaps the presence or absence of an expatriate component, more than the quality of the research bought per dollar equivalent.
b. Growth of scientific staff in Third World countries 1970-80

During the ten years under review scientific staffs in the developing countries studied also increased in numbers, from 18,656 with B.Sc. or above in 1970 to nearly 34,000 in 1980. The annual growth rates were not as fast as those of expenditures, being 4.8 percent compound between 1970 and 1975, and accelerating to 7.5 percent for 1975-80. The overall rate was 6.1 percent. Data for 31 countries indicate that there was also an improvement in the academic levels of staff, although many countries still lack sufficient highly trained staff at the Ph.D. level; only 10 of those countries had 10 percent or more on their total establishment, and in about half 70 percent or more of the scientific staff were trained only to B.Sc. level. Data for the remaining countries could not be obtained.

Nevertheless, it is significant that research staff numbers in the 67 countries studied now exceed the figure of 29,100 postulated in the 1981 World Bank Sector Policy Paper on agricultural research as an indicative target for all national systems in Third World countries by 1984, even though the concomitant target of 20 percent of Ph.D. scientists is a long way from achievement. ${ }^{3} /$

The fact that deflated expenditures increased faster than staff numbers probably indicates the rising costs of providing adequate supporting services for better-trained staff. Since expenditures include capital costs as well as salaries and operating costs, they reflect the general expansion and modernization of national systems, involving major capital components -- both buildings and equipment -- in a number of countries. There are also indications that numbers of trained field and laboratory technicians have expanded in the period under study. Nevertheless, reports from several countries show a disturbing tendency to have too high a proportion of total expenditures devoted

3/World Bank. Agricultural Research Sector Policy Paper. June 1981.
to salaries, and insufficient allocations for operating costs. This may indicate poor research planning, an ad hoc reaction of research managers to "stop-go" government financing, or both.

The World Bank has suggested a 1984 planning goal for research and extension expenditures of U.S. $\$ 2,730$ million in 1979 dollars. In the past national extension expenditures have exceeded those on research,4/ and this has also been true of World Bank supported investments during the 1970 s but, assuming that the $1: 1$ research to extension ratio suggested by the Bank were to be achieved by 1984, the share of research in the total would be around $\$ 1,360$ million. When the data in Table 1 are converted to 1979 dollars, and taking into account the missing countries, this target would have been achieved by 1979. The 9 percent annual growth rate of national research expenditures suggested by the 1974 World Food Conference has also been passed.

Thus, both national agricultural research expenditures and scientific staff are now ahead of internationally accepted indicative planning targets. This represents substantial progress on the part of the Third World countries.

One important reservation must still be expressed concerning the quantitative expansion of staff numbers and expenditures allocated to agricultural research. This concerns the very uneven distribution of those resources among the developing countries and regions. Table 2, taken from the IFPRI-ISNAR study, shows that in 1975 dollars over 60 percent of all expenditures were concentrated in only five countries, which also had 46 percent of all scientific staff. Nearly 90 percent of all expenditures were concentrated in 15 out of 51 countries studied, and those countries had 85 percent of all the scientists. The skewness of the distribution of resources in favor of rather few countries seems actually to have increased since 1971 or 1975.

A more recent IFPRI review of the data (including some new and unpublished figures) shows that several more countries can be added to the list of countries with 1980 expenditures exceeding $\$ 10$ million (expressed in 1975 dollars). These are Egypt, Iran, Turkey, Taiwan, Morocco, Sudan, and Zaire. This would raise the total number of countries in this category to 22 out of a total of 72 countries. However, it does not alter the overall position too much because the new information also shows that expenditures in two of the five countries exceeding $\$ 50$ million in Table 2 (Brazil and Mexico) are considerably larger than shown there, and probably this is true also of India and Nigeria. The 1980 total for that category of large countries may exceed $\$ 700$ million in 1980 dollars. Both Brazil and Mexico now spend considerably more on agricultural research than does the entire CGIAR system.

4/Boyce J.K. and Evenson Robert E. National and International Agricultural Research and Extension Programs. Agricultural Development Council, New York. 1975.

## c. The quality of Third World systems

The situation with respect to national agricultural research systems in the Third World has thus improved to a marked degree in the last decade, and particularly in its second quinquennium. In 1980 dollars expenditures in developing countries (about $\$ 1,620$ million) are now greater than those at the end of the last decade in the developed countries of Western or Eastern Europe (both about \$1,490 million), or the United States ( $\$ 1,240 \mathrm{million})$. Their scientist numbers actually exceed those in Western Europe $(19,540)$ or the United States (around 10,000 ) by a substantial margin. $5 /$

The difference lies in quality. This is no derogation of Third World countries. Most have become independent within the last 35 years and have had to build their research organizations from scratch or to substantially reorganize systems that were designed in colonial times so as to meet new challenges. Few have university systems capable of turning out large numbers of post-graduate students to replace departed expatriates. Both management training and management experience are weak. Policymakers were, and in a number of countries still are, reluctant to give wholehearted support to what some perceive as a slow and perhaps costly way of expanding agricultural production. For many years donors were also slow to perceive the value of investing large sums in either agricultural research or higher education in developing countries. The CGIAR system was seen by some people as a means of getting quick breakthroughs in technology while avoiding large, direct investments in national systems, rather as technology transfer through extension was seen as a shortcut by national policymakers. Higher education was also considered by some developed country and international aid staffs to promote elitism and not to help the poor.

The cumulative result has been a slow buildup of awareness of the need to give strong support to national agricultural research and higher education systems, both domestically and externally. Although there seems to have been an important change of mind after 1975 in most developing countries, as well as among donors, this has so far been reflected largely in the availability of additional funds and, to some extent, in stronger support for higher-level education and management training. This provides the base for upgrading the standards of national systems in the long term; but quality, which requires both training and experience, cannot be achieved overnight.

This is clear from a number of recent studies and reports which show that even in some countries with a rather high proportion of highly-trained (Ph.D. and M.Sc.) but inexperienced staff, the choice of research priorities is inappropriate to national needs, the research organization is highly fragmented and badly coordinated, there is no adequate planning mechanism, and linkages between clients and

[^1]researchers (whether at the policymaking or the farm end) are poor. The result is a system that is operationally ineffective and likely to remain so, whatever money is injected into it, until these management weaknesses are corrected. ISNAR may be able to play a valuable catalytic role here.

## THE GROWTH OF NATIONAL AGRICULTURAL RESEARCH SYSTEMS in Developed countries

Although agriculture represents a much smaller proportion of GNP in the industrialized countries compared to the majority of those in the Third World, the former spend a higher proportion of their agricultural GDP on research. While this may seem paradoxical, the reasons are rooted in history and the comparative economic strengths of the high and lower-income countries.

In any case, as the figures quoted earlier indicate, the situation is changing quite rapidly, with expenditures in the Third World countries increasing much faster in the 1970s. Nevertheless, there was modest real growth in some industrialized countries: derived from most recent unpublished figures supplied by Evenson, the increase in Western Europe was 3.6 percent annually for the $1968-74$ period, rising to 5.8 percent for 1974-80. In the United States, according to a recent report, it was about 1.6 percent between 1969 and 1974, and 2.4 percent between 1974 and 1979.6/ These growth rates are based on constant 1975 dollars. However growth in Oceania, Japan, and Eastern Europe seems to have levelled off or even declined after 1974.

The direct assistance provided to Third World agriculture by advanced scientific institutions in industrialized countries has probably been increasing. Several countries have special institutional linkages, notably France through the medium of Orstom and Gerdat; and the U.S.A. through Title XII arrangements with its universities; while Australia, Belgium, Canada, the Federal Republic of Germany, Holland, Japan, Sweden, and the United Kingdom have all devised linkage mechanisms, mostly through universities. No comprehensive review of the cost of these mechanisms or the programs they support is available, but several of the countries mentioned here have established them only in the last ten years. Another recent step is the inception of ICRA, supported by seven European countries, which aims to train young scientists from both developing and developed countries in research management techniques.

In addition to direct institutional linkages in the public sector there are important indirect effects of industrial or other private sector research in developed countries on agriculture in the Third World. These are mainly the result of industrial research on the

6/An Assessment of the United States Food and Agricultural Research System. Congress of the United States, Office of Technology Assessment. Washington, D.C. 1981.
development of pesticides and weedicides, farm machinery, and fertilizers, although biological research and the development of improved commercial varieties of crops and livestock is of growing importance, especially in Latin America.

A question sometimes asked, but on which there is as yet no clear verdict, is how far stronger relationships between research institutions in industrialized countries (whether public or private) and those in the Third World could accelerate agricultural growth in the latter and provide solutions to difficult problems of resource management in the tropics.

As yet the answer is probably "not very far." There are a number of reasons for this. In the first place, the tropical environment is so different from that in Europe, Japan, and North America that most applied research on resource management in those areas of the world is not relevant. Secondly, and for the same reason, their crops and livestock differ considerably. In an almost literal sense the proof of the pudding is in the eating: the long-standing neglect of tropical food crops and livestock is the result of lack of interest in them in temperate regions and lack of relevance of work undertaken there to tropical conditions! Third, most public sector research establishments and universities in developed countries are now under some financial pressure and may, therefore, be unable or unwilling to devote resources to Third World problems unless specifically funded to do so by national aid agencies. Even then, because of their different ecological and socioeconomic situations, the contribution of developed country institutions is more likely to be research in the basic sciences, research methodology, or training, than research of an applied nature of immediate utility to agriculture in developing countries. This is not to belittle its potential long-term value, but it leaves a gap of a practical nature at the intermediate time-scale. Finally, success in collaborative research with developed country institutions, or in the transfer of technology from industrial research, requires a sound indigenous research capability in the Third World. Many countries do not yet have this, although as will be seen from the earlier discussion, it is growing rapidly. The International Agricultural Research Centers play an important role in bridging the gap between western technology, and that adapted to the needs of the Third World.

## GROWTH OF THE INTERNATIONAL AGRICULTURAL RESEARCH CENTERS

Unlike national research institutions in the high-income, industrialized countries, virtually all of which have no significant land areas in the tropics and which have their own scientific problems to solve, the International Agricultural Research Centers of the CGIAR were established expressly to assist in finding solutions to agricultural problems of widespread significance in the low-income countries and are mostly located in those countries. The role of the CGIAR institutes in the application of advanced scientific knowledge to problems that often transcend national boundaries is, therefore, complementary both to Third World research institutions and to those in
developed countries which have a capacity for basic research but are not well-located geographically to assist in applied research in a tropical environment.

The complementarity of international and national research institutions has important multiplier effects and, while not the only reason for the establishment of the CGIAR in 1971, it has certainly been a main factor in the continuing success of the International Centers, and is one most appreciated by the Third World countries.

Over approximately the same time horizon as that used for reviewing the growth of national programs, the expansion of the CGIAR system was phenomenal in its first quinquennium: nearly 20 percent compound per annum, compared to just under 10 percent for the national systems in 1970-75. Four existing IARCs were strengthened and expanded, and six new ones created, between 1971 and 1975. During the same period certain other new international centers (IFDC, ICIPE, AVRDC, and SEARCA) were created outside the CGIAR. However, in the second (1975-1980) quinquennium only three new centers were funded, and there has been a marked deceleration in the real rate of growth of expenditure on the CIGAR to 12.9 percent compound overall (and to under 3 percent in 1979-80 and 1980-81). That of the national systems in developing countries rose to 11.3 percent between 1975 and 1980.

THE CONTRIBUTION OF EXTERNAL ASSISTANCE TO AGRICULTURAL RESEARCH IN THE THIRD WORLD
a. Assistance to national agricultural research systems

The pattern of growth of agricultural research in developing countries is the result partly of increased national awareness of the need to develop an indigenous research capacity, and partly of increased donor support. The latter has comprised both technical and financial assistance, mainly the latter.

According to Boyce and Evenson (op cit), financial assistance fell during the 1960s to less than $\$ 100 \mathrm{mil} 1 \mathrm{i}$ on by 1971, representing under 20 percent of total funding of national systems in that year, compared to 40-50 percent in the 1950s. While their 1971 estimate of $\$ 60-70$ million might be somewhat low there has certainly been a striking increase since, to approximately $\$ 582$ million in 1975 dollars by 1980 (Oram and Bindlish, op cit) (Table 3). Assuming the 1971 aid level to have been $\$ 100$ million ( $\$ 133$ million in 1975 dollars), this is a fourfold increase representing an annual growth rate of 17.8 percent.

The contribution of external assistance to financing overall agricultural development in 1978/79 has been estimated by FAO in its AT 2000 Study to be about U.S. $\$ 5$ billion in 1975 dollars. According to a broader definition it was $\$ 6.035$ billion in 1977, and this was 17
percent of total development assistance of approximately $\$ 35$ billion. 7/ Based on IFPRI's estimate, the agricultural research component of aid in 1977 would probably have been about $\$ 365$ million in 1975 dollars: approximately 6 percent of development assistance to agriculture and around 1.0 percent of overall aid funding. This estimate includes both direct assistance to national research programs and the CGIAR funding. The latter was $\$ 77$ million (1975 dollars) in 1977 and would then have represented 21.0 percent of the component going to agricultural research, 1.27 percent of total financial assistance to agriculture, and only 0.22 percent of total aid commitments. Since then its share has declined.

The expansion of external financial assistance to agricultural research since 1975 has been divided about equally between bilateral and multilateral agencies. However, the latter, especially the World Bank and the Inter-American Development Bank, contributed hardly anything to agricultural research in the 1960 s, and their large increase in multilateral funding in the last half of the decade just ended has been a striking new aspect of their policies. On the whole bilateral aid also increased significantly, although the fact that 8 out of 12 countries' growth rates in real terms fell off after $1978 / 79$ is disturbing. Both multilateral and bilateral assistance programs have supported institution-building in some countries and components of projects in others. Latterly, however, particularly on the part of the World Bank and the Inter-American Development Bank, greater emphasis has been placed (we believe correctly) on institution-building. $\underline{8} /$ Overall the World Bank has channeled $\$ 1.2$ billion to agricultural rēsearch and extension in the financial period 1970-80, of which $\$ 745$ million went to full-scale projects rather than to components. All but one major loan (to Spain) were launched after 1975. About \$520 million appears to have gone to research, of which the CGIAR share was 10.5 percent.9/ However, while research components affected 80 countries, major Bank support went to relatively few, and mainly to larger countries, especially in Asia or Latin America. Ninety-four percent of the major World Bank research and extension loans, for example, totalling nearly $\$ 700$ million between 1975 and 1980, went to ten of those countries. Bilateral aid was more evenly distributed, with a large share going to Africa, but individual projects were often smaller. Altogether, IFPRI estimates that multi and bilateral donors support over 1,000 agricultural research projects in Third World countries.

7/Walters, Harry $E$. The Need to Substantially Increase Financial Investments to Alleviate World Hunger. Statement prepared at the request of the U.S. Presidential Commission on Hunger. August 1979 (mimeographed).
8/Data for all donors is not available. So far the Asian and African Development Banks and funds of OPEC countries (except through IFAD) have contributed little to agricultural research.
9/This may slightly underestimate the element going to national systems, since it is sometimes difficult to disaggregate allocations for research in components under other headings such as agricultural extension or rural development projects.

This emphasizes the massive problem involved in national institution building, which, in addition to large capital elements, requires long-term support for operations and training, with substantial local currency financing.

## b. Assistance to international and regional agricultural research institutions

While the early expansion of the CGIAR was fast compared to that of national systems, it has remained relatively constant as a proportion of total agricultural research expenditures devoted to developing country problems since 1975 and has recently begun to decline. Thus the Centers' budgets represented 5.2 percent of the estimated overall total in 1970, 8.1 percent in 1975, and 8.7 percent in 1980. Given the levelling-off of real growth in the CGIAR in 1981 and its actual decline in 1982, and assuming an average annual real growth of national systems for those two years of 10 percent, it would be 7.0 percent of total expenditures targeted directly to agricultural research in Third World countries by 1983. (These calculations include core, capital, and special project expenditures by the Centers.)

As a proportion of total direct donor support for agricultural research in the Third World, the CGIAR institutes would have represented nearly 26.0 percent in 1971 (based on Boyce and Evenson's estimate for that year), 20.0 percent in 1976, and 15.8 percent in 1980. Estimates are in 1975 dollars.

The fact that national systems now seem to be expanding more rapidly in real terms than the CGIAR institutes is not in itself a cause for concern, since there is a symbiotic relationship between national and international research, and the impact of the work of international centers is likely to be greater if they have competent national collaborators. Quite apart from this there are many agricultural problems on which countries need to undertake research that are outside the mandate of the IARCs. There is no empirical evidence to suggest what an optimum balance of investment between national and international agricultural research ought to be.

However, there should be real concern if a decline in support for the IARCs renders them incapable of facing the future challenges of tropical agriculture or of meeting the current and future demands of national systems for research backup, information, and training. Evidence from developed economies shows that such demands do not slacken but, rather, increase as agriculture becomes more sophisticated. It is disturbing that, despite repeated "summit" declarations of high priority support for agricultural research in the Third World in general and the CGIAR in particular -- and acceptance in principle by donors of indicative planning targets for the CIGAR which would have given meaning to these declarations of intent -- the money to implement them has not been forthcoming since 1980, and the targets constantly have had to be revised downward.

Even though many of the older contributors have maintained their past levels of support constant in real terms calculated at their domestic rates of price increase, those inflators are lower than what is needed to keep pace with the high rates of inflation in some of the countries in which institutes are based. As a result, instead of continuing growth being possible in the 1980s, overall funding has now fallen below that needed to maintain the level of support for the system as a whole constant in real terms. Further reasons for funding shortfalls are set out in a recent CGIAR Secretariat paper. 10/

There may also be some misconceptions about the size and nature of the system that affect donor attitudes towards increasing its funding, of the type contained in a recent article (March 20) in The Economist. It has been suggested that the system has grown very large now and is becoming more like another U.N. agency. This is not true. Its total budget is now below those for agricultural research in some Third World countries (China, Brazil, Mexico, and probably India); as well as of Australia, Canada, France, the Federal Republic of Germany, Japan, the Netherlands, the United Kingdom, the United States, and the U.S.S.R. Compared to FAO funding, the Centers' estimated 1983 core and special projects budget of about $\$ 184$ million is roughly a sixth; FAO's 1982-83 estimate is U.S. \$1.05 billion, including its regular program, U.N. contributions, and contributions from other sources.11/

It has also been suggested that the CGIAR system duplicates or draws resources away from national research systems, both in developed and developing countries. The figures quoted above do not suggest that this is true; rather, they support the view that the establishment of the CGIAR has helped to increase awareness of the benefits accruing to well-managed agricultural research, leading to increased support to national systems. Moreover, as indicated earlier, there are strong operational complementarities between international and national institutions, and the fact that an increasing number of Third World countries are now supporting the international and regional research centers as donors not only gives practical evidence that the centers are needed, but refutes suggestions that they compete with or duplicate their own institutions.

THE CONTINUING NEED FOR EXTERNAL ASSISTANCE
TO NATIONAL AND INTERNATIONAL AGRICULTURAL RESEARCH IN THE THIRD WORLD
As a result both of differences in their levels of government support and their innate quality, national agricultural research systems still vary widely in their effectiveness. Some 25 countries now are capable of self-sustaining growth and of undertaking a wide variety of

[^2]research, especially where the national agricultural research system is backed by and linked to a strong higher education system, as for example in Brazil and India. Many more countries -- perhaps about 35 -- are weaker and more dependent on outside assistance for research materials, information, and training. Some of these are underfunded but capable of growth and development, given stronger national support and perhaps additional external assistance. A third category of around 40 countries -- particularly in Southern Africa, Central America, the Caribbean, and South Pacific and Indian Ocean islands -either cannot support a further expansion of their existing modest agricultural research establishments, or cannot afford a viable selfsupporting agricultural research organization at all.

It should not therefore be assumed that, because aggregate progress in the expansion of national agricultural research systems in the Third World has been more encouraging in recent years, the need for continuing external assistance, whether to national or international institutions, has diminished. There are eight main reasons for this:

1. The need to improve the quality of research and its management. In our opinion this is now of overriding importance in the more developed national systems, as a recent World Bank evaluation of Bank assistance to 10 countries (several of them with substantial research establishments) confirms.
2. The high degree of skewness in the distribution of national research resources illustrated by Table 2, and the need to build up national institutional capacity to undertake research in many weaker countries. The problem here is one of both quantity and of quality.
3. The massive training requirement for scientific staff related to these identified needs, with an estimated cumulative 1975-1990 cost of $\$ 3.4$ billion (Table 4), plus an additional $\$ 500$ million for research technicians.
4. The need to find a solution to the research needs of the many "category three" countries: those with problems in maintaining an independent, viable system. International or regional centers can provide these countries with access to facilities such as germ plasm banks, participation in research networks, information services, statistical support, etc., giving them the advantages of economies of scale that they cannot achieve on their own.
5. The high costs, sophisticated equipment requirements, and risks of failure associated with some of the more speculative research required to solve intractable problems resulting from gaps in the sum of knowledge, or to achieve breakthroughs through the application of existing knowledge. Such research may also be increasingly necessary to counter the exhaustion of conventional approaches to technological improvement but, because it may not always have immediate or obvious practical benefits that can be narrowly related to national needs, it may be difficult to obtain funding for it in low-income countries. International research can help fill this gap.
6. There are important complementarities that may be achieved by research across national boundaries on problems affecting commodities or ecological zones. This cannot be undertaken easily by individual national systems, except perhaps in a few large or diverse countries. Such research may involve basic or applied components, or a mixture of the two. There is considerable evidence that it is most effective when there is a strong, independent, and autonomously-funded research institute to play a catalytic, conceptual, and coordinating role.
7. An international institution can often bring together scientists or policymakers from countries that are different in many ways, even ideologically, to discuss common agricultural problems, share experiences, and plan future action. It is more difficult for an individual country to do this.
8. The increasing breadth and complexity of scientific information, and the need to communicate information in a readily assimilable form to scientists in national research systems that do not always have easy access to it, as a basis for the choice, planning, and conduct of their research. Few national systems anywhere are able to deal with this problem effectively.

The value of international support and collaboration in agricultural research is recognized by countries such as Brazil, which has one of the strongest, best funded, and best managed of all Third World systems. Brazil has stated that, for research and information on more basic problems, it intends to rely largely on the capacity of developed countries and/or the International Agricultural Research Centers supported by the CGIAR. The World Bank study mentioned earlier (with which the author of this paper was involved) shows clearly that a number of other important countries draw valuable resources from the CGIAR system, and wish to continue to do so.

It is too early to say whether the recent decline in some donors' assistance to national research is part of a secular decline in aid to agricultural research that is also affecting their support to the CGIAR system; nor have we data to substantiate the claim that aid to agricultural research is faring better than other forms of aid in the general economic malaise resulting from the current industrial recession. However, any continuing fall could seriously damage the emerging global agricultural research system because research requires steady, long-term funding. Within this system the CGIAR institutes are particularly vulnerable to any sudden decline in external support because they depend almost entirely on donor grants. More and, if possible, larger donor contributions are required if the CGIAR is to remain a potent force for agricultural development. New donors to the system averaged $\$ 4.3$ million a year of additional contributions between 1973 and 1977, but under a million a year between 1978 and 1982 (Table 5).

Among the most urgent needs is for the World Bank as one of the original sponsors of the CGIAR and the home of its Secretariat to raise its contribution above the 10 percent or so of the CGIAR
requirements, which is its maximum commitment at present. Although the Bank has played a key role in the origins, management, and stability of the system, and is its second largest donor, its cumulative 1972-80 financial contribution of $\$ 54.9$ million in current dollars is not very great relative to total bank lending to agriculture and rural development. 12/ This amounted to almost $\$ 19$ billion in current dollars for the period 1975-81, equivalent to 31 percent of all Bank lending. For the same period loans to assist national agricultural research are estimated by IFPRI to have been about $\$ 465$ million, so that the Bank's loans and grants to agricultural research overall (national plus international) were of the order of $\$ 520$ million, approximately 2.7 percent of its total funding of agriculture and rural development. In this setting the CGIAR component is miniscule: about 0.33 percent of the cumulative total. Moreover, after a rapid increase between 1972 and 1976, the CGIAR component has grown somewhat more slowly in real terms between 1976 and 1981 (around 6.2 percent per annum) than the Bank's overall support of agricultural research and extension ( 7.1 percent per annum), and very little faster than its total lending for agriculture and rural development (5.8 percent per annum). Thus in proportionate terms Bank CGIAR grants have hardly risen in relation to its other agricultural investments.

These comparisons must be treated with some caution, since annual loan figures to research and extension tend to be "lumpy," and we do not have a year-by-year breakdown for research alone.13/ However, they do suggest that the CGIAR grant is not very significant in the wider context of Bank financing of agricultural development, or even of agricultural research.

Bilateral donors generally contribute a much higher share of their total funding of Third World agricultural research to the CGIAR, usually 25-50 percent and sometimes more. It is thus more difficult for them to increase their CGIAR funding further than it is for the World Bank, whose proportionate share is so much smaller.

The documentation for the 1974 World Food Conference (Item 9, The World Food Problem) contains this significant statement:

[^3]12/The CGIAR data are based on Annex 8 of the Bank's Sector Policy Paper on Agricultural Research.
13/These calculations were made from unpublished World Bank data in an internal document on FY 1981 Bank/IDA lending for Ariculture and Rural Development, July 1981. The author is indebted to the Bank for permission to draw on this source.

By the end of the decade global public sector research expenditure in current dollars was probably approaching $\$ 7.3$ billion, and that on the CGIAR had risen to about $\$ 140 \mathrm{million} .14 /$ Thus the share of support to the CGIAR institutes within the globaT agricultural research budget was not all that different in 1980 from that in 1970, although their potential value to the Third World countries had probably risen rather than declined.

In addition to those countries, the donor countries and agencies also benefit from the output of the international Centers. Developed country researchers gain through the Centers' research, germ plasm collections, and information networks. Developed country economies gain indirectly through enhanced economic growth in developing nations arising from new technology and improved policy management, which provides new markets for industrial goods, more stable food prices, and increased export availabilities of some agricultural commodities.15/ (Spin-off benefits of agricultural research outside the region where it is conducted have been shown to be considerable in the United States, but have not been assessed for the international Centers.) The private sector gains both in developed and developing countries. In addition to material research outputs, methodology, information, and trained personnel derived from the Centers, there are substantial benefits from increased demand for improved seeds, fertilizers, and other inputs; machinery purchase, repair, and servicing; and from processing agricultural products and a wide range of other goods and services purchased by a more prosperous rural community. These linkage effects of technological change, which have not until recently been studied adequately, seem likely to be of major economic importance. Finally, aid agencies, and particularly lending agencies, gain through improved rates of return to their investments in the Third World. Aid is not a one-way stream, particularly when it is directed to research.

14/Estimates include $\$ 1,490$ million for Western Europe; $\$ 715$ million for Japan and other Asian countries; $\$ 65$ million for South Africa; $\$ 1,240$ million for the United States; $\$ 240$ million for Canada, $\$ 386$ million for Australia and New Zealand; \$1,490 million for the U.S.S.R. and Eastern Europe; and $\$ 1,620 \mathrm{million}$ for the developing countries. The CGIAR figure is derived from Table 9.1 of the Second Review of the CGIAR (November 1981) and includes core and special projects. Other data are mostly from Dr. Robert E. Evenson.
15/This point is made forcibly in the 1981 report of the U.S. Office of Technology Assessment referred to earlier.

Table 1: Agricultural Research Expenditures and Scientific Staff, 1970, 1975, and 1980; and Growthrates

| Number of Countries Included 1/ | Region | --(000 constant 1975 US \$)-- |  |  | --(\% compound per annum)-- |  |  | Agricultural Research -----Scientists |  |  | Growthrate of Scientific Staff$\qquad$ \% compound) |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 1970 | $\underline{1975}$ | 1980 | 1970-75 | 1975-80 | 1970-80 | 1970 | 1975 | 1980 | 1970-75 | 1975-80 | 1970-80 |
| 10 (90) | Asia (except Middle East and PRC) | 141,013 | 183,411 | 299,770 | 5.4 | 10.3 | 7.8 | 9,084 | 11,665 | 15,503 | 5.2 | 5.9 | 5.5 |
| 9 (73) | Middle East/North Africa | 45,005 | 64,989 | 95,213 | 7.6 | 8.0 | 7.8 | 3,232 | 3,412 | 5,383 | 1.1 | 9.5 | 5.2 |
| 28 (88) | Sub-Saharan Africa (excluding South Africa) | 67,474 | 118,144 | 159,194 | 11.8 | 6.2 | 9.0 | 1,549 | 2,457 | 4,136 | 9.7 | 11.0 | 10.3 |
| 20 (93) | Latin America | 140,100 | 256,406 | 509,834 | 12.9 | 14.8 | 13.8 | 4,866 | 6,054 | 8,667 | 4.5 | 7.5 | 6.0 |
| 57 (83) | TOTAL: 67 Dexeloping Countries | 393,592 | 622,950 | 1,064,011 | 9.6 | 11.3 | 10.5 | 18,731 | 23,588 | 33,689 | 4.7 | 7.4 | 6.1 |
|  | CGIAR Institutes 3/ | 20,344 | 50,446 | 92,650 | 19.9 | 12.9 | 16.4 | -- | -- | 605 | n.a. | n.a. | n.a. |
| 17 | Western European Countries 4/ | 566,100 | 694,740 | 974,200 | 3.6 | 5.8 | 4.7 | 11,986 | 14,752 | 19,540 | 3.5 | 4.8 | 4.2 |
| 1 | United States 5/ | 628,321 | 680,911 | 767,070 | 1.6 | 2.4 | 2.0 | 9,575 | 9,570 | 9,972 | 0 | 1.0 | 0.5 |

## Notes and Sources:

1/ Figures in parenthesis show percentage of total population of the region included in the countries surveyed.
2/ Oram P. and Bindlish V. "Resource Allocations to National Agricultural Research: Trends in the 1970s." IFPRI/ISNAR Joint Report. 1981. Plus more recent information.
3/ Second Review of the CGIAR. November 1981.
4/ Data from Robert Evenson 1982. Personal communication. Data are for 1968-74 and 1974-80.
5/ An Assessment of the United States Food and Aaricultural Research System. Conaress of the United States, Dffice of Technology Assessment. 1981.

Table 2: Concentration of Agricultural Research Resources, 1980

| 1980 <br> 1. Expenditure | Actual <br> 1980 <br> Expend. | Population 1978 | Country as \% Tot. Expend. | Country as \% Tot. Population | Country as \% Tot. Ag. GDP | Expend. <br> as \% Nat'l <br> Ag. GDP | Growth Nat' 1 <br> Ag. GDP <br> 1970/80 | Number of Scientists | Percent <br> Total No. <br> Scientists | Number PostGrads. | Post-Grads. as \% of Total Nat'l Researchers |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| (over $\$ 50 \mathrm{mil}$.) | (\$000) |  |  |  |  |  |  |  |  |  |  |
| Brazil | 160,026 | 126,377 | 19.8 | 7.2 | 9.6 | 1.15 | 5.3 | 2,957 | 10.1 | 1,684 | 57 |
| Argentina | 108,648 | 27,056 | 13.4 | 1.5 | 4.6 | 1.64 | 2.3 | 1,064 | 3.6 | 285 | 27 |
| India | 101,098 | 693,887 | 12.5 | 39.5 | 24.2 | 0.29 | 2.6 | 7,103 | 24.1 | 2,059 | 29 |
| Nigeria | 79,634 | 77,082 | 9.8 | 4.4 | 7.9 | 0.70 | - 1.5 | 1,084 | 3.7 | 276 | 25 |
| Mexico | 54,181 | 69,994 | 6.8 | 4.0 | 5.7 | 0.65 | 2.1 | 1,269 | 4.3 | 395 | 31 |
| Tot. Budget (over $\$ 50 \mathrm{mil}$ ) | 503,587 | 994,396 | 62.3 | 56.6 | 52.0 | 0.67 | -- | 13,477 | 45.8 | 4,699 | 35 |

2. 1980 Expenditure
( $\$ 10-49 \mathrm{mil}$. or over 1000 scientists)

| Colombia | 31,455 | 26,907 | 3.9 | 1.5 | 3.2 | 0.67 | 4.9 | 333 | 1.1 | 184 | 55 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Indonesia | 29,056 | 151,894 | 3.6 | 8.6 | 4.6 | 0.44 | 4.0 | 1,473 | 5.0 | 71 | 5 |  |
| Malaysia | 29,023 | 13,640 | 3.6 | 0.8 | 2.5 | 0.81 | 5.0 | 822 | 2.8 | n.a. | n.a. |  |
| Venezuela | 25,586 | 14,914 | 3.2 | 0.8 | 1.3 | 1.32 | 3.5 | 365 | 1.2 | 115 | 31 |  |
| Korea, Rep. | 18,962 | 37,979 | 2.3 | 2.2 | 5.7 | 0.23 | 4.0 | 960 | 3.3 | 190 | 20 | $\checkmark$ |
| Bangladesh | 17,385 | 88,705 | 2.1 | 5.0 | 2.5 | 0.48 | 1.6 | 1,642 | 5.6 | 1,262 | 77 | 1 |
| Thailand | 15,203 | 47,674 | 1.9 | 2.7 | 4.0 | 0.26 | 5.6 | 1,525 | 5.2 | 242 | 16 |  |
| Pakistan | 16,510 | 82,441 | 2.0 | 4.7 | 2.8 | 0.41 | 1.9 | 2,900 | 9.9 | 1,638 | 56 |  |
| Kenya | 14,204 | 16,402 | 1.8 | 0.9 | 0.9 | 1.08 | 5.5 | 400 | 1.4 | 356 | 89 |  |
| Philippines | 8,769 | 50,996 | 1.1 | 2.9 | 3.8 | 0.16 | 4.9 | 1,050 | 3.5 | 618 | 59 |  |
| Tot. (\$10-49M) | 206,153 | 531,555 | 25.5 | 30.3 | 31.3 | 0.46 | -- | 11,470 | 39.0 | 4,676 | 41 |  |
| Total 1 and 2 | 709,740 | 1,525,951 | 87.8 | 86.9 | 83.4 | 0.59 | -- | 24,947 | 84.8 | 9,375 | 38 |  |
| 3. Tot. Below \$10M | 98,662 | 229,714 | 12.2 | 13.1 | 16.6 | 0.41 | -- | 4;451 | 15.2 | n.a. | -- |  |
| Grand Tot. $1+2+3$ | 808,402 | 1,755,665 | 100.0 | 100.0 | 100.0 | 0.56 | -- | 29,398 | 100.0 | n.a. | -- |  |

Source: Oram, P. and Bindlish V. "Resource Allocations to National Agricultural Research: Trends in the 1970s." IFPRI/ISNAR Joint Report. 1981.

Table 3: External Funding for Agricultural Research by Region, 1976-80 ́́ (Constant 1975 U.S. 000 Dollars Deflated from 1981 IMF Yearbook)

|  | ----Africa---- |  | -----Asia----- |  | Latin America |  | --Near East-- |  | ----Total---- |  | $\begin{gathered} \text { Total } \\ 1976-80 \\ \hline \end{gathered}$ | 5-Year Average |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| , . | 1976 | 1980 | 1976 . | 1980 | 1976 | 1980 | 1976 | 1980 | 1976 | 1980 |  |  |  |
| Australia | --- | -- | 9,570 | 7,650 | -- | -- | -- | 300 | 8,570 | 7,650 | 43,650 | 8,730 |  |
| Belgium ${ }^{\text {/ }}$ | n.a. | 5,552 | n.a. | 1,568 | n.a. | 392 | n.a. | 653 | n.a. | 8,165 | $(8,165)$ | $(1,633)$ |  |
| Canada | 11,877 | 6,932 | 7,612 | 4,463 | 5,541 | 5,111 | 1,102 | 1,653 | 26,132 | 18,159 | 109,781 | 21,956 |  |
| Denmark | -- | 59 | 173 | 270 | -- | 8 | -- | -- | 173 | 337 | 1,037 | 207 |  |
| Finland | 11 | 5 | -- | -- | -- | -- | -- | -- | 11 | 5 | 36 | 7 |  |
| France | 30,589 | 42,090 | 76 | 77 | 1,495 | 2,628 | -- | -- | 32,160 | 44,795 | 178,344 | 35,669 |  |
| Japan | 32 | 297 | 3,694 | 5,597 | 144 | 2,106 | 19 | 98 | 3,889 | 8,098 | 45,289 | 9,058 |  |
| Netherlands $\underline{3} /$ | 2,824 | 5,289 | 1,930 | 1,380 | 2,252 | 1,183 | 572 | 986 | 7,578 | 8,838 | 49,534 | 9,907 |  |
| New Zealand | -- | -- | 1,119 | 205 | -- | -- | -- | -- | 1,119 | 205 | 2,191 | 439 |  |
| Norway | 52 | 1,918 | -- | 93 | -- | -- | -- | -- | 52 | 2,011 | 6,895 | 1,379 |  |
| Sweden | 608 | 1,737 | -- | 882 | 325 | 664 | 54 | 309 | 987 | 3,592 | 13,074 | 2,615 |  |
| Switzerland $\frac{3,4 /}{4}$ | 567 | 234 | 302 | 351 | 491 | 1,092 | -- | -- | 1,360 | 1,677 | 9,422 | 1,884 |  |
| W. Germany 4,5/ | 4,827 | 4,827 | 5,001 | 5,001 | 2,217 | 2,217 | 2,838 | 2,838 | 14,883 | 14,883 | 83,812 | 16,762 |  |
| United Kinadom 4/ | 978 | 302 | 17 | 135 | 539 | 557 | 119 | 17 | 1,653 | 1,011 | 11,230 | 2,246 |  |
| United States ${ }^{\text {4/ }}$ | 5,800 | 72,000 | 6,000 | 17,000 | 6,200 | 25,000 | 6,000 | 20,000 | 24,000 | 134,000 | 370,000 | 74,000 |  |
| Total Bilateral | 58,165 | 141,242 | 35,494 | 44,672 | 19,204 | 40,958 | 10,704 | 26,854 | 123,567 | 253,426 | 932,460 | 186,492 |  |
| EEC | n.a. | 8,700 | n.a. | 100 | п.a. | 400 | n.a. | 2,260 | n.a. | 11,460 | n.a. | n.a. | 1 |
| IBRD | 2,660 | 18,500 | 29,800 | 58,200 | 440 | 29,300 | 100 | 6,000 | 33,000 | 112,000 | 400,000 | 80,000 |  |
| IDB 5/ | -- | -- | -- | -- | 20,100 | 20,100 | -- | -- | 20,100 | 20,150 | 100,500 | 20,100 |  |
| UNDP/FAO 4 4,5,6/ | n.a. | 23,300 | n.a. | 21,000 | n.a. | 17,300 | n.a. | 19,200 | 66,000 | 93,000 | 350,000 | 70,000 |  |
| Tutal multilateral | 2,660 | 50,500 | 29,800 | 79,300 | 20,540 | 67,100 | 100 | 27,460 | 119,100 | 236,610 | 850,500 | 170,100 |  |
| Total Bilateral and Multilateral | 60,825 | 191,742 | 65,294 | 123,972 | 39,744 | 108,058 | 10,804 | 54,314 | 242,667 | 490,036 | 1,782,960 | 356,592 |  |
| CGIAR System | -- | -- | -- | -- | -- | -- | -- | -- | 60,800 | 92,300 | 411,742 | 82,348 | . |
| CGIAR as a Percentace of Overall Total |  |  |  |  |  |  |  |  | 20\% | 15\% | 18.8\% | 18.7\% |  |
| Overall Total | 60,825 | 191,742 | 65,294 | 123,972 | 39,744 | 108,058 | 10,804 | 54,314 | 303,467 | 582,336 | 2,194,702 | 438,940 |  |

1/ Does not include base costs of technical assistance organizations of donor countries or agencies.
$\frac{2}{2} /$ Data provided for 1980 only.
$\frac{2 /}{3 /}$ Includes contribution to core budaets of CGIAR.
4/ Includes some global projects not identified by region.
5 / Five year total pro rated by jear.
6/ UNDP data for regions apply only to FAO; additional allowance for non-FAO projects included in 1976 and 1980 UNDP totals.
Sources of Data: Country reports to FAO and/or IFPRI; World Bank, UNDP, FAO data supplied to IFPRI, IDB data supplied to IFPRI, Bilateral Agency Reports, Marches Tropicaux (France).

Table 4: Estimated Requirements for Trained Scientists and Training Costs, 1990 (51 countries)

|  | Agric. <br> GidP <br> 1980 | $\begin{aligned} & \text { Agric. } \\ & \text { GDP } \\ & 1990 \text { I/ } \end{aligned}$ | Agric. Res Expend. 1980 <br> -(1975 \$)- | Agric. Res Expend. <br> 1990 | Expend. <br> Per <br> Scien- <br> tist <br> 1980 | No. of Research Scientists 1980 | No. of Research Scientists 1990 3/ | Number <br> Requiring <br> Training $1990 \text { 4/ }$ | Est. <br> Dropout <br> During <br> Edu- <br> cation 5/ | Totai <br> Training <br> Require- <br> ment <br> 1990 | Total <br> Training <br> Cost 6/ <br> (thousands) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ASIA | 74,517 | $\begin{gathered} \text { 1ions) } \\ 105,069 \\ \hline \end{gathered}$ | 246,238 | $\begin{array}{r} \text { (thousands) } \\ 1,050,690 \\ \hline \end{array}$ | 13,464 | 18,289 | 82,031 | 67,400 | 23,590 | 90,900 | 2,729,700 |
| Temperate E. Asia | 8,193 | 11,552 | 18,962 | 115,520 | 19,752 | 960 | 5,849 | 5,081 | 1,778 | 6,859 | 205,770 |
| South Asia Subcontinent | 44,178 | 62,290 | 139,656 | 622,900 | 11,361 | 12;293 | 52,387 | 42,553 | 14,894 | 57,447 | 1,723,410 |
| Indo-Malaysian Humid Tropics | 22,146 | 31,225 | 87,620 | 312,250 | 17,399 | 5,036 | 23,795 | 19,766 | 6,918 | 26,684 | 800,520 |
| NORTH AFRICA/MIDDLE <br> EAST | 1,707 | 2,464 | 5,587 | 24,040 | .21,324 | 262 | 1,191 | 981 | 343 | 1,324 | 39,720 |
| Mediterranean Climatic Region | 1,707 | 2,404 | 5,587 | 24,040 | 21,324 | 262 | 1,191 | 981 | 343 | 1,324 | 39,720 |
| SUB-SAHARAN AFRICA | 25,863 | 36,467 | 149,905 | 364,670 | 50,473 | 2,970 | 9,052 | 6,676 | 2,337 | 9,013 | 270,390 |
| Semiarid Tropics | 13,546 | 19,100 | 95,593 | 191,000 | 68,232 | 1,401 | 2,823 | 1,702 | 596 | 2,298 | 68,940 |
| Lowland Humid Tropics | 8,946 | 12,612 | 29,635 | 126,120 | 38,189 | 776 | 4,439 | 3,818 | 1,336 | 5,154 | 154,620 |
| Eastern and Southern Africa | 3,371 | 4,752 | 24,677 | 47,520 | 31,119 | 793 | 1,790 | 1,156 | 405 | 1,561 | 46,830 |
| LATIN AMERICA | 44,180 | 62,294 | 411,721 | 622,940 | 52,422 | 7,854 | 15,361 | 9,078 | 3,177 | 12,255 | 367,650 |
| Central America/ Caribbean | 11,599 | 16,355 | 62,634 | 163,550 | 34,433 | 1,819 | 5,316 | 3,861 | 1,351 | 5,212 | 156,360 |
| Tropical South America | 24,652 | 34,760 | 230,951 | 347,600 | 51,690 | 4,468 | 8,116 | 4,542 | 1,590 | 6,132 | 183,690 |
| Temperate South America | 7,929 | 11,180 | 113,136 | 111,800 | 75,390 | 1,567 | 1,929 | 675 | 236 | 911 | 27,330 |
| TOTAL ALL REGIONS | 146,268 | 206,238 | 813,451 | 2,062,380 | 27,692 | 29,375 | 107,635 | 84,135 | 29,447 | 113,582 | 3,407,460 |

1/ Based on an annual compound growth of 3.5 percent 1980-90.
2/ Assuming research expenditures reach 1 percent of agricultural GJP by 1990.
3/ Based on 1980 costs and 1 percent 1990 agricultural GDP.
4/. 1990 scientist numbers less 80 percent of 1980 scientists still in service by 1990.
5/ Assessed at 35 percent of total entering university.
6/ $\$ 30,000$ per scientist, assuming majority trained in Third World.
Source: Oram P. and Bindlish V. "Resource Allocations to National Agricultural Research: Trends in the 1970s." IFPRI/ISNAR Joint Report. 1981.

Table 5: Donor Contributions to CGIAR 1972-82

Constant 1981 Currency Contributions in 1981 US \$


Source: CGIAR Secretariat

Attached is a copy of the Report of the Second External Program Review of the Centro Internacional de Agricultura Tropical (CIAT) (AGR/TAC: IAR/84/12) together with the transmittal letter from the Chairman of the Technical Advisory Committee (TAC) to the Chairman of the Consultative Group, TAC's Commentary on the Report, and the Center's Response to the Report of the External Program Review.

This Report will be considered under Agenda Item "CIAT External Program and Management Reviews" of the Consultative Group Meeting in Washington, D.C. in November.

Attachment

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# CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH 

## TECHNICAL ADVISORY COMMITTEE

## The Chairman

8 August 1984

Dear Mr. Husain,
I take pleasure in transmitting to you the report of the second External Program Review of CIAT which was conducted during February and March 1984.

The Review Panel was chaired by Dr. F.E.Hutchinson, who presented the report to TAC at its 34 th meeting in June 1984 at Addis Ababa, in the presence of Dr. R. Hertford, Chairman of the Board of Trustees, and Dr. J.L. Nickel, Director-General of CIAT.

TAC discussed the report in conjunction with the report of the External Management Review of CIAT. The Committee noted that the CIAT Board generally agreed with most of the recommendations of both Review Panels and planned to take early action on their implementation.

On the basis of its discussions, TAC prepared a commentary which summarizes its conclusions, comments and recommendations. This commentary together with CIAT's response to the review is attached to the report.

I would like to underline here that CIAT emerges from the Review process as a well balanced and very successful Center. This is largely due to the fact that CIAT, originally conceived as a tropical lowland Regional Center with a strong animal production component, stands out in the effort it has made over the last decade, and continues to make, in sharpening the focus and operational definition of its mandate. The Center has indeed established an effective process for a continuing review of its strategies and priorities.

Mr. S. Shahid Husain
Chairman, CGIAR
World Bank
1818 H Street, N.W. Washington, D.C. 20433
USA

I would also wish to underline the Review Panel's conclusion concerning the impact of the improved technologies developed by CIAT. The technology with the greatest quantifiable impact is irrigated rice, and that of beans and pastures is steadily increasing.

Despite spectacular advances made by the Cassava Program, the impact of the improved cassava technologies has been more difficult to quantify because this crop is grown primarily by subsistence farmers and has not benefitted so far from strong support of many governments in Latin America. The situation is however quite different in Asia and Africa. The Panel has suggested and TAC and CIAT have agreed that a demand study for cassava be made worldwide to guide CIAT's research activities and resource allocations. It should also be noted that TAC is pleased with the prompt and effective manner in which CIAT and IITA have improved their collaborative agreement on cassava research.

These and other aspects which TAC wishes to draw to the attention of the Group are elaborated in TAC's Commentary.


1. In transmitting the report of this Review to the CGIAR, TAC commends and thanks Drs. F.E. Hutchinson and O.M. Solandt and their colleagues on both the Program and Management Review Panels for their very thorough analysis and their excellent, clear and perceptive reports. At its 34 th meeting TAC dicussed both Reviews with the Panel Chairmen, in the presence of Dr. R. Hertford, Chairman of CIAT's Board of Trustees, and Dr. J.L. Nickel, the Center Director, who both indicated their agreement in principle with most of the Program Review Panel's recommendations.
2. In dealing with these Review reports TAC appreciates the positive response of the Center to the recommendations of the 1977 Quinquennial Review.

## Evolution and Impact of CIAT's Program

3. TAC agrees with the Review Panel that CIAT is an efficient and well managed Center, the overall research program of which is effectively organized into four interdisciplinary commodity programs. The Center has achieved a satisfactory balance both within and among its commodity progams which also include farming systems components.
4. TAC notes the substantial impact of CIAT's research and training activities. This impact is particualrly significant in the area of rice, but also the other commodity programs are now at a stage where impact is becoming increasingly evident. The Committee strongly commends CIAT for these achievements.

## CIAT's Mandate

5. TAC commends CIAT for the effort it has made and continues to make in sharpening the focus and the operational definition of its mandate. The Committee agrees with the Panel in endorsing CIAT's mandate, which over the years has evolved from many to the present four commodities, i.e. beans, cassava, rice and tropical pastures.
6. The Committee supports the evolution which took place within the commodity programs and their research strategies, striking a balance between strategic and adaptive research.

Bean Program
7. TAC welcomes CIAT's initiative to implement its global mandate by expanding its bean research into Africa.
8. Concerning CIAT's breeding strategy, the Committee endorses the Panel's recommendation, accepted by the Center, that a balanced approach be adopted with due emphasis to both yield potential and performance under low input conditions. TAC commends CIAT on the significant achievement in transferring resistance against major pests in this crop.
9. TAC recognizes the scientific quality and achievements of the Program which for various reasons has been concentrated on the Latin American continent. Only recently has CIAT been able to respond to the demands from Asia and thus started to take up effectively its global mandate for this crop. This is a crop which has all the characteristics of a CGIAR-mandate crop, as it is particularly suited to the marginal lands, extensively grown by small farmers, and has until recently received limited research attention.
10. The Committee urges CIAT to continue its assessment of research needs for cassava globally and to carefully consider the Center's priorities in responding to these needs in the regions. Whatever CIAT does in Africa should be done in close cooperation with IITA. I/

## Rice Program

11. TAC supports CIAT's shift in emphasis on research from irrigated to upland rice, but the Committee wishes CIAT to continually examine the needs of both categories in order to ensure an appropriate balance between them.
12. TAC is particularly pleased to note the good collaborative arrangements which have been in operation between IRRI, CIAT and national programs on this important crop.

## Tropical Pastures Program

13. TAC encourages CIAT to assume a global germplasm role with respect to tropical pasture species for the acid, infertile soils in the humid and subhumid tropics, and to collaborate with ILCA and other institutions on research in ecological systems associated with CIAT's mandate. However, the Center should not attempt to become the world germplasm center for all tropical pastures species. The Committee agrees with the Panel's recommendations that the outposting of liaison staff at ILCA should be considered in the light of its merits vis-a-vis the implementation of the forage agronomy program at ILCA.
14. The Commitee supports the Pane1's recommendation regarding the pasture improvement projects in both the moderate acid soils and the humid tropics with the proviso that in the humid tropics CIAT must focus on already cleared areas with degraded pastures, and not on clearing of new lands.
[^4]Seed Unit
15. TAC commends CIAT for having established the Seed Unit. The function of it is to extend technical collaboration to countries in the region interested in seed program development, conduct specific research in seed technology, provide CIAT with a mechanism for multiplying, processing, storing and distributing advanced breeding material to collaborating countries, and to conduct training. The Seed Unit proves to be a very effective and successful response to the need for such activities in Latin America.
16. The Committee accepts the Panel's recommendation to examine carefully whether the Seed Unit could best fulfill its functions as part of CIAT's core program, by becoming a semi-autonomous unit, or by a combination of these and other possibilities.

## International Cooperation

17. In spite of an initially somewhat slow development of an outreach program, TAC commends CIAT on its achievement regarding the present scale and scope of its international cooperation activities; it has created most useful and effective institutional and commodity networks. These activities facilitate generation and horizontal transfer of new technologies.
18. TAC is pleased to note that in most instances CIAT collaborates effectively with sister IARCs in the CGIAR System. Collaboration with IITA in cassava, which has been less than satisfactory, has recently been subject to negotiation between the two Centers. TAC strongly welcomes the new collaborative agreement.
19. The Committee encourages CIAT to explore additional possibilities of collaborative research with institutions of scientific excellence around the globe.

## Long Range Plan

20. TAC agrees with the Panel's impression that CIAT has prepared a very good and rational Long Range Plan. The Committee appreciates the thought and effort devoted to the development and implementation of the Plan.
21. TAC particularly commends CIAT for having established a mechanism which not only enables the Center to determine its future plans, strategy and priorities, but also facilitates continual reappraisal of needs and priorities in the light of changing conditions, and hence allow adaptation of future plans and strategy.

## Organization and Management

22. TAC concurs with the findings of both Review Panels which consider CIAT a well established Center with sound organization and
management. It was pleased to note that practically all recommendations for further improvements in this area have been readily accepted by the CIAT Board and Management and are already in the process of being implemented.

Conclusion
23. TAC congratulates CIAT, a very successful and productive Center both in terms of generating improved technology and of impact in collaborating national programs, with its achievements.
24. The Committee notes the staff increases proposed by CIAT as a result of the Review recommendations; these additions will be considered by TAC during its annual review of Centers' programs and budgets.
25. TAC considers the Program and Management Review reports on CIAT excellent, and commends their findings and recommendations for detailed consideration by the CGIAR, as CIAT highly deserves continuing attention and support from donors.

CIAT welcomes the constructive and useful advice and recommendations it received from the Exterinal Program Review Panel. The clearly stated recommendations and suggestions by the Panel reflect perceptiveness of the problem context and constitute clear guiding points for the research and international cooperation strategy of the Center. CIAT is pleased that the Panel, after an exhaustive review, was in a position to fully endorse the basic objectives, strategies, and approaches of the commodity research programs, and to eloquently attest to the solid achievements in research and international cooperation which have been realized since the first External Review. CIAT generally agrees with the recommendations and suggestions made by the Panel. To a large measure, the recommendations coincide with CIAT's own appraisal of adjustments that are necessary at the present stage of development, and thus sees in the recommendations by the Panel a confirmation and endorsement of CIAT's evolving strategies. The Panel also reviewed the CIAT Long-Range Plan of 1981 and an updated version of projections which was made available during the Review. The Panel strongly endorsed the Plan and concurred with the overall strategies and projections of resource requirements to the end of the decade. The Panel was complimentary of the realistic projections which the Center has made in the light of expected reduced growth in resource availability.

A detailed point-by-point response to the suggestions and recommendations made by the Review Panel was presented to the TAC. A summary of the response to the most important points follows.

## BEAN PROGRAM

General Assessment
The EPR has given strong support to the on-going research and international cooperation activities of the Bean Program and approves of the planned expansion into Africa. With respect to the overall progress of the program the EPR notes steady scientific progress and an increasing impact at the national level in terms of cultivar releases by network collaborators.

Program Emphasis
The Panel endorses the Program objective of placing more emphasis on raising the yield potential of improved varieties and specifically recommends that a larger effort should be given to breeding for higher yield potential under higher inputs.

The strategy of the Bean Program which was defined and focused in 1974-75 has proved to be very effective. The initial focus of the Program on disease and insect resistance breeding was based on a realistic assessment of the biological constraints to increased productivity
in this crop, and the environmental conditions under which beans are mainly produced around the globe. Progress since Program aims were clarified has been significant. An effective network of bean scientists has been created in the Western Hemisphere and network development is underway in Africa. Cultivar release and farmer adoption is accelerating and national increases in productivity and production appear to be in evidence in some countries. Studies on adoption are underway in selected countries.

Progress made to date would suggest that the original strategy adopted was indeed correct. One of the spin-offs of increased resistance to biological constraints is a reduction of the riskiness of the crop which provides the basis for an increased readiness by some farmers to apply higher levels of purchased inputs, principally fertilizers and possibly insecticides, once disease incidence has been reduced.

CIAT considers that a significant shift of Program resources away from the present focus towards more stressful environments may not be of immediate benefit to the majority of small farmers, especially as the Program becomes more involved in Africa where bean production is almost totally concentrated within the small-farm sector and usually on impoverished soils prone to periodic water stress. Indications from work in the Bean Program suggest that germplasm selected under low inputs is also reasonably well adapted at higher levels of input and/or in stressful environments. On the other hand materials selected at high levels of inputs often perform quite poorly at low levels of inputs.

CIAT, in responding to this EPR recommendation, suggests that a move in this direction is justified for cultivars with particular seed type/growth habit combinations which are presently grown in more favored ecologies. Physiological research will continue to focus on the factors related to increasing yield potential through breeding in this species under favored production conditions. This research will concentrate on those plant types which could be expected to enter cropping systems where the level of constraints is lower and where chances of exploiting higher yield potential are greater.

On-Farm Research
The Panel expressed the view that greater clarity in the definition of the objectives of bean on-farm research would be welcome.

The principal objective of the on-farm research is to increase the efficiency of CIAT and national research efforts by feeding back information into the technology generation process about on-farm problems and the on-farm performance of network-developed germplasm. Due to the great diversity in the areas where beans are grown, CIAT alone cannot achieve this goal and neither should it try to do so. National programs necessarily have the primary responsibility to conduct on-farm research. Consequently, in order to obtain the needed feedback, CIAT must also be concerned about strengthening national capacity to implement effective on-farm research. To achieve this end, not only is CIAT involved in the adaptation of existing on-farm research methodologies for use by national programs, but also an exploratory
program has been developed for the training of national program personnel in on-farm research techniques, and for their preparation to participate in informal networks of on-farm researchers. The recommendation of a recent meeting at CIAT of a group of invited specialists in this field focused on the need for CIAT to be involved in on-farm research with a farming systems perspective mainly with the objective of developing national capacity in germplasm evaluation activities at farm-level. An implicit realization behind this recommendation was that farming systems research at the national level cannot be commodity-specific, and thus the need for a farming system perspective in CIAT activities. On-farm research in all CIAT programs is monitored by an internal committee of relevant biological and social scientists who advise the Director General on the appropriate role for CIAT within this general area of research.

## Quarantine Issues

The Panel recommended that a solution be found as rapidly as possible to allow any necessary movement of seeds from high-risk to low-risk areas and from Africa in order to implement fully the Eastern African bean project.

Partial solutions to the problem of intercontinental quarantine between Africa and the Americas have been explored with respect to Phaseolus, and a modest program of germplasm collection transfer through thirdcountry quarantine is being informally instituted with the United States Department of Agriculture (USDA) at Pullman, Washington. In addition smaller numbers of breeding lines will enter Colombia from Africa after prior quarantine in Prosser (Washington) in collaboration with Bean Cowpea/CRSP scientists. With respect to shipments from the Americas to Africa (i.e., under CIAT auspices), CIAT has developed a Seed Health Laboratory which will be monitoring all seed shipments of Phaseolus to ensure that, according to the best available knowledge, seed material is free of economically important diseases and pests. Highest priority will be given to those constraints which are present in the Americas but which are not of critical importance in Africa or in which there are doubts with respect to relative occurrence. In the meantime collaborative research projects with institutions in Europe are being developed to study halo blight race structure in the Americas and in Africa and to better define the interrelationships of the viral complexes between the two continents.

Continued efforts will be made to find a means of developing effective third-country quarantine arrangements in a European country to complement the initiatives in the USA. To date, due to limitations of funds for physical facilities at such institutions, no success has been achieved in this area and the issue probably deserves system-wide attention since other centers are faced with similar problems. The longer-term solution to the issue of quarantine in Colombia is related to the immediate need for bilateral assistance to the Colombian Government in order that the national quarantine services can be strengthened to handle the extra load imposed by the presence of CIAT in that country.

## Filling of Vacant Positions

The Panel recommended ihat the physiology and microbiology positions be filled as soon as possible. The Center agrees with this recommendation; indeed, prior to the visit by the Panel CIAT had already begun very active recruitment which had been suspended for the past several years due to financial constraints. It should be pointed out, however, that these sections are not, at the present time, leaderless. The physiology position is currently filled by a visiting scientist; the microbiology position by a postdoctoral fellow.

CASSAVA PROGRAM

## General Assessment

The EPR has highlighted the excellent scientific progress which the Cassava Program has made against a background of almost complete neglect of this crop by the world scientific community prior to the creation of the programs at CIAT and IITA. It also suggested that additional, systematic information on the potential demand situation of cassava be compiled and that this information be used to define the nature and scope of the Cassava Program.

## Cooperation with IITA

The Panel notes that progress towards improved CIAT-IITA collaboration has not been satisfactory and recommends that CIAT and IITA meet at an early date to redefine firm guidelines which reduce the risk of spreading diseases to an acceptable minimum.

The need for more effective IITA-CIAT collaboration in cassava has been recognized by CIAT and repeated and sincere attempts have been made to improve the level of inter-program ties. The issue of more adequate germplasm exchange between the two continents has been complicated, however, by the changing knowledge base, particularly with respect to virus-like diseases of cassava. One area in which CIAT has effectively collaborated with IITA is in the latter's present focus on biological control of insect pests in Africa. There are, however, a number of other areas in which effective collaboration has not been achieved. Both centers are now embarking on a dialog which should lead to a resolution of outstanding difficulties, particularly with respect to cassava germplasm under development at CIAT, which could have important implications for the highland areas of Eastern and Southern Africa. The dialog will also focus on other areas of collaboration, e.g., cassava documentation service at CIAT, and the contribution of information from Africa to particular cassava network publications which have an international focus. The aim of this dialog will be to develop a clearer set of guidelines on means by which CIAT can complement the lead role of IITA in Africa.

## Potential Demand Studies

The Panel felt that future developments of the Cassava Program should be guided by information concerning the potential for the crop as a source of human food and animal feed, and recommended that arrangements be made with an appropriate independent institution to conduct, in collaboration with CIAT, the necessary studies as a basis for CIAT to decide the future scope of the Cassava Program. The concern of the Panel in making this recommendation appears to be not so much directed at the appropriateness of the CIAT research and outreach strategy in Latin America and Asia, but rather at the potential return that would accrue from CIAT investment in cassava research, particularly in terms of the resources being directed at Latin America.

Analyses of studies up to the present indicate that there are excellent possibilities for an increase in potential demand for cassava in particular countries in Asia and that circumstances have produced the appropriate climate to expand cassava production and diversify its utilization for national consumption. CIAT will continue its efforts in Asia with the limited resources available. In Latin America the issue is a strategic one of determining effective country plans for exploiting demand potential. Due to the diversity of possible end-uses and the different competing products in each country, separate studies are required on a country-by-country basis. CIAT has presented to TAC a summary of information on the demand situation of cassava in Asia and Latin America already compiled by CIAT economists and external agencies. In addition, CIAT has presented to TAC a plan of action by which the on-going demand research will be significantly accelerated. In the proposed studies the first step is to determine the demand potential for cassava or cassava-based products in each country. In countries with a proven demand potential a careful analysis of the competitiveness of cassava must be made. This will involve the estimation of the price at which cassava or cassava products can effectively compete, the agronomic potential of cassava by subregions and an estimation of production costs using available improved technology and its related costs. CIAT proposes to coordinate such studies utilizing its own unique expertise on cassava but relying on national programs and outside institutions to reinforce its efforts and to independently evaluate the results. Thus IFPRI will be consulted on the possibility of that institution to pay special attention to world markets, the demand for animal feed products in general and, if appropriate, the present and potential cassava situation in Africa. In addition, the Stanford Food Research Institute will be consulted on the possibility of their carrying out a portion of the work and to critically evaluate the results of all the studies.

CIAT proposes to continue present collaborative efforts with national programs to develop strategies on integrated production, processing and marketing in those Latin American and Caribbean countries where studies have clearly identified the future potential of cassava. CIAT regards these limited efforts as an integral part of the studies to precisely define the future potential of cassava and how it can be realized. Consequently it plans to reallocate existing resources within the program so that these studies can be effectively carried out.

In response to the EPR recommendation not to add to core-funded positions while the studies are under way, CIAT has deleted the additional cassava position for a utilization specialist which was previously in the 1985 Forward List. With regard to the projected Liaison Scientist in Asia to be stationed in Thailand, CIAT-- based on the economic studies already completed which show significant potential pay-off for an enhanced CIAT involvement in Asia--proposes to maintain this position in the Forward List so as to assist in the realization of this cassava potential in Asia.

RICE PROGRAM

## General Assessment

The EPR Report is highly complimentary with respect to the regional progress which has been achieved by the Rice Program at CIAT in collaboration with national programs and IRRI, as evidenced by the significant impact of the new technology on national production of most rice growing countries in Latin America.

## Staffing Priorities

The Panel recommends that a higher priority be given to the establishment of a third core-funded breeding position. The activities of the position would focus on the well-watered, acid-savanna ecosystems-which are presently underutilized in the Western Hemisphere--for rice production. These areas constitute an important potential area for development in order that production can keep pace with the expected growth in demand in the tropical countries of the region.

CIAT had not projected this position in the 1981 version of the Long-Range Plan but it was included as a projected position in the 'optimum' category in the revision of the Long-Range Plan which was presented to the EPR Panel. The EPR recommendation, in effect, places higher priority on this third breeding position than on the projected Economics position in the Program.

In response to another EPR recommendation, CIAT considers it advisable to create a new position of full-time program coordinator for the Rice Program as soon as possible. The present incumbent of the part-time coordinator position is a breeder. The creation of a new full-time position for the coordinator would liberate the breeder position, thus allowing for the recruitment of another full-time breeder for the program. CIAT considers that two full-time breeders would be sufficient to cover the mandate of the program in the Western Hemisphere, at least in the short- to medium-term. In consideration of a longer-term need for a third breeder in the program CIAT intends to maintain the present projections for this position in the 'optimum' category and to project a position for an agricultural economist as a higher priority. This position is considered to be of critical importance in defining future program research strategies on a country and ecosystem basis.

The Panel recommends that the requested extra-core CIAT-IRRI-EMBRAPA liaison scientist position be established as soon as possible so as to strengthen the collaboration between CIAT and IRRI on both upland and irrigated rice in Brazil, Latin America's largest rice growing nation.

CIAT endorses the recommendation of the Panel, and fully supports the view of the Panel that the specific focus of the work of the scientist should be related to the "varzeas" areas of Brazil. Obviously this latter recommendation will need to be considered in the light of the priorities of the Brazilian government and EMBRAPA.

Southern Cone of South America
Regarding the requested outposted core breeding position for the Southern Cone subtropics, the Panel recommends that instead CIAT, through consultations and visits, provide technical assistance on agronomic practices, and, in conjunction with IRTP, accelerate efforts to integrate cold-tolerant, North American germplasm into breeding efforts in the Southern Cone.

CIAT endorses the intention of the recommendation of the EPR in relation to the rice ecologies in the Southern Cone. Representatives of the rice research groups from these countries with more temperate ecologies have requested direct subregional involvement by CIAT in order to accelerate progress towards resolution of particular constraints in this subregion. The recommendation of the EPR provides at least a partial response to the needs of these countries.

## TROPICAL PASTURES PROGRAM

## General Assessmet

The Panel commented favorably on the strategy and organization of the Program in the light of the considerable restructuring of this program which has been instituted commencing in 1976. The Panel noted excellent scientific progress which has been achieved through a close and successful integration of a wide range of disciplines.

CIAT agrees with the recommendations and suggestions made by the EPR regarding the Program, and finds them well-founded and useful. CIAT wishes to make the following specific comments.

## Mandate

The Panel describes the mandate of the Tropical Pastures Program (as having principal responsibility for lowlands in humid and subhumid tropics with acid and infertile soils, but having specific responsibility for the American tropics) and suggests that, with relation to Africa, the mandate needs to be clarified with ILCA.

CIAT's interpretation of its mandate in Tropical Pastures is as described by the Panel and agrees with the Panel's recommendation that, with regard to Africa, this interpretation be discussed and clarified with ILCA. The present ILCA-CIAT agreement de facto recognizes ILCA's leading role in Africa, with CIAT playing a backstopping role, particularly in the provision to ILCA of germplasm adapted to acid and infertile soils in humid and subhumid lowland tropics. As ILCA further refines its priorities and strategies between and within ecological regions, the need might arise to further clarify and define the nature of the collaboration between the two institutions in Africa.

## Germplasm Evaluation

The Panel recommends that germplasm collection and characterization continue at approximately present levels, but decrease the evaluation and development studies in the Llanos, and that ICA be approached to join in the later stages of evaluation. The Panel recognizes that if both pasture agronomy and pasture development activities in the Llanos were eventually to be phased out, Carimagua would still be the major site for the Program. Also, the Panel recognizes that due to the differences in the Cerrado ecosystem, the Cerrado CPAC site should continue to be used for some initial evaluation studies, but expects that CIAT's role in later stages of evaluation at CPAC will gradually decrease.

CIAT agrees with this recommendation. It should be pointed out that while more national program involvement (ICA and EMBRAPA) in advanced evaluation at both sites is desirable, CIAT cannot expect national programs to carry out research which is of limited national interest but which is of high international importance. Thus CIAT envisages the need for a continued involvement in the more advanced stages of evaluation.

While the above relates to germplasm evaluation for the savanna ecosystems, CIAT notes that the Panel recommends that both the planned expansion into moderately acid and humid tropic environments go ahead, with one and two core-funded scientists, respectively. CIAT considers as highest priority the evaluation of material for the humid tropics to provide better adapted materials for this region, thereby helping to reverse the severe degradation of pastures in this ecosystem. These plans were already approved by the Board and TAC several years ago but were delayed because of budgetary constraints. CIAT has projected that this position in the humid tropics be filled in 1985, with the other two positions to be filled as soon as resources permit.

## SEED UNIT

General Assessment
The EPR Panel has given strong support to the concept of a Seed Unit at CIAT and to the activities in which the Unit has been engaged since its inception in 1979.

In response to the suggestion by the Panel regarding the need for outposted positions by the Seed Unit, CIAT considers that a careful evaluation will need to be made with respect to the role of such outposted positions. Should such an evaluation suggest that outposted positions are required, then a proposal will be presented to appropriate donors for special project funding. At this time it is not clear that such positions are appropriate to the present nature of the Unit.

## Future Status of Seed Unit

The Panel recommends that a study be done to determine whether the Seed Unit would best fulfill its functions as part of the CIAT core budget or by becoming a semi-autonomous unit (or by a combination of these).

The Panel recommendation derives from the center-wide issue--which is raised in the case of the Seed Unit--of the inter-relationship of development-oriented activities to the more traditional role of the IARC's in research. CIAT has been concerned with this issue and welcomes the recommendation of the Panel to explore the possibility of a semi-autonomous status (as one alternative) for the Unit under overall CIAT patronage. CIAT will engage a consultant with knowledge of global seed-related activities in developing countries and an intimate knowledge of the CGIAR system. This consultant will evaluate the various alternative modes under which the Seed Unit could be continued at CIAT following the termination of the present SDC-funded project. This evaluation will necessarily need to take account of the implications for funding of such a Unit if it is to have some type of semi-autonomous status within the Center.

The various options derived from this study will then be presented to a small consultative meeting of appropriate donors, selected national programs, representatives from the CGIAR Secretariat, and at least one other IARC. This group will review the consultant's recommendations and prepare an appropriate response for consideration by CIAT Management and Board of Trustees. The Board of Trustees would then approve appropriate action for eventual consideration by TAC and the CGIAR.

## GENETIC RESOURCES

Head, Genetic Resources Unit
The Panel recommended that the position of Head of the Germplasm Resources Unit--which has been vacant for an extended period of time--be filled as soon as possible.

This position was previously filled by a germplasm specialist. When CIAT began recruiting after the position became vacant in May 1981 the Center came under severe budgetary constraints and the position was
cut and recruiting terminated. CIAT endorses the Panel recommendation to re-establish the position and will proceed to do so as soon as possible.

## Seed Pathology

The recommendation of the EPR with respect to the establishment of a new position of seed pathologist will have to be seen against Center-wide priorities and the likelihood of further growth in resources allocated to the Center. Establishment of a Seed Health Laboratory within the Genetic Resources Unit was achieved in 1983 and the operation of this laboratory is now monitored by a committee of program pathologists who are, in turn, providing appropriate methodologies for use in routine screening of both seed and vegetative propagation material. A set of techniques is already in use and several additional ones are about to be implemented. In view of the restrictions on growth in Center activities CIAT considers that the above arrangements should suffice, at least in the short- to medium-term. Hence, no specific position of seed pathologist will be projected in the foreseeable future.

## RESEARCH MANAGEMENT

## Organization

The Panel indicated that the division of responsibilities between the Director of Crops Research and of Resources Research and International Cooperation is not clearly delineated, and it recommended that CIAT Management reconsider the division of responsibilities assigned to these two positions.

Management has proposed, and the Board has approved, a redistribution of responsibilities between the two program directorates. One will have responsibilities for operational oversight and supervision of all activities of the Bean and Cassava Programs, along with center-wide responsibility for international relations with countries in Africa and Asia; the other will have responsibilities for operational oversight and supervision of all activities of the Rice and Tropical Pastures Programs, and center-wide international relations responsibilities for countries in Latin America and the Caribbean.

## Publications

The EPR states that "considering the large amount of productive research being conducted at CIAT, the Panel finds the number of scientific publications to be disappointing," and encourages the staff to bring this part of their scientific activities into balance with the rest, and the administration to encourage staff more strongly in that regard.

CIAT recognizes the need for some increase in the output of research papers in refereed journals, in addition to the considerable attention presently being given to a wide range of CIAT-produced network and methodology publications which are considered to be of critical
importance as a means of scientific communication with fellow scientists in the commodity networks. Among the measures that have been taken or will be implemented to encourage more publication in refereed journals are the following: (a) the annual evaluation of senior staff now includes a reference to the volume and the appropriateness of the publication record of each scientist with respect to the Center's objectives, and (b) with the expected increase in sabbatic leaves it can be anticipated that staff may use this time to catch up on publications.

## Central Scientific Unit

The Panel made a specific recommendation on the creation of a new unit to be comprised of germplasm resources management, tissue culture, virology, and applied microbiology.

CIAT considers that--at least for the time being--there are no compelling reasons and arguments for instituting a relatively large cross-commodity research unit composed of a set of rather diverse disciplines. Nevertheless, CIAT agrees that there is indeed merit in the concept of a small cross-commodity effort in the form of a research unit devoted to the emerging field of genetic engineering/biotechnology. Thus, CIAT proposes to follow the spirit of the EPR recommendation by creating a Biotechnology Research Unit along the following lines.

The Biotechnology Research Unit initially will consist of one senior researcher and support staff. The Unit will be charged with center-wide responsibility for all research in the general area of biotechnology. The Unit will act as an interface between CIAT scientists, particularly breeders, and advanced research institutions where new methodologies are becoming available which can be useful in the germplasm development process. The Unit will thus focus on all aspects of applied biotechnology which could be potentially valuable to CIAT and will not place emphasis on basic research. The creation of such a Unit will focus attention on the role of CIAT in this area of work and will allow CIAT to generate special projects and host graduate research students to augment the overall effort. The existing position of cell physiologist in the Genetic Resources Unit will be transferred to the Biotechnology Research Unit to head up that unit.

## TRAINING

The EPR found Training and Conferences at CIAT to be dynamic, well oriented and well executed. In the course of its review it found numerous instances of CIAT-trained personnel in national programs activelly and successfully participating in the generation and diffusion of improved technologies for the production of the commodities in CIAT's mandate.

The Panel suggests that the demand for training of key extension and development specialists be met with short courses specifically planned for extension and development specialists. These courses should involve only minor participation of CIAT's senior staff, and a major participation
of the best national Latin American professionals in extension and development within CIAT's commodities.

CIAT shares the EPR concern for adequate training of extension and development personnel. However, it feels that rather than oganizing a separate course for such personnel at CIAT it is best to expand the two-fold approach which has already proved its effectiveness: 1) to assist national research institutions in the conduct of regional and in-country courses for extensionists and to make increased use of non-CIAT instructors selected from the pool of available professionals at the regional and local level; and 2) to include participation in research and production courses at the Center (mainly for researchers) a few selected extension leaders in order to help bridge research and extension by providing for interaction between these professionals. Such a mix of disciplines and professional backgrounds has proven to be highly effective in CIAT courses over the past seven years.

## COMMUNICATION/INFORMATION

The EPR is highly complimentary of the quantity, quality, and relevance of the CIAT-produced menage packages in support of the Center's technology generation and transfer activities, and in support of the commodity networks in which CIAT participates.

Among its specific observations, the Panel states that ideally, a permanent staff member should manage the audiotutorial effort.

CIAT agrees that educational materials are sufficiently important to merit a full-time, core-funded senior staff position. Under the current budget restrictions, however, a full-time visiting scientist with specialization in educational communication is preferable to part-time attention from a non-specialist staff member. Before a core-funded position can be added, its relative merits vis-a-vis other currently needed positions will have to be weighed.

The Panel also notes that the Communication and Information Support Unit (CISU) does not have an English or French editor, and suggests that CIAT study the possibility of immediately contracting an English editor.

The need for an English editor is accepted. CISU currently plans to meet that need by appointing an English editorial assistant and by seeking visiting editors to come from English-speaking countries on oneto two-year contracts. This plan has the advantage of leaving the much needed senior staff positions for more conceptual communication tasks that cross programs and publication types.

## INTERNATIONAL COOPERATION

## Relations with National Programs

Because CIAT has given, and continues to give, highest priority to developing and maintaining productive collegial relationships with the national programs it serves, the Center is particularly appreciative of the statement by the Panel that the relationships of CIAT with national programs in Latin America is uniformly excellent and that administrators and research scientists in the many countries visited by the Panel consistently expressed strong support for the value of their collaboration with the Center.

## Regional Activities

The Panel notes that because of budget reductions most of the outposting of staff has been accomplished with extra core funding. While the Panel accepts this as a short-term reality, it encourages CIAT to attempt to achieve a more proper balance between special project and core funding and activities in each region be, when possible, coordinated by outposted experienced core staff.

CIAT agrees that a proper balance between special project and core funding must be strived towards in relation to outposted staff. In fact, the Center has publicly enunciated what it considers to be a "proper" balance (see, for example, "CIAT's International Cooperation Strategy", dated 30 January 1984). Outposted Research Staff are placed outside of Colombia in those cases in which important, commodity-specific ecosystems are not adequately represented in Colombia. All such ontposted research staff should, in principle, be core-funded. In regional cooperation projects, CIAT seeks to place one (or maximum two) corc-funded permanent scientist(s) who is (are) to provide on-going liaison between CIAT and the respective commodity efforts in the region. These liaison scientists may need to be backed up by temporary regional research teams which are to provide necessary research input until the regionally available resources are fully organized to take over this responsibility. Such temporary regional teams should, in all cases, be special project funded. In bilateral projects, which are mounted at the request of individual countries or subregional research programs, all staff should be special project funded.

Due to budget funding shortfalls in recent years, several of the regional liaison scientist positions needed to be filled with special project funds. In its forward projections, and in accordance with the Panel's recommendations, CIAT is planning to move these positions into core, thereby implementing its long-standing policy on the financing of outposted staff.

18 May 1984
EPR-B

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH TECHNICAL ADVISORY COMMITTEE

REPORT OF THE SECOND EXTERNAL PROGRAM REVIEW<br>OF THE<br>CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL (CIAT)

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TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
August 1984

BOARD FOR INTERNATIONAL FOOD AND AGRICULTURAL DEVELOPMENT INTERNATIONAL DEVELOIMENT COOPERATION AGENCY

Agency for International Development
Washington, D. C. 20523

23 March 1984

Dear Professor Camus,
On behalf of the Review Panel, I forward herewith the report of the TAC External Program Review of the International Center of Tropical Agriculture (CIAT). The Review was guided by the terms of reference, guidelines, and additional questions forwarded to the Panel by TAC.

The Panel was fortunate to have the opportunity to participate in the week-long Internal Program Review of the Center prior to conducting the External Review. Also, members of the Panel had an opportunity to meet with research administrators and scientists of national programs in six countries in Latin America and three countries in Asia and Africa. The Chairman met with the CIAT Board of Trustees in October and the entire Panel met with the Program Committee of the Board during the week of Internal Review. These interactions served very effectively to build a base of understanding within the Panel prior to the intensive phase of the Review. I commend TAC for its willingness to invest the resources to assure the Panel's success in developing an adequate understanding of the Center's programs.

The Review focussed heavily on progress of the Center since the 1977 Quinquennial Review, on the impact of CIAT technology and on the future plans of the Center. Particular attention was paid to the development of the outreach program which has evolved rapidly in recent years. The Panel reviewed the effectiveness of the Center's interactions with other IARCs with which it shares responsibilities for mandated programs, particularly with regard to the CIAT/IITA programs in cassava.
. ./.

Prof. Guy Camus
TAC Chairman
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We feel privileged to have been selected to conduct the Review. We invested five weeks of our time in learning about, and hopefully commenting effectively on, the progress of this vital Center. To the extent we have succeeded, much credit goes to the Board of Trustees, and to the Directorate and staff of CIAT for their availability, cooperativeness and open attitude.

We give special thanks to the TAC Secretariat for making the services of Mr. Louk Ochtman available for the entire review.

On a personal note I wish to express my sincere appreciation to the members of the Panel who accepted the task with enthusiasm and great sincerity. Their cooperativeness made my task easy.

## Sincerely yours,

Frederick 3. Hutchinson
Frederick E. Hutchinson
Chairman
CIA EXTERNAL PROGRAM REVIEW

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## 1. The External Program Review

The Panel was guided by TAC's Terms of Reference and Guidelines for External Program Reviews, a list of specific questions to be be addressed, the 1977 Quinquennial Review Report, and by the personal knowledge of the Panel members. The Panel spent one week participating in the Center's Internal Review and two weeks travelling to various countries and substations to view CIAT programs, as well as its impact on national research programs, prior to its two week intensive review at the Palmira headquarters.
2. The Report

The purpose of this Report is to assist the Center to carry out its mandate better, and to provide TAC and the CGIAR with information and recommendations that will facilitate their continuing assessment of and guidance to CIAT.

The recommendations in the Report were unanimously agreed upon by the Panel. The recommendations which appear in the Report are also summarized at the end of each chapter. Other guidance in the form of suggestions or endorsements appear in the text. The concluding chapter is a general assessment of CIAT, including observations about the future.

The External Program Review was conducted concurrently with the External Management Review (EMR). The Panels coordinated their reviews and this Report contains references to the EMR.
3. CIAT's Mandate and its Interpretation and Implementation

The Panel agrees that the broad mandate of CIAT, which in summary is to generate and deliver "improved technology which will contribute to increased production, productivity, and quality of specific food commodities in the tropics, principally countries in Latin America and the Caribbean", is still valid. CIAT for many years has accepted principal or global responsibility for beans and cassava within the CGIAR system, and regional responsibility for rice. The Panel agrees that this should continue. The situation regarding the fourth major commodity, tropical pastures, has not been as clear. CIAT has interpreted the pastures mandate as applying globally to lowlands in the humid and subhumid tropics with acid and infertile soils, but having specific responsibility to the American tropics.

The Panel accepts this interpretation but suggests it must be discussed and clarified with ILCA. The Panel agrees with CIAT's decision to restrict its focus by phasing out the Swine Program and concentrating the emphasis of the former Beef Program on Tropical Pastures.

Since the 1977 Quinquennial Review, CIAT, as discussed in section seven, has appreciably extended its outreach activities in accordance with the mandate for each commodity. Significant global expansion has been made by the Bean Program into Africa and the Cassava Program into Southeast Asia, and a regional expansion into the American tropics has taken place in all commodities. Noteworthy changes in CIAT programs in the regional context have been the increased emphasis on upland rice, the development of networking activities, and the plans to expand the Tropical Pastures Program into the humid tropics. All of these activities are clearly within the Center's mandate. The Panel does not believe that any new commodities should be allocated to the Center.

## 4. Impact

CIAT's impact on client countries has been attained primarily through the four commodity programs and their supporting units. These programs have catalyzed formation and strengthening of national research programs.

Development of high yielding varieties (HYVs) in the Rice Program was the first and still the greatest success story to emerge from CIAT's work. National programs in Latin America have released some 40-50 HYVs derived from CIAT germplasm and/or IRTP nurseries. In 1981 these HYVs were grown on 2,286,000 hectares in Latin America, which represents $26 \%$ of the rice area in the region. If Brazil, with its largely upland rice area is excluded, the adoption rate is $70 \%$. The increased value of production from the HYVs was US\$850 million annually. Although the HYVs were developed for irrigated conditions, the figure of $2,286,000$ hectares includes the unexpected adoption of HYVs on 661,000 hectares of upland rice area.

It is still too early to measure the impact of the approximately 40 bean varieties, based on CIAT Bean Program germplasm, that have been named in recent years by national programs in 16 countries in the Americas and two in Africa. Since the CIAT Bean Program concentrated its efforts on breeding for disease and insect resistance, the main impact is expected to be in stabilizing production rather than in yield increases per se.

The most significant impact of the Tropical Pastures Program has been the identification and distribution of improved tropical grasses and legumes. One grass (Andropogon gayanus), and three legumes (Stylosanthes spp.) from the Tropical Pastures Program have been released by several countries under a variety of names. Because of
the long-term nature of perennial forage evaluation, it will take several more years to adequately measure the economic impact of the Program on Latin American agriculture.

The impact of the cassava cultivars containing CIAT Cassava Program germplasm that have been released in 10 countries is not yet discernible in national yield statistics. However, their impact may be one of the reasons why cassava hectarage has increased in several Latin American countries. Impact on productivity in this crop is particularly difficult to measure, since it frequently is grown in small farms on marginal lands.

The Genetic Resources Unit (GRU) contributes to the overall impact of the commodity programs by providing germplasm of beans, cassava, and forage species. The Seed Unit has had a substantial impact through its service function for CIAT commodities and in providing seed of 49 varieties or lines of beans, rice, and tropical pasture species for 16 developing countries.

The impact of CIAT's training programs which have trained 2400 people in the 1969-1983 period, is being reflected in the strengthening of national programs as trainees return to their countries and apply their new skills and assume increased responsibilites. A recent survey indicates that $54 \%$ of former trainees remain active in the field for which they were trained. The additional contributions which former CIAT trainees will make over their careers will have a long-term and continuing effect on agricultural production in Latin America.

## 5. The Future

CIAT's Long Range Plan and its updates prepared for the EPR' provide excellent working documents for operation of the Center during the 1980s. These documents will guide the Center well as it decentralizes its research from headquarters and extends its outreach program through Latin America and into selected activities in Asia and Africa.

As a result of decreased funding growth rates in the CGIAR system, CIAT will not be able to implement its plans as fast as originally desired. However, CIAT has shown flexibility in adapting to the funding shortfall, through modification of priorities both within and between programs, and through supplementation of core funds with extra-core funding.

Overall, the Panel anticipates that CIAT's impact on increased agricultural production in its mandated areas will grow at substantially faster rates than in the past. Large returns have already been realized from the Rice Program and more are expected. The other three commodity programs, which started later or have dealt with longer-lived crops or with crops for which infrastructures for
dissemination are still in development, have much germplasm and technology which is emerging from the pipeline and which can be expected to increase productivity as it moves into national programs.

Like all IARCs, CIAT must continually examine its role in the technology development and transfer process. As national programs gain strength and assume larger adaptive and applied research roles, CIAT must give more attention to basic research opportunities which complement national research activities. The challenge for CIAT, as for any agricultural research organization, is to select those basic research opportunities which have the greatest potential for ultimately increasing productivity on the farm.

## 6. Follow-up of the 1977 Quinquennial Review

The 1977 Quinquennial Review gave a broad endorsement to CIAT's programs and recommended that CIAT be given a period of stability and the opportunity to make uninterrupted progress without major changes. CIAT has accomplished this despite the financial pressure of recent years. The Center has also responded positively to the recommendations of the Quinquennial Review, and these responses are detailed in Annex V. The Panel has noted the beneficial effect of CIAT's positive actions during the current review. The only recommendation that CIAT did not follow was that on retention of senior scientists in animal health within the Beef Production Program. The Panel endorses CIAT's reasons, also listed in Annex $V$, for not following this recommendation.

## 7. Overall Assessment

The Panel finds CIAT to be a productive international agricultural research center with competent staff and administration. The Board of Trustees accepts its role responsibly and is directly involved in making major policy and program decisions. The inter-disciplinary commodity-oriented program structure has been successfully implemented in the Center. Open dialogue both within and between program staff is encouraged. However, communication between the financial administrative division and the scientists needs improvement.

CIAT moved more slowly in the development of an outreach program than did some of its sister IARCs. In recent years it has expanded this part of its overall program quite rapidly. One of its major achievements has been the development of effective networks of scientists in national programs in the region. The outposting of staff has been accomplished in a logical sequence following the Long Range Plan. Because of budget reductions most of this has been based on extra-core funding. The Panel accepts this as a short-term
reality, but encourages the Center to attempt to achieve a more proper balance on core funding in the long-term.

The Panel feels the future development of the Cassava Program should be guided by information concerning the potential for the crop as a source of human food and animal feed. Its competitiveness with cereal grains needs to be analyzed on a national, regional, and global basis. An external organization should be funded to conduct such a study as a basis for CIAT to decide the future scope for the Cassava Program.

In any agricultural research organization which is organized along interdisciplinary commodity lines there normally emerges a need for a scientific unit which conducts research in support of all of the commodity programs. The Panel feels strongly the time for such a unit has arrived for CIAT. A unit combining germplasm, tissue culture, virology, mycorrhiza microbiology, and other relevant specialities is suggested. An immediate task for such a unit would be to focus on the phytosanitary problems related to interchange of CIAT germplasm and breeding materials with other organizations.

CIAT interprets its mandate to imply a major focus on developing improved plant materials for minimum input conditions. The Panel feels this has resulted in inadequate attention to the exploration of yield potential, particularly with beans. It is hoped the Center will give more attention to yield potential in the future.

In general CIAT has developed excellent working relationships with other IARCs with which it shares joint responsibilities. However, the Panel finds the relationship between CIAT and IITA with regard to their cassava mandate to be unsatisfactory. The two Centers must be required to develop a satisfactory arrangement very soon, and if not achieved, a third party should be brought in to resolve the issues.

Considering the large amount of productive research being conducted at CIAT, the Panel finds the number of scientific publications to be disappointing. It is time for the staff to bring this part of their scientific activities into balance with the rest and for the administration to encourage them more strongly in that regard. The future credibility of CIAT as a leading agricultural research organization within the region and the world will in part depend upon this matter.

The relationships of the Center with the national programs in Latin America is uniformly excellent. Administrators and research scientists in the seven countries visited by the Panel consistently expressed strong support for the value of their collaboration with CIAT.

## CHAPTER I - INTRODUCTION

## 1. The Consultative Group on International Agricultural Research (CGIAR)

1. 

The Consultative Group on International Agricultural Research (CGIAR), founded in 1971, is an international consortium sponsored by the Food and Agriculture Organization (FAO), the United Nations Development Program (UNDP), and the World Bank. It seeks to increase food production in the developing world through research programs and through training of scientists and production specialists in these countries.
2. The Consultative Group is comprised of 39 donors, including 23 governments, 11 international organizations and development banks, and five foundations. In addition, ten developing nations representing the five major developing regions of the world - Africa, the Middle East, Asia, Latin America, and Southwestern Europe nominated by the FAO Regional Conferences on a two-year basis are non-donor members of the Group.
3.

The 13 institutions which the CGIAR supports are autonomous international research and training institutions with an international staff of scientists, supported by locally recruited support staff. Each is governed by its own international Board of Trustees.

## 2. The Technical Advisory Committee (TAC)

4. The CGIAR has an independent Technical Advisory Committee (TAC), entrusted with the periodic assessment of the achievements, appropriateness, and effectiveness of the programs of the International Agricultural Research Centers (IARCs). These reviews of individual Centers are conducted for TAC at approximately five to six year intervals. At its 30th meeting in March 1983 TAC, in consultation with the Center Director, agreed that CIAT should undergo the second External Program Review, which was ultimately planned for March 1984.
5. The International Center of Tropical Agriculture (CIAT)
6. 

Founded in 1967, CIAT began operations at its present site at Palmira near Cali, Colombia, in February 1969. Its headquarter facilities were inaugurated in October 1973.
6. In coordination with government institutions and other organizations dedicated to increasing the production and productivity of food crops basic for human subsistence, CIAT's goal is to contribute to the improvement of nutritional levels and the general welfare of the low-income urban and rural populations in the tropics.
7. Initially, CIAT worked with six specific commodities, i.e., cassava, field beans, maize, rice, beef, and swine, and concentrated its activities chiefly in the subhumid, lowland tropics of Latin America and the Caribbean. Over the years, CIAT's overall research program evolved to its present state, which encompasses four programs, i.e., beans, cassava, rice, and tropical pastures, with the objective "to generate and deliver, in collaboration with national and regional institutions, improved technology which will contribute to increased production, productivity and quality of specific food commodities in the tropics-principally countries in Latin America and the Caribbean- thereby enabling producers and consumers, especially those with limited resources, to increase their purchasing power and improve their nutrition."
8. The Government of Colombia provides support as host country for CIAT and furnished a 522 -hectare site near Cali for CIAT's headquarters. In addition, the Fundación para la Educación Superior (FES) made available a 184 -hectare substation in Quilichao and a 73hectare substation near Popayăn. CIAT also co-manages with the Instituto Colombiano Agropecuario (ICA) the 22,000-hectare Carimagua Research Center in the eastern plains of Colombia. A new 30-hectare substation, in Santa Rosa near Villavicencio, has recently become operational.
9. An independent panel conducted the Quinquennial Review (QQR) of CIAT in April 1977 and submitted its report $\boldsymbol{-}^{\text {( }}$ to both TAC and the CGIAR. It supported three major policy decisions taken by CIAT.
10. Firstly, CIAT had adopted as a primary objective of the Tropical Pastures Program the development of some 300 million hectares of the acid soil savannas, the largest potential land and food resource in Latin America. Nutrition of beef cattle had been identified as the principal factor in the development of this vast resource. Therefore, CIAT was embarking on an ambitious program of plant, soil, and animal husbandry research in close cooperation with national research institutions in Colombia and Brazil. The Panel supported CIAT's decision to postpone pasture research in newly cleared forest land until sufficient progress had been made on the main plains.
11. Secondly, CIAT had decided to retain a veterinary research component in the multidisciplinary beef production team to ensure that utilization of improved pastures was not limited by disease problems in cattle. The former separate and more comprehensive veterinary
component of the Beef Production Systems Program was phased out.
12.

Thirdly, CIAT had terminated its small farming systems program; rather than have a separate program focusing on farming systems, it was recognized that this must be a concern of all the multidisciplinary commodity programs.
13. The recommendations of the 1977 QQR were endorsed by TAC, the CGIAR, and CIAT. The Review report served as a reference document for the second Review.

## 4. Terms of Reference

14. The External Review Panel was charged to conduct the review under the standard Terms of Reference for External Program Reviews of the International Agricultural Research Centers, revised by TAC at its 31st meeting in June 1983 - . In general terms, the Panel was to assess the content, quality, impact, and value of the overall program of CIAT, and to examine whether the operations are being carried out in line with declared policies and to acceptable standards of excellence.
15. In pursuit of the above objectives, the Panel was to give particular attention to the mandate of the Center, to the relevance, scope and objectives of its program and budget, and of its forward plans, to the content and quality of its program, to the impact and usefulness of its activities, as well as to the constraints on them. Furthermore, the Panel was to address specific questions put forward by members of the CGIAR, the Center, and TAC.
16. While the Panel was free to make any observations or recommendations it wished, because the report is its alone, it could not commit the CGIAR or TAC to any consequent action.
17. The detailed Terms of Reference, including the list of specific questions are appended in Annex I.
18. Preparations for the Second External Program Review (EPR)
19. The preparations for the Second External Program Review started in June 1983 and were conducted in close cooperation with the Director General of CIAT. Details of the Review program and the composition of the Panel (Annex II) were discussed and agreed upon by TAC at its 31 st meeting in June 1983 and its 32nd meeting in October 1983. Both CIAT and the TAC Secretariat provided the Review Panel with a comprehensive set of relevant briefing documents which are listed in Annex III.

I/ AGD/TAC:IAR/83/23
19. The Panel Chairman was invited to attend the 10th anniversary of CIAT in October 1983, where he had an opportunity to discuss the scope of the Review and related matters with members of CIAT's Board of Trustees and the Management.
20. During the 32nd TAC meeting the Panel Chairman had further discussions on the Panel composition and the Review program with the Chairman of TAC, CIAT Management, and TAC Secretariat.

## 6. Review Activities

21. In November 1983 the Panel Chairman and one member visited the ICTA bean and rice programs in Guatemala. The accompanying Panel member also visited the bean program in Costa Rica.
22. In January 1984 one Panel member visited the national cassava programs in Thailand and Indonesia. Another Panel member had discussions on CIAT related research programs with specialists of INRA, GERDAT, IEMVT and IRAT in Montpellier and Guadeloupe.
23. From 30 January to 3 February 1984 the Review Panel attended the annual Internal Program Review at CIAT. Following this review the Panel split up in two teams; one team visited in Brazil from 5-11 February 1984 the bean, rice, cassava, and tropical pastures programs of EMBRAPA: CPAC, CNPAF, and CNPMF at Brasilia, Goiania and Salvador; ICA and IRGA at Campinas and Porto Alegre. The second team visited from 4-10 February 1984 national programs in Costa Rica (beans of MAG, CNP, and ONS), Cuba (beans, cassava, rice, and pastures of MINAG), and Mexico (beans, cassava, rice, and pastures of INIA). One Panel member visited IITA on 7-8 February for discussion on CIAT-IITA collaboration in cassava research for Africa.
24. During the week from 5-10 March 1984, prior to the main Review at CIAT headquarters, the Panel split up again in two teams to visit ICA and CIAT program activities in various regions of Colombia, as well as ICA headquarters near Bogotá. From 11-23 March the Panel conducted the main phase of the External Program Review at CIAT headquarters in Palmira. Details of the entire program of Review activities are presented in Annex IV.

## 7. The Report

25. On 23 March 1984, the Panel presented its collective findings and recommendations to CIAT and provided them with the draft report for their comments.
26. The Review Panel accepts sole responsibility for this report, which does not commit in any way the sponsoring agency, i.e., the CGIAR/TAC.
27. The report is structured in such a manner as to reflect the Panel's findings with respect to the following key areas:

- the Center's mandate, its interpretation and its research strategy, as well as its status in Colombia (Chapter II);
- an assessment of the relevance, quality and impact of CIAT's commodity research programs (Chapters III-VI);
- a review of the other components of CIAT's program and their interrelationships with the commodity research programs (Chapters VII-X);
- a review of CIAT's international cooperation with national research programs and institutions, with other IARCs and advanced research institutions, and of its Long Range Plan (Chapters XI and XII); and
- an overall assessment of the Center's achievements, impact, and future plans (Chapter XIII).

28. The Panel's report was subsequently presented by its Chairman to TAC at its 34 th meeting in June 1984 together with CIAT's response to the report. TAC formulated its comments, which together with the report and CIAT's comments were transmitted to the CGIAR for consideration at its meeting in November 1984.

CHAPTER II - MANDATE, STRATEGY, ORGANIZATION, AND MANAGEMENT

## 1. Introduction

29. In the mid-1960s the Rockefeller and Ford Foundations collaborated to establish an international agricultural research center in Latin America. This resulted in an agreement signed by the Colombian Government and the Rockefeller Foundation on 12 May 1967, to create CIAT. The Center was officially decreed as a Colombian institution on 4 November of the same year, and CIAT headquarter facilities were dedicated on 12 October 1973. By that time it had been brought under the aegis of the CGIAR system.

## 2. Mandate and Interpretation

30. The original purposes of CIAT were defined as: "The Center shall have the right and power:
a. To carry out research on practical and theoretical problems related to increased production of basic food crops, both of plant and animal origin, especially in the tropical lowlands.
b. To train young technical people principally from South and Central America, under the direction of a staff of highly competent scientists.
c. To help develop educational and research institutions of the region by collaborating with national programs and giving assistance whenever convenient and mutually agreed upon.
d. To distribute improved genetic materials, of plant or animal origin, resulting from national or international research programs where such materials can be utilized in local improvement programs.
e. To publish and disseminate the results of the research of the Center.
f. To establish and operate a Center of Information and a library that will supply information and data on tropical agriculture for the use of the interested scientists around the world.
g. To organize periodical conferences, forums and seminars on important problems related to the development of tropical agriculture.
h. To participate in such other actjyities as may be related to those listed above."
31. The original founders intended to create, "an institution serving tropical Latin America and the Caribbean."
32. The Board of Trustees eventually approved the following mandate for CIAT, as one of several agricultural research centers under the aegis of the CGIAR:
33. "To generate and deliver, in collaboration with national and regional institutions, improved technology which will contribute to increased production, productivity and quality of specific food commodities in the tropics, principally countries in Latin America and the Caribbean, thereby enabling producers and consumers, especially those with limited resources, to increase their purchasing power and improve their nutrition."
34. The Board further stated in 1977, "the CIAT programs have evolved to currently encompass the following responsibilities:
a. Principal responsibilities for beans (Phaseolus vulgaris and related species) and cassava (Manihot esculenta);
b. Principal responsibilities for tropical pastures (specific responsibilities for the acid, infertile soils of the American tropics);
c. Regional responsibilities for rice (specific responsibilities for the American tropics)."
35. The Panel understands the evolutionary process which has occurred since the creation of the Center, considering the subsequent move into the CGIAR system in 1972 and the broad mandate originally given to the institution.
36. The Panel agrees with the Center's interpretation of its mandate in terms of the four crops to be studied. It also accepts the principal responsibility being assumed for beans and cassava. With regard to tropical pastures, it is the Panel's understanding that the Program interprets its mandate as applying globally to lowlands in the

1/ Act of the Foundation of the Centro Internacional de Agricultura Tropical (CIAT), October, 1967.
2/ From "CIAT as Originally Conceived and CIAT Today: Mandate, Objectives and Achievements," L. Hardin, October, 1983.
humid and subhumid tropics with acid and infertile soils, but having a specific responsibility to the American tropics. The Panel accepts this interpretation, but suggests it be discussed with ILCA, and it agrees that CIAT should not assume responsibility for all tropical pasture species.
37. CIAT should be commended for its decision to change the focus of its Animal Production Program by phasing out the Swine Program (1975-1979) and narrowing the Beef Program by transforming it into the Tropical Pastures Program. The 300 million hectares of acid savannas which the Tropical Pasture Program has concentrated on in Latin America warrant such attention because they hold great potential for expanded beef production if suitable pasture species can be identified and developed.
38. The major program changes at CIAT can be summarized as follows:

Early 1970s
1975 Decentralization of training and conferences into commodity programs
Small Farm Systems Program functions redefined and transferred to commodity teams Beef Program focus narrowed to tropical pastures, with major emphasis on acid, infertile soil regions of tropical America Swine Unit phased out Creation of Seed Unit Broadening of Rice Program focus from irrigated lands to include favored upland environments
Acceleration in implementation of mandates for beans and cassava outside of Western Hemisphere.

## 3. Strategy

39. The Center has developed a strategy which emphasizes enhanced production on farms with limited resources and on underutilized land areas. It focuses its programs predominantly on the American tropics and the commodities were selected for their importance to the region. It also recognizes that it represents only one segment of the agricultural research and development system, thus linkages with national research systems, basic research institutions in developed and developing countries, and sister centers within the CGIAR system are part of the strategy.
40. In recognition of the broader responsibilities assigned to CIAT by the CGIAR system for given commodities, the Center has differentiated its responsibilities as:

## Principal

1. Assemble, maintain and make available the world germplasm collection.
2. Conduct specialized, strategic research.
3. Generate improved production technology components for, and develop cooperative activities with, national research systems in all regions in the developing world where the commodity is important, and no sister CGIAR center is assuming regional responsibilities.
4. Provide in-service training for professionals in the specialized/strategic areas of research on a global basis.
5. Provide specialized in-service and production-oriented training for professionals from countries where no other CGIAR center has regional responsibilities.
6. Collect, process and disseminate information on the commodity on a global basis.
7. Backstop the activities of other institutions with regional responsibilities for that commodity.

## Regional

This category applies when a sister CGIAR center has principal responsibility for a commodity, and in close cooperation with that center, CIAT takes on selected responsibilities, especially No. 3 and No. 5. Together with national research systems it identifies principal production constraints and, in close collaboration with the center having responsibility, seeks to facilitate such activities as are required to overcome such constraints." -
41. CIAT has developed a sound strategy to implement the mandate. It appropriately focusses upon the farmers with limited resources and the Center's role in the CGIAR system.
42. The Panel is concerned by the interpretation in No. 3 that CIAT will "develop cooperative activities with national research systems in all regions in the developing world where the commodity is important and no sister CGIAR center is assuming regional responsibilities" for a commodity for which CIAT has principal responsibility. It would be preferable to state, "and no sister CGIAR center has been assigned regional responsibilities." - Confusion about which center works with the national institutions in a country on a specific commodity must be avoided at all cost, and whenever possible this linkage should be with the regional center nearest to the country.

[^5]43. CIAT appropriately states its interest to develop linkages with basic research institutions in the developed and developing countries. The Panel notes the credible number of existing projects, but is not convinced these linkages, especially with developed country institutions, have been adequately explored and implemented. The Panel recommends that CIAT further explore this part of its strategy, with the intent of increasing the amount of basic research conducted in support of its programs.
44. The Center has achieved a proper balance between conducting research and serving its other functions of training, conferences and workshops, publication and distribution, and seed development. As the program continues to develop during the next ten years, it will be necessary to respond to changing needs and priorities within the region. The Long Range Plan attempts to anticipate those changes and charts a future course. For example, the Panel believes there will be an increasing demand for the Seed Unit to assist national organizations by assuring adequate supplies of certain new varieties which are not adequately produced by the national seed organizations. This will be particularly true with new tropical pastures varieties developed for the acid savannas. The role and administrative arrangements for the Seed Unit may need to be modified as it assumes future responsibilities for seed development in the Latin American region.

## 4. Legal Status

45. 

CIAT was originally incorporated under Colombian law and granted certain rights and privileges (Decree No. 301) which assured its right to operate as a quasi-international institution. It is now apparent steps should be taken to assure true international status. The Center is presently developing a plan to achieve such status by an arrangement with the three co-sponsors of the CGIAR (FAO, UNDP, World Bank) and the Colombian Government. All parties appear favorably inclined but several factors have delayed progress. The present status is not satisfactory for an organization of the nature of CIAT.
46. The Panel recommends that CIAT and its co-sponsors continue to pursue the attainment of international status with vigor and dispatch.

## 5. Organization, Administration, Management

47. CIAT headquarters is located in Palmira, Colombia. It is supported by three substations in Colombia and substantial CIAT collaborative research programs at five Colombian (ICA) stations. Some facilities have been added in recent years, including the seed Unit and the communications support buildings, the IBM System 36
computer, and an auditorium. There are no plans projected for major facility additions in the future.
48. The Panel was impressed by the completeness of present facilities and the modest approach followed by management in establishing facilities at the substations.
49. The Center has an autonomous Board of Trustees composed of 18 members, four of whom are ex officio and one is emeritus. The members have three-year terms and they may be reappointed only once. Three of the members are nominated by the CGIAR and the others are selected by the Board itself. Balance of membership has changed over the years to appropriately recognize the broader mandate for Asia and Africa. The present Board has one member from each of those regions. The Panel notes the Board is large relative to other IARCs and raises the question of relative efficiency.
50. 

The Program Committee of the Board is the vehicle by which the Center's programs are evaluated annually. The Committee is part of the annual internal review process and then it formulates appropriate policy recommendations for consideration with the Executive Committee and ultimately the Board. This process appears to be very effective. It has led the center to make major changes in policy and program, such as those with beef, swine, training, upland rice, and decentralization.
51.

The Director General is assisted by the Directors for Crops Research, for Resources Research and International Cooperation, and for Finance and Administration who have staff responsibilities as well as direct supervisory duties for the research and administrative functions of the Center. The research programs are each led by a Coordinator who works closely with senior staff in the program to achieve planning, implementation, evaluation, and dissemination of results. The organization structure of CIAT is presented in Figure 1.
52. The Panel is generally satisfied with the organizational structure with a few reservations. The division of responsibilities between the Directors of Crops Research and of Resources Research and International Cooperation is not clearly delineated and appears to be confusing to the scientific staff at times and also to those who cooperate with the Center. The Panel recommends that CIAT management reconsider the division of responsibilities assigned to these two positions.
53. The administrative style operating at top levels of management at CIAT is collaborative. The Director General meets regularly with the Directors and his assistant to discuss Center-wide policies and programs. All members of this administrative group are broadly knowledgeable on the programs of the Center and are capable of responding to concerns beyond the limits of their defined responsibilities. They appear strongly committed to the total program of the Center and its mandate.

54. The Management Review of CIAT was conducted concurrently with the Program Review and the two panels collaborated on questions of management. The Panel is generally in support of the recommendations made by the Management Review Panel. It strongly concurs with their recommendations concerning the administrative function.
55. At the time of the Review there were 56 man-years budgefed for international staff on minimum net core and 17 on extra-core. These figures are planned to increase to 64 and 29 in 1985 and to 73 and 24 in 1990 for the minimum requirements. These projections reflect a substantial decrease in the previously expected rate of growth of the Center's programs, and this trend appears realistic in view of anticipated levels of funding in the CGIAR system. The inclusion of an "optimum" core requirement has allowed staff to plan for long-term program needs should the funding situation become more optimistic. More specific manpower assessments appear in Chapters III, IV, V, VI, and XI.
56. Recruitment of international staff is the responsibility of the appropriate Director, as a line responsibility delegated by the Director General. The Director appoints a committee of three principal staff, always including the appropriate program coordinator, to advise and assist him in the process. The Director advertises the position and candidates are screened, with assistance of the committee.
57. The Center utilizes post-doctoral fellows effectively in its programs. It has a stated sabbatic leave policy but the Panel is concerned that frequency of such leaves appears low (seven during the last five year period). The Panel recommends that CIAT develop a plan to schedule sabbatic leaves on a regular basis.
58. CIAT submits a biennial budget proposal to the CGIAR which includes projections for the subsequent biennium. The donor members of the CGIAR provide funds on an annual basis for the Center's core operations and for capital expenditure. A member of the Group has the prerogative to support certain components of core operations and of capital requirements, and not others. This causes a differentiation between restricted and unrestricted core funding.
59. CIAT also has a number of extra-core special projects jointly with specific national programs and donors. CIAT has utilized this type of project very effectively to develop its outreach responsibilities in a number of countries for which present budgets would not have allowed development. The Panel commends CIAT for this imaginative approach and encourages it to continue its growth as long

[^6]as the projects are evaluated carefully for appropriateness to CIAT's mandate and do not adversely affect the balance of core programs.
60. The Center's approved budget for 1984 is shown in Table 1, along with comparative figures for 1980, 1981, 1982, and 1983. There has been an obvious levelling off in budget growth in recent years. In fact, when compared with the 1980 budget, it shows a reduction in excess of one million dollars (US). This is a reflection of the funding available to the CGIAR. This is closely linked to the manpower growth reductions in the Summary, Modifications to Long Range Plan (January 1984).

## 6. Recommendations

61. The Panel recommends that CIAT further explore its stated responsibility for developing linkages with basic research institutions in the developed countries, with the intent of increasing the amount of basic research conducted in support of its programs.
62. The Panel recommends that CIAT and its co-sponsors continue to pursue the attainment of international status with vigor and dispatch.
63. The Panel recommends that CIAT management reconsider the division of responsibilities assigned to the Directors of Crops Research and of Resources Research and International Cooperation.
64. The Panel recommends that CIAT develop a plan to schedule sabbatic leaves for senior staff on a regular basis.

TABLE I: CIAT BUDGETS AND FUNDING, 1980-1984 ́/ (US\$ $\times 1,000$ ह//)

|  | $\underline{1980}$ | $\underline{1981}$ | $\underline{1982}$ | $\underline{1983}$ | $\underline{1984}$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Board Approved | 21,317 | 21,566 | 21,834 | 21,379 | 19,924 |
| Baseline | N/A | N/A | 21,834 | 21,379 | 19,924 |
| Incl. Forward List | N/A | N/A | 22,028 | 24,576 | 21,444 |
| At Bottom of Fallback | N/A | N/A | N/A | 20,416 | 18,946 |

TAC Rec/CG Approved
Single Figure
Top of Bracket 20,639 21,231

N/A
N/A
N/A
Top of Bracket
N/A
N/A 22,028
20,829
20,336
Bottom of Bracket
N/A
N/A 21,209
19,931
19,411
Emergency Fallback

-     - 20,085
$\begin{array}{llllll}\text { Actual Funding } & 20,624 & 19,990 & 19,967 & 19,051 & 19,324\end{array}$

1/ Exclusive of special projects transferred to core
2/ In constant 1983 dollars

Inflation factors used:

| $1980-1981$ | 15.5 |  |
| :--- | ---: | :---: |
| $1981-1982$ | 12.8 |  |
| $1982-1983$ | 10.0 |  |
| $1983-1984$ | 3.5 | (current estimate budget request and <br> approval based on $8.5 \%$ ) |

3/
Current estimate

## CHAPTER III - BEAN PROGRAM

1. Background and Objectives

### 1.1. Background

65. CIAT has worldwide responsibilities within the CGIAR System for the improvement of bean (Phaseolus vulgaris) production. Beans are the most important grain legume for direct human consumption in the world. The crop is very important as a source of protein for the rural and urban poor in Latin America, its center of origin, and in East Africa, where a large amount of genetic variability has developed. It is predominantly grown by small farmers as a cash crop and for staple food in a wide range of cropping systems and in a large number of edaphoclimatic zones to which the crop is specifically adapted. A large proportion is intercropped with maize, and it is mostly grown on poor soils of difficult access.
66. In Brazil, Mexico, and Central America, beans constitute between $10-30 \%$ of dietary protein. In these countries and in East Africa beans are the main source of noncereal protein, because they are generally the most inexpensive form of protein. In countries such as Rwanda and Burundi, people derive more protein from beans alone than from all animal products combined. Static yields, and highly variable output and price, create a critical problem to millions of small farmers and poor urban consumers.
67. In some countries, such as Guatemala, Costa Rica, Nicaragua, and Cuba, the decline in production has halted. Guatemala, which had been an importing country, has begun to have an occassional small surplus for export as a result of the technology generated by CIAT in cooperation with the national institution, ICTA. However, in Latin America and Africa as a whole, per capita consumption is still less than it was some years ago. In Brazil it has decreased from 26 to 22 kg , thus further aggravating the problems of the poor. Brazil has an average production of 2.4 million tons, yet the yield per unit area is still decreasing. Under pressure from sugar cane and soybeans, beans are increasingly grown on poorer soils in the south of that country. Furthermore, beans are not favored in areas growing soybeans because both soybeans and beans are hosts of bean golden mosaic virus. As beans move to marginal land, soil-related constraints, such as soil acidity and associated lack of phosphorus availability, aluminum toxicity, and the inherent low capacity of beans for nitrogen fixation, become more important.
68. 

Beans suffer from diseases, pests, and climatic and edaphic constraints which result in very low and unstable yields (500-600 $\mathrm{kg} / \mathrm{hectare}$ ). Beans are among the most susceptible of the world's crops to diseases. Bean common mosaic virus, bean rust, anthracnose,
angular leaf spot, common bacterial blight, halo blight, and bean golden mosaic virus, can each cause losses as high as $80-100 \%$ on susceptible varieties. Similar losses can be caused by insect pests such as leafhoppers and pod weevils, although insects are generally considered less of a problem in beans than are diseases.
69.

Most varieties have an undesirable plant type and have pods in contact with the soil at maturity, leading to increased disease and crop loss. Many bush habit types have early and intense flowering characteristics that contribute to yield instability. Added to all these constraints are local consumer preferences, such as seed taste, seed color, and seed size.
70. Recently sources of resistance have become available to breeders, as a result of the cooperation of the CIAT Bean Program with national bean programs of increased strength. This has resulted in more resistant germplasm and varieties.
71. The goal of the Bean Program is to increase bean yields in collaboration with national research efforts and to stabilize production at increased levels, by conducting research on the principal constraints in the Western Hemisphere and Africa. The Panel interprets this as meaning that CIAT, with apropriate research, can develop new technology which, in conjunction with the work of national programs, will lead to increased vield.
72. The specific objectives are:
"1) to develop, in collaboration with national research institutions, improved technology for common beans, particularly germplasm providing higher and more stable yields, which will lead to increased national production and productivity in those Western Hemisphere, countries where the crop is an important food source;
2) to assist in achieving the same objectives in other regions, particularly Eastern Africa, through institutional arrangements in which CIAT can provide an input and allow advantages to be taken of work done in Latin America;
3) to selectively strengthen existing national bean research programs through training and the establishment of a bean research network of collaborating professional scientists" (CIAT in the 1980s).

### 1.2. Research Strategy

73. The primary focus in germplasm improvement has been on breeding for important disease and insect resistance or tolerance in a range of selected commercial grain types. The Program considers that this emphasis should continue throughout the 1980 s and diminish as
national programs increase research in this area. It will then be possible for CIAT to give increased attention to providing more stable resistance sources and studying disease epidemiology. "In addition, the Program has increased attention to improvement of other germplasm characteristics. These include nitrogen fixation and drought tolerance and some soil-related constraints, particularly low phosphorus availability " (CIAT in the 1980s). Thus, the Program is placing more emphasis on research to raise the yield potential of improved varieties, an objective which will continue over time.
74. The Panel endorses these objectives and recommends that a larger effort should be given to breed for higher yield potential under higher inputs for the following reasons:
1) The objective of achieving higher yield stability is being achieved through the release of varieties with resistance to several of the main diseases. Diminishing risk factors will allow small farmers to grow high-yielding varieties at increased agronomic input levels.
2) Many small farmers have a flexible attitude when managing their enterprise. If the input/output relationship is favorable, they do not hesitate to use higher input levels to optimize profits. For instance, the small bean farmers of Southern Colombia use fungicides, insecticides, and fertilizers, and change varieties and other technology if they consider it profitable to do so. Similarly, the small bean farmers of Guatemala, when given the possibility to grow high-input but also highly profitable vegetable crops, have changed part of their land use to these crops by applying an intensive technology of which they were previously unaware, or considered too risky.
3) Consumers are also potential beneficiaries of new bean technology. It is imperative to enable the ever increasing numbers of urban poor to buy cheap good quality food. This is possible through cost-reducing technology. This objective could be attained by increasing yield capacity to allow the small farmer to have a sufficient profit while lowering the price of the product for the consumers and stimulating bean production by medium and large farmers.
4) The Bean Program has relative advantages in breeding for high yield potential: the critical mass of scientists; a large amount of genetic variability; the necessary facilities; and good international connections.

## 2. Program Activities

### 2.1. Germplasm

75. The bean germplasm collection comprises 33,290 accessions of the four cultivated species Phaseolus vulgaris, P. lunatus, P.
coccineus, and $P$. acutifolius, and 10 wild noncultivated species. About 29,000 of the cultivated accessions are P. vulgaris. This is an impressive and a very important collection. The Panel commends the Bean Program for assembling and utilizing this collection. The Program sees the need for further discussions with IBPGR for the definition of an appropriate descriptor list for the germplasm, including the development of a minimum list.
76. Although the collection is still growing, the Program considers that more emphasis should now be given to maintenance, classification, documentation, and evaluation. The facilities for maintenance are not adequate. The drying facilities can process a small amount of samples ( 60 per week) and only 3000 samples can be conveniently stored at -6 to $-2^{\circ} \mathrm{C}$. About 17,500 samples can be stored at $5-8^{\circ} \mathrm{C}$. Because of absence of quarantine facilities only half of the collection can be evaluated for breeding purposes.
77. Although CIAT-Palmira has a postquarantine glasshouse for treated seeds from countries which have disease problems, such as bacterial wilt and virus diseases such as bean southern mosaic virus and bean mild mosaic virus, plants are only visually inspected. However, a Seed Health Laboratory has been created within the GRU which will utilize ELISA testing methods, enabling more reliable detection of disease. These diseases are only found in material from Puerto Rico and from European and African countries.
78. 

Currently about 100 breeding lines from Africa can be cleared per year for use at CIAT through USDA (Prosser, Washington) acting as a third country quarantine. To further increase the availability of African materials and make quarantined germplasm from the gene bank available, preliminary consultations have begun with USDA, Pullman, Washington. Contacts have also been made with Kew (U.K.), and Wageningen (Netherlands) concerning the possibility of using these institutions for third country quarantine.
79.

The Panel recommends that a solution be found as rapidly as possible to allow any necessary movement of seeds from high risk to low risk areas and from Africa in order to implement fully the East African bean breeding project and to allow the possibility of evaluating the whole collection.
80.

CIAT is able to evaluate routinely 16,500 accessions every time a new character is sought. The remaining half of the collection is held in quarantine and is unavailable.
81. It is planned to double the present cold storage facilities, but even that is clearly insufficient. The current requirement of the Colombian Government to save energy by requiring CIAT to reduce the expenditure of energy by $10 \%$ is an additional constraint to be resolved.
82. For reasons of security, an agreement with CENARGEN/EMBRAPA (Brasilia, Brazil) is to be signed which will allow a duplicate of
each accession in the collection to be stored in that institution which has good cold storage facilities. The Panel supports CIAT's moves to ensure the safety of the collection by storage of duplicate samples through arrangements similar to those pending with CENARGEN/EMBRAPA.
83. Through a special project, the lima bean collection is to be multiplied and documented.

### 2.2. Plant Breeding

84. In view of the large number of constraints to which the crop is subjected, a major effort has been made to incorporate resistance to diseases and pests, and tolerance to drought stress and acid soils, into different plant types. This is resulting in increased yield stability. Many desirable characteristics exist in breeding lines and/or varieties released in collaboration with national programs. The strategy now is to decentralize the breeding program by strengthening national programs through training and increasing the number of outposted staff. This staff will help national scientists to develop varieties adapted to the local conditions.
85. Establishment and maintenance of an international bean research network is the basis for the interchange of materials and information among national programs and between CIAT and national programs.
86. The principal means of international distribution of superior germplasm was originally the International Bean Yield and Adaptation Nursery (IBYAN). The IBYAN trials take into account local consumer preferences and agronomic requirements. Experimental lines, developed either by national programs or CIAT, as well as germplasm accessions, and check entries are compared. The objective is to identify superior material. In this way, varieties developed in one country have been adopted in another.
87. As national programs become strengthened, other network nurseries in addition to IBYAN have been developed such as the Preliminary Yield Trıals (EP), First Uniform Nursery (VEF), International Bean Rust Nursery (IBRN), International Web Blight Nursery (VIM), International Anthracnose Nursery (IBAN), International Empoasca Resistance Nursery (IERN), International Drought Nursery, and International High Temperature Nursery. The next step has been to send out segregating material and parental lines as national programs strengthen further.
88. The networks, which are supported by outposted staff, visits of CIAT-Palmira staff, staff training, workshops and meetings, have created an international bean research community in Latin America which uses as efficiently as possible all the human and physical resources of the network. This model is also being developed in Africa. This enabled the national programs to release more than 40 varieties, each one of them combining the resistance to several
diseases, thus helping to achieve the stability objective in these countries. Resistance to rust, anthracnose, bean common mosaic virus, bean golden mosaic virus, common bacterial blight, halo blight, web blight, and pests such as leafhoppers, storage pests, bean pod weevil, and bean fly have been identified and incorporated into some varieties.
89. 

There is still a large amount of work to be done in this field. New sources of resistance have to be found or incorporated, and in some cases, the resistance within Phaseolus vulgaris is not satisfactory. Therefore, in collaboration with the Faculty of Agronomy of Gembloux (Belgium) and with the University of California, Riverside, interspecific crosses and multiple crosses with $P$. coccineus and $P$. acutifolius have been made and $F_{1}$ to $F_{4}$ and backcross material is being grown with the expectation of increasing the variability of $\underline{P}$. vulgaris. In addition to the usual difficulties of interspecific hybridization, a particular difficulty in $\underline{P}$. vulgaris is the small size of the chromosomes which result in a very small number of recombinations.
90. The Panel commends the work done by CIAT in breeding for resistance to the major pests and diseases and also CIAT's collaboration with developed country institutions in this field.
91. Photoperiod sensitivity has limited the movement of germplasm to high latitudes. Research on photoperiod insensitivity, temperature adaptation, and their interaction has allowed a clear understanding of their effects on bean growth. This understanding has decreased restriction of movement of germplasm between some regions, increasing the possibilities of the breeding work.
92.

Breeding for other constraints such as for increased nitrogen fixation has continued in an indirect way, using Rhizobium strains selected by the microbiologist who left CIAT three years ago and which are maintained by a research assistant. The present situation is not satisfactory in view of the importance of Rhizobium in bean production. The Panel recommends that strong efforts be made to fill the vacant position of the microbiologist and, in the meantime, ways be found to further share the services of the microbiologist of the Tropical Pastures Program.
93. Some advances have been made in identifying high-yielding plant types which show real promise for increasing yield potential. As discussed under research strategy, the Panel has recommended that greater effort be devoted to breeding for high yield potential.
94. For this research the collaboration of a plant physiologist will be required, thus the Panel recommends every effort be made by CIAT to ensure that the plant physiologist position be filled.
95. The Bean Program has begun a limited effort in the breeding of snap or green beans, which it considers to be important. The Panel is not aware of data to support this assumption. Therefore, the Panel
recommends that a study on the importance of snap beans should be made before a commitment is made to a long-term program.
96. Breeding work done in Colombia is at CIAT-Palmira which concentrates mainly on crossing, plant architecture, rust, and BCMV resistance; at the Quilichao substation on tolerance to low soil fertility conditions and some diseases; in Popayan (under medium altitude) on resistance to diseases prevalent under those conditions; and in collaboration with ICA, at the ICA experimental stations of La Selva ( 2200 m ) and Obonuco, Nariño ( 2700 m ) under low temperature conditions. Breeding is now increasingly done in collaboration with national institutions in many countries of Latin America.

### 2.3. Plant Protection

### 2.3.1. Plant Diseases

97. Work in bean pathology has focused on breeding for resistance to the more important diseases and on integrated control. Three viral, two bacterial, and four fungal diseases in bean have been emphasized in breeding for resistance.
98. Bean common mosaic virus (BCMV) continues to be the most important viral pathogen. The existence of strains capable of inducing a hypersensitive necrosis constitutes a potential threat. Studying the epidemiology of bean southern mosaic virus (BSMV), has been difficult due to the symptomless-to-mild reaction and the lack of a highly specific antiserum. Both BSMV and BCMV are seed-transmitted. Bean golden mosaic virus occurs in many countries in the region. High levels of resistance are available in black beans and are being sought in other color groups.
99. 

The more prevalent fungal diseases studied are anthracnose, angular leaf spot, rust, and web blight. Some of the less widespread, but locally important, are Ascochyta leaf spot in the Andean zone, round leaf spot in the highlands of Mexico, and downy mildew causing severe damage in Mexico and Costa Rica. Web blight management strategies have been developed. They include the use of mulch created by weeds, previously killed by herbicides, in addition to application of the fungicide Benomyl. Rice hulls and fungicide also diminish the inoculum levels. Rotation with a nonleguminous crop (maize) or fallow also reduces disease. High plant density generally is conducive to high levels of disease pressure.
100. There is wide pathogenic variation in the anthracnose fungus from one area to another in Latin America. Work on this subject has been developed in a collaborative project with IVT (Netherlands). Most anthracnose-resistant materials (tested under both greenhouse and field conditions) have been grouped in the International Bean Anthracnose Test (IBAT).
101. With Ascochyta leaf spot, monoculture and intercropping with maize caused no significant differences in disease severity, except in
highly susceptible lines. Progeny from interspecific crosses of Phaseolus spp. provide encouraging results for resistance to common bacterial blight. The incidence and severity of halo blight in susceptible cultivars was greater in monoculture than when intercropped with maize. High plant density also increased disease levels.

### 2.3.2. Insects

102. The Bean Program has an active breeding program for insect resistance. The main pests identified include the whitefly, the vector of BCMV, leafhopper Empoasca, Apion, Heliothis pod borers, slugs, leaf feeding beetles, bruchids, African bean fly, and stinkbugs. The detrimental effect of these pests, and their biology and control, have been investigated and breeding projects for resistance have been commenced.

### 2.4. Microbiology

103. From 1977 to 1981 a microbiologist worked in the Bean Program. Rhizobium strains were selected which effectively nodulated with beans and were highly tolerant to acid soils. It was found that later-maturing beans fixed more nitrogen suggesting that the carbohydrate supply was the key to increase nitrogen fixation. Screening methodologies in segregating populations under greenhouse conditions and field evaluation methods involving addition of molybdenum, lime, and peat were developed. High nodulation and anthracnose resistance were combined.
104. The Program is continuing to select for high nitrogen fixation ability by inoculating with some of the selected strains and looking indirectly for vigorous plants under low fertility and acid soil conditions. However, as shown in the plant breeding section, the work conducted under these conditions is not satisfactory for a Center which must have a high standard of research; in the absence of a microbiologist the Rhizobium strains may get lost, and new strains and methodologies have to be identified.

### 2.5. Plant Nutrition

105. Research in plant nutrition is mainly in support of breeding for tolerance to moderately acid soils, low in phosphorus content. Fertilizer research is mostly confined to on-farm trials. Selection of segregating breeding populations is compared under high and low fertility in Quilichao and Popayan.
106. The Panel considers that research on phosphorus is needed to understand better the balance between vegetative growth and seed set.
107. In order to work with the breeding under higher input levels, or under unstressed nutritional conditions, extra support from a plant nutritionist/soil scientist is needed. The Bean Program is looking at present for a post-doctoral fellow in soil science to
strengthen the research of the soil scientist, stationed in Brazil, whose work load as liaison scientist allows for only part-time research on soil science.
108. As there is no vacant position in soil science to be filled, the Panel notes that it is desirable that the plant physiologist or microbiologist to be appointed have some soil science training to help in the elucidation of some of the plant nutrition problems until it is possible to recruit a soil scientist.

### 2.6. Agronomy and On-Farm Research

109. Most agronomic research on beans is location-specific and is best conducted by national programs. The agronomy research of CIAT consists mainly of on-farm research with a farming systems perspective (OFR/FSP). There are three principal linked objectives:
"a) The feedback of information to breeding programs on the performance of new technologies, especially varieties, in farmer's existing cropping systems.
b) The adaptation of methodologies for on-farm research to cropping systems which include beans," for use in training.
c) "The training of national program scientists in these methodologies." This is aimed at strengthening bean national programs with subsequent feedback information to CIAT's network.
110. "A fourth objective is expected gradually to increase in importance, namely the support of national program scientist conducting on-farm research in areas where beans are an important crop, through the formation of a network, initially in Latin America." (Internal Program Review, 1983).
111. Due to the variability of ecological conditions where beans are grown and the restricted adaptability of bean varieties, trials in numerous locations are necessary for the initial screening of germplasm. The choice made by the Bean Program to use on-farm trials for that purpose was opportune and economical.
112. The selection of the collaborative farms was done after brief and limited surveys in two diverse regions in the south of Colombia. Subsequently, trials have been made of varieties and new lines, and also of agronomic practices (different fertilizer levels, plant density, maize varieties where climbing beans were cultivated in intercropping, etc.).
113. These surveys gave a statistical description of the current bean practices, showing a surprisingly high percentage of farmers using chemical fertilizers, fungicides, and insecticides. But limited attempt was made to understand the place of beans in the complete system of each farm (which would have required observations on labor inputs, rotations, other agricultural and non-agricultural family
activities, etc.) or to do, at least, a provisional grouping of farms focussed on bean production.
114. The on-farm trials have been giving valuable feedback to the breeders and have been useful for the first on-farm short intensive course (1984). They also allowed an initial technical and economic evaluation of new bean technologies. However, the high profitability of these technologies, calculated after one year (1983), should have been interpreted more cautiously, due to the particular conditions of the collaborating farmers, who had guidance from research workers and had some "insurance" against the risk of failure.
115. In order to analyze the future direction of OFR in the CIAT Bean Program, a workshop was held in 1983 at CIAT. One of the conclusions was that it doubted if the two first goals could be simultaneously achieved with the current human resources (one agronomist and 0.4 economist.), which is very low relative to other IARC's. Therefore, the workshop suggested, "the program should take a decision whether one or both goals to be given priority." It also recognized that at present, "the CIAT OFR Program is probably more readily prepared to offer training with an on-farm germplasm testing focus than whole farm OFR training." This is interpreted by the Panel as been more readily prepared to fulfill objective (a), and partially, (c).
116. The Panel agrees with this conclusion. In developing countries, national institutions are not adequately aware of existing farming systems. However, to provide adequate training in OFR/FSP, CIAT must first acquire more experience with a range of methodologies which can be compared (See Chapter XI). The Panel believes CIAT has not adequately clarified its objectives in carrying out on-farm trials.

### 2.7. Economics

117. The small economics team, comprised of one senior staff and two assistants, has divided its time more or less equally between work related to on-farm research (mentioned previously) and specific research on different topics.
118. Preliminary macroeconomic studies have been made on beans in Latin America, studying production, consumption, prices, international exchanges, agricultural policies, and the world bean market.
119. A study on bean consumption in Cali and Medellin, Colombia, carried out without direct participation of Colombian institutions, documented the degree of complexity of consumer preferences and gave information on the possible price movements of the different bean types as a function of supply. This information will be useful in the ex-ante economic evaluation of the transfer of technology to bean producers.
120. Such economic studies and continuing interchange among researchers has resulted in a critical analysis on the relationships among research, technology, and different social groups of bean growers, in particular small farmers. The Panel is of the opinion that this type of critical reflection can be of considerable importance in the orientation of research programs.

## 3. Staff and Facilities

121. At present there are 12 senior scientists core positions: one entomologist who works $90 \%$ of his time as Coordinator, three plant breeders, one pathologist, one virologist, one agronomist in Brazil, one agronomist in international germplasm, one agronomist in cropping systems, and one economist. One of the twelve positions, the microbiologist, is vacant and the physiologist position is currently filled by a visiting scientist. In addition there are four post-doctoral positions or visiting scientist, one of these being vacant. One Rockefeller Foundation funded anthropologist is stationed in Africa. There is a visiting scientist in plant pathology who will form part of the East African program. There are 25 research associates and assistants.
122. Outposted staff consist at present of nine scientists financed largely by extra-core funds: three scientists in Central America and Caribbean, a coordinator (pathologist), a cropping system agronomist, and one breeder funded by SDC; three in the Great Lakes area of Africa (Rwanda, Burundi, Zaire), one breeder, one pathologist, and one cropping systems agronomist (currently vacant) funded by SDC, and the above mentioned post-doctoral in anthropology. Funding for the other extra-core positions in East Africa (Ethiopia, Kenya, Uganda, Somalia) has been requested from the Cooperation for Development in Africa (CDA). Also, one agronomist is stationed in Peru under a bilateral agreement (see Chapter XI).
123. The expansion of outposted staff reflects the specific strategy of the Bean Program to strengthen local breeding programs, at the beginning with CIAT staff and afterwards, as the national institutions gradually strengthen, with the gradual phasing out of the CIAT staff. With this in mind, CIAT contemplates the gradual phasing out of the Central American and Caribbean Program with the exception of the regional liasion officer. The Panel commends the effectiveness with which this Program, led by an experienced senior scientist, has coordinated the human and physical resources of that area. It recommends that a similar model be used in other areas.
124. The recruitment of new staff has presented some difficulties as evidenced by the existing two vacancies; one has been vacant for three years, the other for five. However, the 1981-1982 budget constraints were responsible for CIAT keeping these positions vacant for more than two of these years.
125. The CIAT facilities are adequate at Palmira and in the substations and ICA collaborating research stations, with the exception noted in the germplasm section.

## 4. International Cooperation

### 4.1. Developing Countries

126. The Bean Program stresses the importance of strengthening the national programs by provision of germplasm, training and information. Finished breeding lines are provided for the small national bean research organizations and, as these develop, CIAT provides promising parental material and applied research methodology from which national programs generate their own finished varieties and associated cultural practices. Such decentralization and collaboration is clearly necessary to make efficient progress in bean improvement.
127. A good example is the Central America and Caribbean Project in which a bean research network has been formed that interacts positively with other countries of Latin America.
128. Horizontal transfer of varieties bred in one country has enabled other countries to release them, for example, Talamanca, a variety bred by ICA (Colombia) is one of the most important varieties in Costa Rica, and a variety released in Guatemala, ICTA-Quetzal, was also released in Argentina as DOR 41. A total of 476 local scientists and some extension personnel have been trained at CIAT. They speak the same scientific language, and have high regard for the CIAT liasion officer. The good working relationships between scientists has aided the solving of regional problems such as resistance to bean golden mosaic virus in Guatemala and Mexico, web blight in Costa Rica, and Apion in Honduras and Guatemala.
129. The Bean Program now faces a big challenge in Africa where, in time, a similar impact can be anticipated if the same ability to adapt to the local conditions is developed. In Africa, CIAT has requested funding from three different sources, SDC for Rwanda, Burundi, and East Zaire; CDA for Ethiopia, Kenya, Uganda, and Somalia; and SADCC for Southeastern Africa. Funding for the first project has been obtained. The Bean Program intends to place nine scientists in the three projects, coordinated by a scientist, possibly core-staff budgeted.
130. The initial research strategy is to test the most promising material in Africa and then make the appropriate crosses in CIAT-Palmira, followed by bulk breeding. Highly variable $F_{4}$ bulks, with appropriate disease resistance, are then sent to African national programs for individual plant and line selection. The national breeders will be assisted in this work by the project staff.
131. In general, the national bean programs visited by the Panel were very satisfied with the work of the Bean Program and were anxious to continue to collaborate. It is almost impossible for a national program to have the freedom of movement, interchange of ideas and materials which CIAT provides.

### 4.2. International Agricultural Research Institutions

132. CIMMYT provides advice on suitable maize material for trials with climbing beans bred in collaboration with the Instituto Colombiano Agropecuario (ICA). New maize germplasm for on-farm research, is provided by ICA, which works in close collaboration with CIMMYT.
133. With the AVRDC (Asian Vegetable Research Development Center), the Bean Program is breeding for resistance to the bean fly, a serious African pest. A good working relationship exists with IBPGR, especially since 1982 when the regional liasion officer for Latin America was posted at CIAT.

### 4.3. Other Institutions

134. Good collaborative research exists with Gembloux (Belgium), the University of California, Riverside, in interspecific hybridization and also with other CRSP (Bean and Cowpea Collaborative Research Support Program) universities, with the Institute for Horticultural Breeding (IVT), the Netherlands, in breeding for resistance to BCMV, and recently with several institutions in the United Kingdom. Also an agreement with INCAP (Guatemala) provides for selection for bean nutritional quality. The Bean Program should be complemented on the establishment of the linkages and encouraged to continue to seek additional joint relationships.
135. Review of Current Research Direction and Future Plans
136. The Bean Program continues to place its main emphasis on breeding for resistance, since it has the backup of two plant pathologists. The Panel considers that rapid progress in disease resistance breeding and improved understanding of disease variability should allow the Program to change gradually its emphasis as projected in "CIAT in the 1980s," as follows:
1) increasing its attention to yield potential under non-stress conditions;
2) tolerance to sub-optimal soil fertility (support from a soil scientist will be necessary);
3) increasing bean quality; improved knowledge and methodology is expected to become available, mostly through collaborative projects, which will enable the Program to breed for
improved protein content, reduced cooking time, and improved digestibility.
136. Further training on on-farm research has to be done to develop the capability of the national organizations to ensure that new technologies will perform well at the farm level. The Panel agrees with this, but suggests CIAT needs to clarify its thinking about on-farm trials and on-farm research.

## 6. Training

137. Training is considered a crucial component of the Bean Program strategy to promote the development of new bean technology. At the inception of the Program, two short multidisciplinary courses, aimed at national program research and extension specialists, were conducted annually. Subsequently, since 1978 the Bean Program has been offering only one annual course, of shorter duration (eight to five weeks), followed by a four month individualized, discipline-based training directed to researchers. Emphasis of the training has also changed for the better; previously much attention was given to the bean research network and the possibilities of germplasm and information exchange, but national problems are now taken more into account through the development of national program research leadership. In 1984 a new eight-week course in on-farm research methodologies has commenced, under Ford Foundation funding, as a pilot project.
138. Since 1978, 23 in-country courses have been organized (averaging six courses/year with about 25 participants over the last three years) by the Bean Program with decreased participation of CIAT staff. Their objective is to improve the capacity of national extension services to support the diffusion of newly released varieties and their appropriate associated agronomy.
139. Individual graduate research training in the Bean Program (M.S. and Ph.D. thesis preparation) has been useful to both the trainees and the Bean Program. The general assessment and recommendations on CIAT training activities, presented in Chapter IX, are relevant to the Bean Program.

## 7. Achievement and Impact

140. The Bean Program is a strong and active group. It has built an international research network in Latin America through the development of national bean programs and coordinates collaborative research work within and between countries. (See plant breeding section for more detail.) It also has accummulated a very important collection of bean germplasm.
141. It has provided lines and segregating material to the national research organizations, enabling them to release more stable varieties, resistant to the main diseases and pests. In the last years 40 varieties in 16 countries in the Americas and two in Africa were released, all being resistant to BCMV (which has been incorporated into all lines leaving CIAT). Some combine resistance to angular leaf spot, bean golden mosaic virus, anthracnose, common bacterial blight, and rust. Also many improved lines combine up to five desirable characters.
142. In 1982, the linkage between red seed color and susceptibility to BCMV was successfully broken, allowing the breeding of red-seeded resistant varieties.
143. The new varieties are beginning to be used by the farmers. For example: in Guatemala, according to preliminary data, $40 \%$ of farmers in certain regions have adopted the new varieties; in Costa Rica in one important bean area, over $50 \%$ of the farmers; in Nicaragua, it is estimated that from 20 to 30,000 hectares are planted to them; in Cuba, about 25,000 hectares, and in Argentina, 30,000 hectares. These varieties are beginning to spread to the other countries.
144. New plant types have been developed with improved plant architecture. The understanding of the temperature and photoperiod response and their interaction has provided an adequate methodology for breeding. Also new breeding methodologies have been developed.
145. In several countries productivity has begun to increase. However, because most national statistics for beans are weak, it is impossible to make accurate estimates. For that reason, the Program intends to have two research associate economists to evaluate the impact of bean improvement in Central America.

## 8. Constraints and Weaknesses

146. The following constraints are noted:
1) There is difficulty in recruiting senior staff, exacerbated by budget limitations during two and a half years.
2) The Bean Program core staff scientists each publish about one paper in scientific journals per year, less if the post-doctorals and visiting scientists are included. CIAT is developing important information on new breeding methodologies, new breeding material, new diseases and their control. However, CIAT does not sufficiently encourage publication of such findings in scientific journals, even though they are shared with other research workers in the "Hojas de Frijol," a bean newsletter, which is only published in Spanish. The Panel recommends that research staff should be encouraged to publish their work in international scientific journals.
3) Because of budgetary restrictions it is not possible to bring enough specialists from the developed world to CIAT for discussions. The Panel suggests that a special effort be made to invite eminent scientists to CIAT to discuss the work of CIAT staff to strengthen the ties with the international community.
4) There is a lack of continuity of the professionals in the national organizations, and the lack of contact between national research, extension and seed producing institutions, retard the progress of the Bean Program.

## 9. Assessment

147. The Panel considers that the Bean Program has made important progress and is fulfilling its stated objectives in collaboration with the national programs. The Panel approves the expansion of the Program into its mandate in Africa with the qualifications about such expansion given in Chapter XI.

### 9.1. Implementation of the Recommendations by the 1977 QQR

148. A third plant breeder for $P$. lunatus was recommended but the recommendation did not receive TAC's endorsement. The third plant breeder was hired for breeding in $P$. vulgaris.
149. It was recommended that better information be obtained on the location and extent of the different ecological zones in which beans are grown. A preliminary classification of bean growing areas into 110 microregions based on climatic data has been made and a data base on climate, soils, and cropping systems assembled.
150. As recommended by the 1977 QRR a new postquarantine greenhouse for screening seed lots was built. There still exists some quarantine problems as mentioned in the section on germplasm.
151. Training courses for the production and multiplication of clean seed have been given by the Seed Unit.
152. Problems with the identification of new diseases have been solved.

## 10. Recommendations

153. The Panel recommends that a greater effort should be made in breeding for higher yield potential under conditions of higher soil fertility.
154. The Panel recommends that a solution be found as soon as possible to allow the movement of seeds from high risk to low risk areas, in order to allow the evaluation of the whole bean collection and to facilitate the movement of seeds, especially from Africa. (Also see seed pathology proposal in Chapter VIII and Chapter X.)
155. The Panel recommends that strong efforts be made to fill the vacant position of the microbiologist and plant physiologist. In the meantime, ways should be found to further share the services of the microbiologist of the Tropical Pastures Program.
156. The Panel recommends that a study of the importance of snap beans should be made.
157. The Panel recommends that publication of the important results be encouraged in international scientific journals.

## CHAPTER IV - CASSAVA PROGRAM

## 1. Background and Objectives

158. Cassava originated in the Americas where it has been a major staple food in the tropical lowlands since the pre-Colombian period. It spread quickly from Latin America to Africa and Asia where it has become important as a human food and for processed products. During the colonial period it was developed for export as starch or tapioca pearl or as a famine reserve crop.
159. Today cassava continues to be a food crop for humans in Africa, and parts of Asia and Latin America. In the tropics it ranks fourth, after rice, sugar cane, and maize, as a source of carbohydrates produced and consumed in the tropics. For Thailand, it has also become a major export commodity for animal feed, and has been considered a potential raw material for ethanol alcohol production. It can be used in bakery products as a partial substitute for wheat flour.
160. Cassava is grown mostly by small farmers, mainly under subsistence conditions, although some large farms produce it also. It is well suited to acid, low fertility soils, and was long considered a "poor man's crop". It tolerates drought well and can be left in the ground for long periods.
161. Because of its hardiness and adaptation to marginal conditions, cassava has readily found a place in shifting cultivation and on farms where multiple cropping is practiced. In Latin America, where $60 \%$ of cassava farmers cultivate 10 hectares or less, about 45\% of the cassava area is intercropped. Maize is the most common intercrop. Few or no purchased inputs are used to grow the crop, and land preparation and labor are usually the major costs for farmers growing cassava.
162. World cassava production is about 130 million tons, of which about one-fifth is produced in Latin America (75\% of this in Brazil), and about 40\% each in Africa and Asia. Brazil is the largest producer followed by Thailand, Indonesia, Zaire, Nigeria and India. In general, while world production is rising, annual production gains are lower than in the major cereals, and entirely from increase in area planted. In Latin America, where cassava is principally used directly for human food, production is about static or even decreasing.
163. Cassava has a limited research history. Few scientists were involved in cassava research before World War II, and these persons were isolated so that information exchange was limited. Therefore, when CIAT and IITA were established and given research responsibilities for cassava, knowledge concerning the crop was limited. A whole new
cadre of scientists had to be mobilized to comb the literature, consult with older researchers who had pioneered in Asia, Africa, or Latin America, and begin to assemble germplasm. Impressive progress has been made since that time.
164. One of the first challenges was to learn as much as possible about cassava as a crop plant, its growth and yield potential, its behavior under different types of management, its breeding behavior, pests and diseases.
165. New breeding programs were established, building as much as possible on the experiences of past programs in the colonial period and in Brazil. At first CIAT adopted a strategy of wide adaptability, but this proved unsuccessful, and a shift was made to developing cultivars for specific conditions. As research progressed, old ideas about cassava had to be discarded. Despite its hardiness, cassava can be attacked and damaged severely by pests and diseases, and it responds to fertilizers and to weeding. Researchers continued to confirm its high yield potential under conditions less favorable for other crops. When studied further, cassava turned out to be a hardy, productive plant with considerable genetic potential for improvement and quite well adapted to improved management.
166. Since its inception in 1971, the CIAT Cassava Program has made considerable advances in research and training and in encouraging the development of national research programs. They have built a sizable germplasm collection which has been useful in breeding.
167. The breeding program has distributed improved material which is in an advanced stage of selection and evaluation by countries in Latin America and Asia. However, while rice production in Latin America during 1960-1980 rose $3.4 \%$ annually, maize by $2.9 \%$, and sorghum by $11.4 \%$, cassava production increased only $1.7 \%$ per annum. In the same period cassava production in Asia rose $7.8 \%$ annually.
168. The main explanation for the virtual stagnation of cassava production in Latin America is that traditional markets for the crop are more or less in equilibrium. New end-uses have to be found if demand is to increase but the greater use of cassava by industry will depend on government policies. For example, subsidies on locally produced and imported wheat make it difficult for cassava to compete as a substitute for cereal flours in bakery products. In the last decade food consumption patterns have changed and a result has been major growth in the poultry industry. However, this coincided with easy availability of international credit which allowed Latin American countries to purchase grain at very competitive prices on the world market. At present the situation is changing and these countries may increasingly be forced to find a substitute for imported grain.
169. This situation has influenced the current CIAT Cassava Program. Thus in Latin America emphasis is on methods to improve cassava utilization, particularly on the development of methodology for small-scale production of dried cassava for animal feed (for
poultry and swine) and on extension of shelf life as a possible means of increasing consumption of fresh cassava. These are simple technologies which may have application elsewhere.
170. In Asia the situation is different. Compared with Latin America the outlook for cassava is relatively buoyant with a great variety of end-uses for home consumption and for export and domestic markets. There CIAT has a more traditional role of generating improved varieties and production technology.
171. The Cassava Program possesses a highly motivated and experienced staff, a considerable body of research information and technology where little existed before, an impressive and important germplasm collection, and a network of former trainees, particularly in Latin America and Asia. It wishes to use these advantages to improve cassava production around the world. Its present objectives and future plans have been developed with that goal in mind.
172. The objectives of the Cassava Program are to: (1) develop germplasm and cultural practices based on low-input levels and responsive to improved management to increase cassava productivity in areas where cassava is presently grown; (2) develop germplasm and cultural practices based on medium-input levels to increase cassava production in the acid, infertile soils of the lowland tropics; (3) develop systems to reduce perishability of cassava and allow more efficient use of cassava for direct and indirect human consumption;
(4) strengthen national cassava research and development programs so they may more effectively carry out their role.
173. The principal ways in which CIAT plans to achieve its objectives are by: (1) developing a strong research program; (2) transferring both the technology of improved production systems and of improved genetic materials to national agencies for further development and application to local situations; (3) contributing to the training of scientists and personnel of development institutions in national programs, at CIAT and in the countries concerned; (4) cooperating with national institutions in promoting the integration of research in production, utilization, and marketing of cassava by supplying technical advice.
174. The Program has changed its objectives slightly since the 1977 QQR, placing more emphasis on reducing losses of the perishable roots by processing and on strengthening national programs and improving international cooperation. The Program considers that reduction of root losses because of perishability is such a major need that improved genetic materials and production practices may be wasted unless food end-use or processing are considered as an integral part of production.

## 2. Program Activities

175. The Cassava Program comprises biological, economic, and processing activities.

### 2.1. Agroecological Studies

176. The cassava breeding program began with the objective of breeding for wide adaptability. This was soon found to be unrealistic given the wide range of environmental conditions under which cassava is grown, and led to the characterization of cassava-growing systems into six edaphoclimatic zones (ECZ) based on climatic and soil factors and each with its characteristic pest and disease complex. The six zones are (1) lowland tropics with long dry season, low to moderate annual rainfall, high year-round temperature; (2) acid soil savannas with moderate to long dry season, low relative humidity during dry season; (3) lowland tropics with no pronounced dry season, high rainfall, constant high relative humidity; (4) medium altitude ( $800-1500 \mathrm{~m}$ ) tropics with moderate dry season and temperature; (5) cool, tropical highland ( $1600-2200 \mathrm{~m}$ ) areas with mean temperatures of approximately $17-20^{\circ} \mathrm{C}$; (6) subtropical areas, with cool winters and fluctuating daylengths. A11 but ECZ6 are found in Colombia. This permits decentralization of the selection process. It enables CIAT to send collaborating countries germplasm matched to their specific environmental factors. Greatest emphasis is put on breeding for ECZ1, followed by ECZ2. A limited input is put into ECZ5 and ECZ4 which are relatively unimportant in terms of world cassava production. More effort than at present needs to be put into ECZ3 and ECZ6. Zone 6 screening is done temporarily in Cuba, but this is seen only as an interim measure until resources are available for the Program to establish work in a better location.

### 2.2. Germplasm

177. Since the 1977 QQR the cassava germplasm collection has increased from about 2400 to 3400 accessions. In addition to storage as seeds in a cold room, two-thirds of the collection is held in in vitro culture. CIAT, in collaboration with the IBPGR and nationaT programs, plans to continue collections of wild and cultivated cassava with major emphasis on material from edaphoclimatic zones poorly represented in the collection.
178. Basic descriptors for cassava have been defined by an IBPGR working group and more than half of CIAT's collection has been evaluated using these descriptors.
179. Germplasm evaluations have shown that extensive variability exists for all important agronomic traits so that genetic improvement will play a key role in increasing productivity. Yield potential of most accessions is low. Although cassava as a species is adapted across a wide range of environmental conditions, most individual clones are narrowly adapted to the conditions of the region where they
evolved. Levels of resistance to diseases and pests combined with high yield capacity in current varieties are generally not adequate for the more intensive production systems envisaged for cassava in the future.
180. Work on cryogenic storage at the Prairie Research Laboratory in Canada, with the collaboration of CIAT and funded by IBPGR, aims at storing cassava meristem tips in liquid nitrogen as a basis to achieve long-term storage of vegetative materials. Plants have been recovered, though at a low rate, from meristem tips maintained in liquid nitrogen for brief periods.

### 2.3. Plant Physiology

181. Plant physiology research has provided a sound basis for breeding and management work. The characterization of an ideal plant type has aided breeders in their search for suitable parents to be used in making crosses. The ideotype also provides a basis for comparison between plant types in studies on effects of temperature, moisture stress, daylength, and plant injury.
182. Water stress studies have shown that when water is not available, cassava reduces leaf production and, in the end, raises harvest index. Stomata of cassava are very sensitive to changes in the humidity of the air, leading to very high water use efficiency in the crop and relatively high yields under low water conditions.
183. When soil nutrients are limiting, cassava maintains the nutrient content of the leaves but reduces leaf area index and increases harvest index.
184. At low temperatures leaf area development is reduced, and leaf life and harvest index are increased. Varieties can be separated into genotypes for different temperature conditions; one set of genotypes serves for temperatures of $20-22^{\circ} \mathrm{C}$ and above, another for temperatures of $20^{\circ} \mathrm{C}$ and below.
185. The effects of photoperiod on cassava, which is known to be sensitive, have been further elucidated. Long days bring about increased top growth and thereby decrease dry matter distribution to the root.
186. Cassava can tolerate some insect and disease attacks because it has the capacity to recover after damage. A major finding is that near ideal plant types are able to recover less easily than less ideal types, and therefore ideal type plants suffer more irreversibly from damage. Therefore, high yield potential must be coupled with greater sources of resistance, or greater levels of plant protection, if stable yields are to be maintained.

### 2.4. Plant Breeding

187. The basis of a successful breeding program is a broad-based,
well maintained, and thoroughly evaluated source of genetic variability. The cassava germplasm collection is a primary resource for CIAT in its improvement work.
188. Basic breeding methodology is designed to improve source populations gradually and progressively by recurrent selection. The parental material evaluations are made in the major ECZs.
189. Over 100,000 hybrid seeds per year, each seed being a potential variety, are produced by a combination of controlled and open-pollinated crosses in specially designed polycross blocks. About one-third of the hybrids are used in the Colombian-based programs, the rest go to cooperating countries and IITA. Hybrids pass through a standard series of evaluation from individual $F_{1}$ plants through regional trials for advanced selection. For each ECZ, the selection criteria are good germination ability, erect plant type, moderate branching, high yield, high harvest index, and high root dry matter content.
190. Stability of performance across years is critical to the process of selection of a new variety, and any clone coming through the selection process has had a minimum of five years of evaluation before being recommended to national programs for testing. The lead time from seed to release of a successful variety may be 10-12 years. Thus, materials distributed in 1974 or 1975 are just beginning to be released by national programs.
191. Best local materials with improved management give twice the yield of those materials in traditional systems. Best CIAT materials combined with improved management practices yield three to four times the levels of traditional systems.
192. Several disciplines, mainly entomology and plant pathology, work closely with the breeding programs, providing screening methodology and support.

### 2.5. Plant Protection

193. Work in cassava pathology has focussed on problems related to botanical seeds, vegetative propagation material, the crop during the growing cycle, and preharvest root rots.
194. Since 1978, seven viruses, one mycoplasma, two bacteria, and three fungi that cause diseases in cassava have been identified and the etiology described for some. The epidemiology has been worked out only for some of these diseases.
195. Crops grown from meristem culture taken from the traditional cropping system have substantially higher yields than crops planted from unselected stakes taken from the same source. The reason is not understood. It could be related to a latent virus complex, underscoring the need for follow-up studies on the cause and practical application of these findings.
196. Recent work has shown that the incidence of viral diseases in the Americas has been underestimated. Several viruses affect the yield potential of cassava. This has implications for the movement of germplasm between countries.
197. The cassava common mosaic virus occurs in South and Central America. It is readily sap-transmissible and has been purified. Thus antisera are available so that indexing presents no problem. Unfortunately, this is not true for other potentially damaging viruses. A suspected virus disease, frog skin, reported for the first time in 1971 in the Department of Cauca, had caused a $90 \%$ reduction in the area planted to cassava in one area by 1982, although cassava area is increasing again as a result of an integrated control campaign by ICA in collaboration with CIAT. The virus is transmitted by the whitefly and thus has an epidemic potential both in Colombia and tropical Africa.
198. The situation with regard to Caribbean cassava mosaic disease is also threatening. The cause is not known and therefore no reliable indexing procedure exists for this disease. In addition to these two diseases for which the etiology is yet to be determined, two viruses have been recorded in Brazil and a latent virus found recently at CIAT is reported to affect a high percentage of cassava clones existing in the Americas. CIAT has asked for ODA support in contracting research at the Scottish Crop Research Institute to elucidate the complex of viruses in cassava and to develop indexing methods. This work will be highly important for reducing the risk of disease transmission in cassava. The Panel suggests that this project should be linked to the African virus complex and that close liasion be maintained with ongoing virus work in the Netherlands which is in support of IITA. Meristem culture can be used to eliminate some viruses from propagative materials, but the efficiency of this procedure varies with the pathogen.
199. In the short-term, CIAT must balance the possible danger of disseminating diseases of unknown etiology with the potential benefits arising from the release of germplasm. The Panel considers this a matter of significant importance for CIAT and IITA to address concerning the exchange of germplasm. It is recognized that no phytosanitary precautions can be fully risk-free, and if precautions are so strict as to make it very difficult to exchange germplasm, others will circumvent the rules increasing the chances of spreading pests and diseases. The Panel recommends that CIAT and IITA meet at an early date to redefine firm guidelines which reduce the risk of spreading diseases to an acceptable minimum. The Panel calls the attention of TAC to this issue as one that it believes should be further examined in the context of establishing firm guidelines on phytosanitary precautions for the Centers, which must be seen to be beyond reproach in this matter.
200. The cassava entomology program directs its efforts largely to seeking resistance to mites, thrips, whiteflies, mealybugs, and lace bugs. Studies are made of resistance mechanisms. Varying levels
of resistance have been identified for thrips (excellent), mites (acceptable), and whiteflies (acceptable in terms of virus transmission). Preliminary indications are that varietal resistance to mealybugs exists.
201. Special emphasis has been given to the biological control of the mealybug, mites, and the cassava hornworm. CIAT collaborates with IITA and the Commonwealth Institute of Biological Control, Trinidad, to identify parasites and predators of mealybugs and mites for introduction into Africa where mealybugs and mites were introduced, probably on infected material, in the 1960s and are now causing large losses in production. CIAT has sent several biocontrol agents to IITA.
202. Tests are underway on use of a virus disease to control the cassava hornworm. Bacillus thuringiensis can also be used for its control. Regarding the virus biocontrol work in hornworm, the Panel recommends that, before the work is taken to larger-scale trials, testing of the virus for its safe use be carried out by an appropriate institution with special expertise in this field.

### 2.6. Agronomy

203. CIAT has developed a complete package of low cost practices for cassava "seed" production including agronomic and phytosanitary management and storage. It has been shown that the spatial arrangement of planting can be changed without affecting yield, a finding which has implications for multiple cropping and for erosion control.
204. Some of the factors affecting optimum plant population are plant type, rainfall, soil fertility, and the probable final use of the roots. Research indicates that for the majority of plant types, climatic and soil conditions, and required root size, a density of not less than 10,000 plants/hectare at harvest is adequate. For low fertility soils and where dry season stress may result, around 15,000 plants/hectare may be needed since plants will grow smaller than under better conditions.
205. Stake length and stake planting position have been studied and lead to the recommendation that the length be no less than 20 cm . Stake selection and treatment can dramatically increase yields. For stake selection simple criteria such as selecting healthy plants with good production and no virus symptoms, selection of cuttings with no diseases or discoloration, with minimum requirements for thickness and node number, coupled with cheap fungicidal and insecticidal treatments are the key to obtaining good stands and high yields in cassava. A successful storage method for stakes has been worked out that permits storage for up to six months. In some CIAT experiments, vertical planting of stakes was found to yield up to $22 \%$ more than horizontally planted cassava.
206. Ridge planting is suggested for higher rainfall areas and in
poorly drained soils. Otherwise, cassava may be planted on the flat. Weed control is important mainly in the first 90-120 days of growth.
207. In Latin America and Asia cassava is frequently planted on steep slopes, where soil erosion can be a problem. Trials at Mondomo (Colombia) where slopes are $40 \%$ showed most promising treatments to be (1) planting in a hole without plowing, with added fertilizer and weeds cut and left as a mulch; (2) planting double rows narrowly spaced apart on plowed ground, but without plowing of the intermediate strips, and fertilized.
208. About $40 \%$ of cassava in the world is intercropped. Mixed cropping with cassava is complex and was not well understood. Since the 1977 QQR, CIAT has developed basic management practices for cassava intercropped with beans, cowpea, groundnut, and maize.

### 2.7. Mycorrhiza

209. 

Cassava is generally grown on soils with very low available phosphorus ( $P$ ) content and is very efficient in obtaining $P$ from these soils. The reason is the beneficial association of cassava with mycorrhizal fungi that live on plant roots and which are present naturally in many soils. In very poor soils, mycorrhizal strains may not be very efficient. CIAT has collected approximately 300 strains of mycorrhiza, mostly in Colombia, and has found that some strains are much more efficient than others. Seventy of these have been evaluated in the greenhouse. Competition studies between the strains have also been conducted. Substantial yield responses have been obtained in cassava by inoculation of mycorrhiza using unsterilized soil in experimental plots.
210. The adaptation of mycorrhizal strains to different soil temperatures and to different $P$ application levels, field inoculation trials, and the effect of agricultural practices on the native mycorrhizal population are being studied and provide a valuable basis for future work.
211. The Panel commends CIAT for its work on mycorrhiza and urges that it be continued at about the same level. The Panel wishes to caution, however, that since mycorrhiza cannot presently be cultured in the laboratory on artificial media but are entirely dependent on soil or plants for survival, that extreme care be taken to ensure that soil-borne plant pathogens are not spread through use of mycorrhizal inoculum or cultures.

### 2.8. Plant Nutrition

212. Most fertilizer trials in Latin America show the greatest response of cassava to phosphate, followed by potassium and nitrogen. The crop has been found to be particularly susceptible to magnesium and zinc deficiencies, although large varietal differences exist in the requirements for these two nutrients.
213. It has been shown that zinc deficiency can cause severe yield losses in cassava. Zinc deficiency is widespread and can be partially corrected by dipping stakes in a zinc sulfate solution.
214. Although cassava gives some yield at extremely low fertility when many other crops fail, it responds well to fertilization under certain conditions. The most efficient methods and times of application have been determined for most nutrients.
215. Cassava is very tolerant to acid, infertile soil conditions but it has been found that the crop may respond to lime, and more so when the soil fertility is raised by application of fertilizer.
216. Cassava grows well on poor soils; however, it cannot continuously be grown without special attention to maintenance of soil fertility. The Program has developed fertilizer regimes that can maintain high levels of productivity of cassava on poor soils. Fertilizer may be required in the first year of cropping, even though no response is obtained, if good yields are to be obtained in subsequent years.
217. 

Screening of germplasm for tolerance to acid and low-P soils has been done in the Colombian Llanos and at Quilichao where there is less disease pressure. Some clones show tolerance; breeders are now using them as parents and will be evaluating their progeny.

### 2.9. Economics

218. The lack of active demand for alternative uses of cassava in Latin America has recently been the main concern of the economics group and economic studies have been done. 1/
219. In Latin America the fresh cassava and starch markets are expected to remain stable. The markets for cassava as a substitute for wheat flour and as animal feed show promise. In Asia the cassava export market is presently stable. The use of cassava for alcohol production results in a $70 \%$ energy waste in the current process, and therefore the future of cassava as a source of energy is questionable.
220. About $65 \%$ of cassava world production is for human food. However, the proportion for human consumption varies greatly among continents. Cassava is of major importance for human food in Africa. In the Americas cassava is used mainly for human food, with some off-take for animal feed, while in Asia it has a wide variety of end-uses for human consumption both on the domestic market and as an export crop. In all three continents it has less importance as an industrial crop.
221. The developing world has undergone a virtual explosion in

1/ For example: J.K.Lynam and D. Pachico, Cassava in Latin America: Current Status and Future Prospects (unpublished, Cali, November 1982) and J.K. Lynam, Cassava in Asia (unpublished, Cali 1983).
the demand for and production of livestock products, even in land-scarce Asia. The largest growth rates have occurred in poultry. Poultry numbers have increased at a $6.1 \%$ annual rate in South America and $3.7 \%$ in Africa in the 1975-1981 period. This has generated a rapidly expanding demand for coarse grains, much of which has had to be met by imports. Debt burdens of many tropical countries are now severely limiting the ability of these countries to sustain these growth rates in meat production through imports. Cassava may provide a practical way of meeting this demand through increases in domestic supplies.
222. Althoug efforts were made to persuade the Panel that potential demand for cassava was likely to increase substantially, the Panel sensed that there was variability between CIAT staff about the adequacy of existing information on cassava demand. None of the papers shown to the Panel provided convincing evidence for a likely significant upturn in the cassava market in the forseeable future.
223. Some further studies on potential for cassava need to be done in order to understand better the markets for human food and livestock feed. The Panel recommends that such a study be carried out and that CIAT uses its results to heTp determine the scope and direction of the Cassava Program. The study should examine cassava's present and potential competitive position relative to other basic energy sources for human food and animal feed, both in world markets and more importantly in the internal national markets.
224. It is envisaged that the national programs should be involved in a meaningful way in the study. CIAT should use the results of the study to decide where it will go in the future with the Cassava Program. A crucial matter is the demand for cassava products in Latin America, since CIAT places heavy emphasis on its work in Latin America. The analysis should be done by an external institute or agency, in collaboration with CIAT, and should pay attention to agronomic, processing, and socioeconomic aspects of cassava's competitivity.
225. The Panel suggests that several alternatives are possible depending on the outcome of the study: (1) If the study shows a possible increased demand for cassava in the world, and particularly in Latin America, CIAT should consider a full scale program focused on Latin America and providing germplasm and aspects of improved technology to Asia and, in cooperation with IITA, to Africa. (2) If the study shows little hope of increasing demand for cassava, particularly in Latin America, CIAT should consider tailoring its program to meeting its responsibilities as a major germplasm center for the world, giving priority to collection, characterization, evaluation, and prebreeding of germplasm targeted for specific needs of national programs. Such a program would take full advantage of the excellent team of scientists currently working at CIAT and would provide a major scientific resource for training. (3) If the study is inconclusive, CIAT should consider moving toward the germplasm model discussed in (2) until the time conditions warrant a change.

Meanwhile the Panel recommends that until the study is completed the Cassava Program should remain at current core-funded position levels, so as to provide necessary flexibility for action after the Center decides on the future course of the Cassava Program.

### 2.10. Cassava Processing

226. 

Cassava roots will start to deteriorate in as little as two days after harvest. A TDRI (formerly TPI) project co-financed with CIAT has developed a simple storage method which is well suited for use by small farmers and wholesalers and could lead to greatly reduced marketing margins and increased consumption. It consists of packing roots in plastic bags to prevent physiological deterioration and the use of a small amount of fungicide to prevent microbial deterioration, the fungicide is of extremely low human toxicity and approved by FDA of the United States.
227. CIAT is participating on the Atlantic Coast of Colombia in a cooperative project with the Integrated Rural Development Program of Colombia and the CIDA, which has established small-scale plants for the production of dry cassava for animal feed. Some modification and improvements have been introduced. The number of plants is increasing as well as the size of the concrete floors where cassava chips are dried. This example has stimulated interest elsewhere. Panama and Mexico have built drying systems and Dominican Republic, Cuba, Ecuador, Venezuela, and Jamaica are interested in the system.
228. Research and development work is now being carried out on through-circulation-bin-drying of cassava chips with the aim of being able to introduce drying in areas of the tropics with high relative humidities or prolonged wet seasons. The choice of fuel to heat the drying air will depend on local availability and cost.
229. Even though the results to date have been promising there is a need to keep in mind the risks that will be involved as the numbers of small drying plants increase. Variation in quality, particularly of moisture content, could be a constraint.
230. The objectives of the CIAT postharvest utilization storage program are specific and emphasize the following principles: (1) small-scale drying, (2) storage of fresh roots for human food, (3) flour or feed as end-products of processing. These objectives appear to be practical and reasonable.

## 3. Staff and Facilities

231. The Cassava Program is staffed by eight senior scientists, one of whom is Program Coordinator, supported by 19 associates and assistants and 112 other staff members. In addition, two post-doctoral and two visiting scientists are working with the team. The Coordinator is a plant physiologist and the senior staff consists
of an entomologist, a pathologist, a breeder, a plant nutritionist, an agronomist, an economist, and an outposted research breeder in Asia.
232. The Long Range Plan projected a Cassava Program consisting of 10 headquarter-based senior staff positions in 1982, rising to 11 in 1983, to 12 in 1985, and 13 in 1986. In total, this represented 15 core-funded senior positions by 1986. Due to budgetary limitations in 1982, two filled senior staff positions were lost (utilization specialist, international cooperation and regional trials), reducing the Program to eight positions as at 1983.
233. For its work at CIAT headquarters the team has laboratories for physiology, pathology, and entomology. The virology laboratory is shared with the Bean Program. The Program is serviced by the Meristem Culture Laboratory and there is a small utilization laboratory. Biometric services and greenhouse facilities are available. There are ample field facilities available at CIAT-Palmira, Carimagua, Popayan, and Quilichao stations, as well as on-farm sites that cover five out of the six ECZs. Support services are available at all stations for the various components of the Program.

## 4. International Cooperation

234. CIAT has played an important role in the establishment of national cassava programs. Different strategies are used in assisting these programs, depending on the size of the country and the resources each program commands. The Program is also actively engaged in collaboration with donor-funded projects in the developing world.
235. A crucial relationship is that with IITA. At present, relationships are less than those desired. The Panel recommends that CIAT and IITA meet soon to iron out their respective working relationships and responsibilities. This matter is discussed in more detail in Chapter XI (International Cooperation).

## 5. Training

236. Training is an essential component of the Cassava Program. At the inception of the Program, mainly long duration (a year or more) general courses were provided. The first trainees often became responsible for establishment of cassava programs on their return home. Subsequently, this type of training has continued but more emphasis was given to training courses in which short-term intensive instruction in cassava production and research was followed by disciplinary training. Specialized courses have been given on meristem culture techniques, pest control, and processing. CIAT has helped some countries hold their own in-country training courses, which usually are short duration production courses.
237. At a higher level of training, associate researchers and visiting scientists have the opportunity to do their Ph.D. and M.S. thesis research at CIAT. General assessment and recommendations on the type of training activities are presented in Chapter IX.

## 6. Response to the 1977 QQR

238. Five recommendations regarding cassava were made by the 1977

QQR Panel. These were: (1) Strengthen cassava linkage with IITA. An agreement was signed between the two centers in November 1978; however, "the nature and level of cooperation need improvement." (2) Further collection of cassava and wild species. Although more collections are planned, considerable progress in collection was made in coordination with IBPGR and national programs. (3) Continuing studies on long-term effects of cassava cultivation on status of plant nutrients in soil. A full-time cassava nutrition scientist was added, and long-term experiments were initiated in Quilichao and Caicedonia, and on the North Coast. (4) Expand work on storage technology at small village and small farmer level (not industrial use). Progress has been made in developing improved storage technology for fresh cassava roots and village-level chipping and drying methods. (5) Storage of cassava foliage (silage, etc.) and large-scale cattle feeding trials to be continued and expanded. Some work on cassava silage was conducted before budget cuts forced its discontinuation. Cattle feeding trials with cassava foliage were completed in 1978. The Panel observed ensiled cassava in Brazil and Cuba.

## 7. Achievements and Impact

239. The Program has accomplished a great deal scientifically since the 1977 QQR. A strong scientific team has gained valuable new information concerning the cassava plant and its behavior as a crop, a significant accomplishment when one considers the paucity of information on cassava when the Program began. Some of the notable scientific achievements have been:
1) Elucidation of the physiology of cassava and its response to temperature, daylength, drought, leaf or stem damage. The definition of the plant ideotype has been helpful for breeders and for scientists who need a basic plant to use for comparative studies. The findings that stomata of cassava are very sensitive to air humidity and thereby protect the crop during drought stress, and that cassava has considerable elasticity in recovering from damage, are important.
2) Work in plant pathology has identified seven viral, one mycoplasmal, two bacterial, and three fungal pathogens since 1978, and their etiology has been established. Rankings of importance of diseases in each of the five ECZs have been completed.
3) Numerous insects and mites attacking cassava have been identified in Latin America where pest diversity is greatest. The biology and ecology of these pests have been worked out by CIAT or its collaborators.
4) Evaluation of the germplasm collection has identified sources of resistance to several pests and diseases. Superior, high-yielding clones have been identified and have been distributed to national programs. Some varieties based on CIAT germplasm are being released by national programs. Edaphoclimatic zones (ECZs) have been delineated to provide a better basis for breeding and specifying materials for use by national programs.
5) Mycorrhizal relationships in cassava have received considerable attention and a collection of mycorrhiza from Colombia has been assembled. The finding that some lines of mycorrhiza are more efficient than others in obtaining phosphorus from less soluble $P$ forms has promising implications for areas with infertile soils.
240. A considerable body of knowledge concerning potential improved cassava production in Latin America has been developed. Despite this knowledge, however, the impact of the work in Latin America is limited. Because of the 10-12 years lead time required to develop new varieties, new lines based on CIAT germplasm are just now being released by national programs. Cuba has adopted CIAT germplasm and production technology of cassava growing on a large number of state farms and cooperatives. This consists of careful selection and treatment of planting material, planting on ridges, reduced irrigation and insecticide applications. Cuban officials claim substantial production increases, as a result of the use of the "Colombian system" and also by use of early varieties introduced from CIAT, which have extended the period of the year when cassava is available. However, it should be noted that available statistics indicate that increased production has resulted largely from increased production on state farms.
241. On the North Coast of Colombia the use of improved technology, as well as CIAT-developed varieties is spreading. A survey in the early 1970s suggested that yields were of the order of five tons/hectare in the region. Preliminary results from another survey presently underway suggest that yields are now of the order of eight to twelve tons/hectare.
242. Several countries have established national cassava programs with CIAT's help. The CIAT training program has played a key role in this. The training of Thai, Indonesian, and Malaysian cassava breeders at CIAT has been a major factor in the establishment of cassava breeding programs in these countries. Asian countries receive $F_{1}$ seed from the Center and material of CIAT origin is at an advanced stage of evaluation and is likely to dominate forthcoming releases of clones to farmers.

## 8. Future Plans

243. The overall strategies of the Program were outlined previously in the objectives section. The only major addition has been the placing of more emphasis on the development of integrated production, processing, and marketing projects by individual countries in Latin America.
244. Plans (selected areas shown in parenthesis below) are to continue work in physiology (water relations, photoperiod, and techniques for synchronous flowering); plant nutrition and soils (including mycorrhiza and screening for low soil fertility); entomology (integrated control of major pest complexes, natural enemies, evaluation of host plant resistance); plant pathology (viruses, cultural control, safe international exchange of seeds, host plant resistance); and germplasm development (meristem culture, evaluation of the germplasm collection). An Integrated Cassava Production Systems Group is proposed to integrate research in production, utilization, and marketing of cassava. The Regional Cassava Program in Asia, where about $40 \%$ of world production occurs, will be staffed by a breeder and a regional liaison scientist, the former arrived in Bangkok in May 1983. A Regional Cassava Program in the American Subtropics would station a regional liaison scientist and a breeder in Brazil to establish a strong working base in ECZ6 which is not now being served as effectively as is desired.
245. The Panel considers the scientific work directed toward germplasm at headquarters and in the regions to be central to CIAT's work of supporting and strengthening national programs. Work that improves screening procedures for specific traits and the knowledge of cassava both as a plant and as a crop, can only enhance the exploitation of the germplasm collection for the benefit. of tropical countries and strengthen training and cooperation.

## 9. Assessment

246. CIAT has assembled an impressive and capable team of scientists who have worked very hard to understand cassava and make it more productive. Much valuable scientific work has been done, and more is known about this previously neglected crop. The Panel commends the Cassava Program for its achievements in providing new information on cassava and its potential. The research in physiology, entomology, plant pathology, mycorrhiza, breeding, economics, germplasm, soils, agronomy and processing has provided insight for better production and utilization of cassava by the national programs. Some impact of improved germplasm is just beginning to be felt here and there. The question of potential future demand for cassava needs to be answered before CIAT can decide on its long-term directions for the Cassava Program.
247. CIAT's Comparative Advantage in Cassava Research
248. The Panel would like to make a few observations on CIAT's possible future role in cassava research which, of course, should be based on the comparative advantage of CIAT in this area. As the Panel sees it, CIAT has a number of advantages in cassava research: (1) a strong and experienced scientific team, (2) good research facilities across all but one of the six ECZs in Latin America, (3) a major germplasm collection, (4) considerable knowledge of cassava both as a plant and as a crop, (5) a good library, (6) a considerable number of former trainees in numerous countries, many of whom are or probably would be willing to cooperate in research.
249. For the long-term, it would appear that CIAT will increasingly assist national programs by providing superior or evaluated germplasm to meet their specific need. To do this will require systematic and careful scientific investigations to fully exploit the germplasm collection, which is probably the Program's most precious and important long-range resource and its major comparative advantage in working with national programs. Other assistance to national programs may be in working out screening methodology, providing fundamental information on sources of resistance, important pests and diseases, and sources of tolerance to stress. In addition, the Program can assist cassava networks, provide communications assistance and training.
250. To sum up, the Panel considers germplasm evaluation and prebreeding, the generation of knowledge, networking, and communications and training to be CIAT's major comparative advantages in cassava research.

## 11. Recommendations

250. The Panel recommends that IITA and CIAT meet at an early date to redefine firm guidelines, in the light of new techniques and knowledge, for sending cassava material to other countries without risk of spreading diseases.
251. Regarding the virus biocontrol work for cassava hornworm, the Panel recommends that before the work is taken to larger-scale trials, testing of the virus for its safe use be carried out by an appropriate institution with special expertise in this field.
252. Some further studies on potential for cassava need to be done in order to understand better the markets for human food and livestock feed. The Panel recommends that such a study be carried out and that CIAT use the results of the study to help determine the shape and direction of the Cassava Program; furthermore, CIAT should make arrangements with an appropriate independent institution experienced in such studies.
253. A crucial relationship is that with IITA. At present, relationships are less than are desired. The Panel recommends that CIAT and IITA meet soon to iron out their respective working relationships and responsibilities.
254. Regarding staffing, the Panel recommends that until the market study discussed is completed, the Cassava Program should remain at current core-funded position levels, so as to provide necessary flexibility for action after the Center decides on the future course of the Cassava Program.

## CHAPTER V - RICE PROGRAM

## 1. Background and Objectives

### 1.1. Background

255. Rice is a primary source of calories and protein in Latin America, especially among low income groups. Apparent per capita consumption of rice averages 51 kg . Total area planted to rice is about 8.8 million hectares, of which $24 \%$ is irrigated, $4 \%$ is rainfed lowland, and $72 \%$ is in various categories of upland rice. Respective average yields for these three rice ecologies are 3.5, 2.5, and 1.2 tons/hectare.
256. 

The relatively small Rice Program, which has been in operation since the beginning of CIAT, already has had major impact in increasing rice production in Latin America. Thus, the introduction of germplasm-based technology has led to additional rice production currently valued at 850 million dollars per year. CIAT also has had a large role in training, having trained 274 Latin Americans, representing 23 countries, in its Rice Program in the 1969-1983 period.
257. CIAT's mandate for rice, as stated in the Rice Program Report ( 30 January 1984) is: "CIAT has regional responsibility for rice in the Western Hemisphere within the CGIAR system. This regional responsibility implies that IRRI has principal responsibilities for rice on a global basis and that CIAT works in close collaboration with that center. CIAT takes on selected responsibilities especially (1) to generate improved production technology components for, and develop cooperative activities with, national research systems; and (2) to provide specialized in-service training for professionals from the countries in a manner which is fully coordinated with IRRI." Unique features of rice production in the Western Hemisphere, which indicate the need for regional research are listed in section 4.1.

### 1.2. Objectives

258. Specific objectives, from the Rice Program Report, are: "(1) to produce germplasm-based technology developed to overcome constraints of the irrigated system; (2) to develop new germplasmbased technology to improve productivity and stability of supply, particularly in the region's more favored upland rice environments; (3) to collaborate actively with IRRI, especially in the IRTP activities; and (4) to help strengthen national rice research programs through training and consultative visits, and to support the network of researchers which has been in effect for the last 10 years."

## 2. Program Activities

259. Program activities were directed at irrigated rice systems until 1982, when the upland rice effort was implemented. To better define rice systems CIAT has performed an agroecosystem analysis, in which six main cropping systems have been identified:

- irrigated rice, 2.1 million hectares;
- rainfed lowland rice, 0.4 million hectares;
- highly favored upland (no water stress, fertile soils), 0.9 million hectares;
- moderate favored upland (some water stress, fertile soils), 1.1 million hectares;
- unfavored upland (pronounced water stress and/or infertile soils), 3.4 million hectares;
- subsistence upland, 0.9 million hectares.

260. Breeding has been a principal component of the Rice Program from the beginning, with emphasis on semidwarfism, and disease and insect resistance. An agronomy program was added in 1971, initially for irrigated rice but now almost exclusively for upland rice. In 1976 CIAT and IRRI formalized the IRTP program for Latin America, to evaluate and distribute germplasm from IRRI and promising materials from CIAT and Latin American national programs. Plant pathology was added to the Program in 1977 in order to better address the changeable race situation in rice blast (Pyricularia oryzae). Economics has been addressed by a three-year post-doctoral appointment. Plant nutrition problems, which are largely iron and aluminum toxicity, have been handled by breeding for resistance.

## 3. Staff and Facilities

### 3.1. Staff

3.1.1. Core Staff
261. The 1981 Long Range PTan (LRP) projected a core research staff of six: (1) an irrigated rice breeder (on board), (2) an upland rice breeder (on board), (3) an agronomist working full-time on upland rice (on board), (4) a pathologist divided equally between upland and irrigated systems (position temporarily vacant), (5) a physiologist for upland rice to be appointed in 1984, and (6) a projected economist position proposed for 1985. As a further part of its minimum core CIAT plans to provide a full-time Coordinator in 1985, in order to handle increasing regional responsibilities and projected growth in
extra-core activities. The Program has proposed the addition of two more core positions in the next two years: a breeder for the acid savannas (1985) and an outposted breeder for the Southern Cone subtropics (1986).

### 3.1.2. Extra-Core Staff

262. The Rice Program has two extra-core funded staff: the IRRI-CIAT liaison scientist who handles IRTP activities and is stationed at CIAT headquarters, and the co-leader of the Peru-INIPA bilateral rice project who is stationed in Peru. Two more extra-core funded positions are projected for 1985: a regional coordinator for a proposed Caribbean Regional Network Project, and a CIAT-IRRI-EMBRAPA liaison scientist, to be located in Brazil.

### 3.2. Facilities

263. Facilities in Colombia include field, grain quality laboratory, greenhouse and screenhouse space at CIAT-Palmira, which is now used mainly for the crossing program and some evaluation services. The principal breeding site of the core program was moved from CIAT Palmira to Santa Rosa and La Libertad, in order to place the breeding program in a location more representative of the problems of the overall Latin American tropical area.
264. 

The Santa Rosa station, acquired in 1983, is the breeding site for favored upland and irrigated rice. Also in 1983, ICA provided long-term use of 16 hectares of acid savanna on its La Libertad station, adjacent to Santa Rosa, for upland rice, along with another La Libertad site for iron toxicity screening. Another Colombian site, at Nataima, is used for selection under irrigated conditions. CIAT also has access to two locations in Panama (Rio Hato and Tocumen), made available by IDIAP for collaborative work on upland and irrigated materials, as well as selection sites in Peru, made available by INIPA, for upland and irrigated rice work. Thus, most field research is now decentralized from CIAT headquarters.

## 4. International Cooperation

### 4.1. CIAT-IRRI Relationship Regarding Rice in Latin America

265. CIAT and IRRI have successfully collaborated in rice research for Latin America since the establishment of CIAT. Thus, the semidwarf variety IR8 from IRRI was released in Colombia in 1968 through a collaborative CIAT-Colombian rice research program. Many other semidwarf varieties, all tracing back to the semidwarfing source in IR8 or its DGWG ancestor, subsequently were released by national programs.
266. IRRI and CIAT collaborate under a memorandum of understanding, which notes, among other things, that IRRI has the
world mandate for rice research and training, while CIAT's mandate is for rice research and training in Latin America.
267. The need for a regional research program for Latin America is justified by the distance from IRRI and by factors unique to rice in Latin America:

- large-scale mechanization, little transplanting;
- specialized grain quality;
- acid soils, resulting in iron and aluminum toxicities;
- more variability in blast, especially in the acid soil-upland rice system;
- hoja blanca virus and its insect vector;
- greater severity of Helminthosporium, dirty panicle, and other diseases;
- highly developed infrastructure.


### 4.2. CIAT-IRRI-IITA-WARDA-IRAT Relationships Regarding Upland Rice

268. It appears that the collaborative roles among the IARCs for upland rice will be analogous to that for irrigated rice, i.e., IRRI has global responsibility while CIAT has regional responsibility in Latin America. IITA, WARDA, IRAT, and IRRI share regional responsibility for upland rice in Africa. A memorandum of understanding on IRRI-CIAT-IITA-WARDA-IRAT roles in upland rice has been signed. Collaborative efforts between CIAT and IITA on upland rice have already begun, and selected IITA materials have been found to have tolerance to the acid savanna soils of Latin America.
269. In general, the need for regional research on upland rice in Latin America is determined by the same unique factors as for irrigated rice (section 4.1).
270. The area of upland rice in Asia, Latin America, and Africa was estimated by IRRI (Report of the Second QQR of IRRI, p.81) ${ }^{1 /}$ to be 19, 5, and 2 million hectares, respectively. However, in the comparison between Asia and Latin America it is important to recognize that the percentage of upland rice, expressed as a portion of the region's total rice, is much lower in Asia (about 15\%) than in Latin America (about 70\%). Research proportions are in similar alignments: IRRI estimates that one quarter of its resources and $13 \%$ of its senior staff time is devoted to upland rice, while CIAT estimates that two-thirds of its rice effort currently is on upland rice.
[^7]
## 5. Review of Current Research Direction

271. Until 1981 CIAT's research was entirely on irrigated rice. In that year CIAT began shifting its emphasis to upland rice research, especially on favored uplands, to the present alignment of two-thirds upland and one-third irrigated. Within upland rice, about $50 \%$ of the effort is on adaptation characters (drought, iron toxicity, aluminum tolerance), $25 \%$ on disease resistance, and the remainder on architecture for yield potential, grain quality, and insect resistance. Within irrigated rice, about $60 \%$ of the effort is on disease resistance, $10 \%$ on grain quality, $10 \%$ on early maturity, and the remainder on lodging resistance and yield potential, adaptation to soil stress, and insect resistance. The sudden and unexpected resurgence of hoja blanca virus disease in both irrigated and upland rice throughout tropical Latin America, as well increasing amounts of Helminthosporium, is keeping the effort on disease resistance breeding, which had been expected to decline, at a high level.

## 6. Training

272. Training of professionals is an important component of the Rice Program. Such training is accomplished through courses at CIAT, in-country courses, regional courses, thesis and research supervision, and conferences. Training is provided in the areas of agronomy, breeding, pathology, and production. A total of 274 Latin Americans, representing 23 countries, have received training in the CIAT Rice Program in the 1969-1983 period. The training period averaged nearly four man-months per trainee during this period. In 1983, 32 professionals ( 95 man-months) were trained. Also in 1983, one post-doctoral, five B.S., one M.S., and one Ph.D. student were associated with the Rice Program. These accomplishments compare very favorably with the training activities of other commodity programs.
273. The new memorandum of understanding being negotiated between IRRI and CIAT also projects an increase in degree work in Latin America.
274. Future training plans in the Rice Program for the period 1984-1988 begin with a bold experiment and departure from previous methods in terms of courses at CIAT. The trainees will spend only three weeks in lectures and use of audiotutorials at CIAT headquarters and then four and a half months in lectures and gaining hands-on field experience at the Santa Rosa station in Villavicencio. This approach, which will be evaluated after one year, is endorsed by the Panel. The Rice Program proposes to devote $12 \%$ of senior staff time to training in the 1984-1988 period. This ranks third of the four commodity programs and appears quite adequate considering the small number of senior staff in this Program. There will be a serious impact on
training if the two additional senior staff cannot be added to the Rice Program by 1985.
275. Achievements and Impact

### 7.1. Introduction

275. The Rice Program has already had a major impact on rice production in Latin America, principally through the development of high-yielding semidwarf varieties (HYVs). By 1981, the last year for which data are available, HYVs were grown on 2,286,000 hectares, or $26 \%$ of the total rice area. If Brazil is excluded, the adoption was $70 \%$ compared with the $40 \%$ noted in the 1977 QQR. Brazil often is excluded from Latin American rice figures because its large upland rice area is not well suited for the original irrigated rice technology of CIAT.

### 7.2. Diffusion of HYVs

276. Some 40-50 HYVs which are derived from CIAT germplasm and/or IRTP nurseries have been nominated by national programs in Latin America. An unexpected spin-off of the irrigated rice breeding program has been the adoption of selected lines in upland production. Thus, in 1981/1982 HYVs were grown on 661,000 hectares of upland rice, or about $10 \%$ of the total upland area in Latin America. If Brazil is excluded, the HYVs adoption on upland areas was $60 \%$. The 661,000 hectares of upland rice planted to HYVs were distributed as follows: 163,000 hectares in Brazil, 140,000 in Venezuela, 80,000 in Mexico, 70,000 in Costa Rica, 64,000 in Colombia, 50,000 in Panama, with the remaining 97,000 hectares being grown in seven additional countries.

### 7.3. HYVs Contributions to Production

277. CIAT estimates that the realized yield advantage of the HYVs over the $2,286,000$ hectares on which they are grown is about 1.2 tons/hectare. Thus, for 1981 the increased production from use of the HYVs was estimated to be 2.7 million tons for Latin America. The value of this added production for 1981 was estimated to be 850 million dollars. Interestingly, $35 \%$ of the increased production resulted from the spillover effect of irrigated HYVs into upland rice systems. Therefore, CIAT has made large contributions to increased upland rice production even though all research emphasis up to 1981 was on irrigated rice.

### 7.4. Benefits and Returns to Rice Research

278. Costs of rice research in Latin America for the period 1970-1981 were estimated to be 9 to 10 million dollars annually, of which CIAT research costs were no more than 1.5 million dollars per year. An analysis of the net benefits and returns of rice research by CIAT and the national programs for the period 1968-1981, showed that
the internal rate of return was $89 \%$. This means that every dollar invested generates another 89 cents per year from the time it is invested. Only $25 \%$ of the estimated benefits were included in the evaluation, since costs of transferring technology to farmers and additional costs of production due to higher use of inputs were not included in flow of costs.

### 7.5. Scientific Achievements for the Period 1977-1983

279. Scientific achievements for the period 1977-1983 fall into four categories: rice pathology; elucidation of the resurgence phenomenon of the hoja blanca virus disease and its vector, Sogatodes oryzicola; IRTP achievements in Latin America; and rice breeding.
280. In rice pathology the achievements included: improvement of disease evaluation methodology for blast, grain discoloration, sheath blight, and stem rot; identification of resistance sources to blast, grain discoloration, and eyespot; studies on disease management and control; and disease monitoring.
281. In the hoja blanca virus-Sogatodes oryzicola vector situation, achievements included identification of virus resistance sources, identification of a dryinid parasite-predator of Sogatodes; discovery that wild taxa of Oryza may be overwintering reservoirs for Sogatodes; confirmation that the virus was not seed-transmitted; and an elegant analysis that may explain the cyclical nature of the reappearance of the virus every 15-20 years.
282. The IRTP achievements included provision of material to national programs which resulted in release of several entries, identification of useful parents for hybridization, and identification of germplasm resistant to iron toxicity and of germplasm resistant to straighthead.
283. Rice breeding achievements included: use of mutation breeding to dwarf unproductive tall varieties, and thus make them better suited as donor parents; improvement of grain quality through irradiation; utilization of genetic male sterility for recurrent selection; identification of broad-spectrum resistance to foliar pathogens; and identification of sources of seedling resistance to hoja blanca.
284. The Panel commends the vigorous attention that the Rice Program has given to the resurgence of hoja blanca virus disease, including the search for sources of resistance to both the virus and its vector, Sogatodes, and to the efforts to determine why the virus recurs in cyclical nature every $15-20$ years. The Panel also commends the Program for its constant monitoring of the blast situation, and for its monitoring of a myriad of formerly minor diseases which are becoming increasingly serious, including dirty panicle, and those caused by Rhynchosporium, Helminthosporium, and Rhizoctonia.
285. The Panel similarly commends the positive attitude being given to seeking applications of biotechnology which will increase breeding efficiency. The current example is in use of anther culture to quickly develop homozygous lines and thus shorten the breeding process.
286. In connection with the scientific achievements, the Panel recommends that more effort be devoted to publication of research results in scientific journals. Knowledge of studies described above which would be of interest to the scientific community include the analysis of the possible cause of resurgence of the hoja blanca virus disease, the procedures being used in the search for durable resistance to blast, the application of genetic male sterility in recurrent selection for disease resistance, and the applications of induced mutuation for semidwarfism and improved grain quality.

## 8. Constraints and Weaknesses

287. Three major constraints to the Rice Program were identified:
1) Staffing - There has been a turnover in two senior staff positions in this small Program. It is imperative that highly competent professionals be recruited as soon as possible to maintain this productive program in its position of prominence.
2) Coordination - Despite the small size of this Program it is necessary for the Coordinator to spend a significant portion of time on administrative matters. This should be reduced to a minimum in all programs.
3) Travel time - The increased decentralization of the Rice Program will necessitate additional travel and detract from time available for research.
9. Future Plans
10. Simply stated, future plans are to concentrate on ecosystems for which greatest returns can be achieved on the research investment. In this work the challenge is to seek the appropriate balance of research between irrigated and upland systems. Thus, irrigated rice presently occupies only $24 \%$ of the rice area in Latin America, but through high average yields of 3.5 tons/hectare, accounts for $46 \%$ of the total production. Rainfed area is only $4 \%$ but, with yields of 2.5 tons/hectare, accounts for $11 \%$ of total production. The various combined categories of upland rice occupy $72 \%$ of the area, with average yields of about 1.2 tons/hectare, and account for $43 \%$ of total production.
11. The general strategy of the Rice Program is to complement the large research effort on upland rice (presently two-thirds of resources) with research on situations where irrigated rice technology can be expected to apply. Within the upland rice effort, emphasis in the current breeding position is on favored upland ecologies, characterized by fertile soils and high rainfall. These favored upland ecologies still represent a diversity of environments in which there are large genotype by environment interactions, and which have high disease pressures. In addition to the favored upland breeding effort, a modest program is underway for upland improvement for the well-watered acid savannas where the major constraints are diseases, aluminum toxicity, and other nutritional stresses. Vast areas of presently underutilized acid savannas in Mexico, Colombia, Venezuela, and Brazil could be converted to productive rice areas if this breeding effort is successful. (Promising germplasm from Africa has recently been identified.) Since the two present core program breeders are fully occupied with breeding for irrigated and favored upland rice, the Rice Program proposes that a third core program breeder be added to work on rice for the acid savannas.
12. The Panel strongly recommends that higher priority be given to the establishment of the third core breeder position, for acid savannas, than for the economist position. In a germplasm-oriented technology program, breeding obviously is a key component, and is a long-term effort which needs to be started at an early date. The Panel also recognizes the need for an economist, but feels that the functions of this latter position could be fulfilled by the appointment of a visiting scientist for a 2-4 year period.
13. In the second category (situations where irrigated technology may apply), three opportunities that have been identified are:
1) The Caribbean, which has rainfed lowland rice and small amounts of upland. Slow but steady progress is anticipated in the region. The Panel suggests that the proposed Caribbean Regional Networks Project be expanded to include Central America since there are many rice production problems common to the Caribbean and to Central America. However, the Panel also recognizes that the urgent need for increased rice production in the Caribbean may justify a Networks Project specifically for this region.
2) Brazilian varzeas areas, which are poorly drained and periodically flooded lowlands. Brazil is estimated to have 20 to 30 million hectares of varzeas of which perhaps one million hectares have been provided with drainage and have been levelled. It is felt that breeding objectives for the varzeas are similar to those for irrigated rice, and that great potential exists for increasing production in the varzeas areas.
3) The Southern Cone, subtropical-to-temperate region of Southern Brazil, Uruguay, Argentina, and Paraguay. High yields are achieved in this area ( 4.5 tons/hectare on the 650,000 hectares in Rio Grande do Sul, for example), but there is potential for increasing yields to 6-7 tons/hectare. Four germplasm problems must be addressed to raise yields: tolerance to low temperature, iron toxicity, grain quality, and straighthead (a physiological disease). An outposted core breeder has been requested for this region (section 3.1.1).

The Panel has recommendations regarding staffing for these last two opportunities.
293. First, the Panel recommends that the requested extra-core CIAT-IRRI-EMBRAPA liaison scientist position be established as soon as possible. Such a position would strengthen the collaboration between CIAT and IRRI on both upland and irrigated rice, and with Latin America's largest rice growing nation, Brazil. The Panel also suggests that the scientist's research emphasize development of germplasm for the varzeas, and thereby complement existing research in Brazil and other rice ecologies.
294. Second, regarding the requested outposted core breeder position for the Southern Cone subtropics, the Panel believes that the needs of this area can be adequately served by further introduction of rice technology and germplasm from North America and from CIAT. Therefore, the Panel recommends the following approaches in lieu of the outposted breeder position: (1) that CIAT, through consultations and visits, provide assistance to the Southern Cone on improved agronomic practices including weed control, stand establishment, and fertilization; and (2) that CIAT, in conjunction with the IRTP, accelerate efforts to integrate cold tolerant, North American germplasm into breeding efforts in the Southern Cone.

## 10. Assessment and Recommendations

295. The Rice Program has had a major impact on rice production in Latin America, and is to be commended for its success. The Program is dynamic and has shown the capability to modify directions as needed. The decentralization of rice research from CIAT headquarters to sites more representative of Latin American rice areas enables the program to deal more effectively with significant problems of rice in the region, but at the same time places greater strains on resources. The termination in 1983 of the Rockefeller Foundation breedingpathology position also reduced program capabilities. Therefore the Program is requesting increases in both core and extra-core positions.

### 10.1. Implementation of the Recommendations by the 1977 QQR

296. There were no specific "recommendations" for rice in the 1977 QQR, but the QQR did suggest "...that early emphasis be given to upland rice with particular emphasis on disease resistance ..." This suggestion was implemented in 1982 with the hiring of an upland rice breeder. Currently it is estimated that two-thirds of Rice Program resources are on upland rice, and one-third on irrigated, which represents a major shift in the last few years. There is concern that the shift may have been too far in the direction of upland rice, but there is a small number of scientists, and it was generally felt that an individual's time should be devoted mainly to one system or the other.
297. The increased efforts on upland rice are expected to interface well with the needs of Brazil, which has $75 \%$ of the total rice area, and $88 \%$ of the upland rice area, in Latin America. It is hoped that the increased emphasis on upland rice research ultimately will result in fewer references to Latin American rice production statistics which "exclude Brazil." Such references are frequently made on the grounds that CIAT's rice technology applies only to irrigated rice. Actually, CIAT's irrigated rice technology already has had beneficial spillover effects on upland rice production. Thus, HYVs are now planted on about $10 \%$ of the Latin American total upland rice area. Furthermore, of the estimated increased production of 2.7 million tons of rice per year due to CIAT-IRTP technology, $35 \%$ has come from increased upland rice production.

### 10.2. Recommendations

298. 299) The Panel recommends that more effort be devoted to publication of research results in scientific journals. Several valuable studies of scientific interest have been or are being conducted at CIAT, but knowledge of this has not been made adequately known in scientific channels.
1. 2) The Panel strongly recommends that higher priority be given to the establishment of the third core breeder position for acid savannas than for the economist position. In a germplasm-oriented technology program, breeding obviously is a key component, and is a long-term effort which needs to be started at an early date.
1. 3) The Panel recommends that the extra-core CIAT-IRRIEMBRAPA liaison scientist position be established as soon as possible, in order to strengthen collaboration between CIAT and IRRI on both upland and irrigated rice, and with Latin America's largest rice growing nation, Brazil. The Panel also suggests that the scientist's research emphasize development of germplasm for the varzeas, and thereby complement existing research in Brazil on other rice ecologies.
1. 4) The Panel recommends the following approaches in lieu of the requested outposted core breeder position for the Southern Cone
subtropics: (a) that CIAT, through consultations and visits, provide assistance to the Southern Cone on improved agronomic practices including weed control, stand establishment, and fertilization, and (b) that CIAT, in conjunction with the IRTP, accelerate efforts to integrate cold tolerant, North American rice germplasm into breeding efforts in the Southern Cone.

## CHAPTER VI - TROPICAL PASTURES PROGRAM

## 1. Background and Objectives

### 1.1 Background

302. Beef, milk, and dairy products are important components of the diet in Latin America and comprise between $21 \%-37 \%$ of total expenditure on food by the lowest income quartile. However, the productivity of cattle is low. Steers grazing the major areas of savanna, the Cerrado and Llanos, take from 4.5 to 5.5 years to reach slaughter, and live weight gain is only some $20 \mathrm{~kg} / \mathrm{hectare} / \mathrm{year}$ or less. Yet there is considerable potential for beef production in these areas as rainfall is in excess of 1000 mm . It is quite a reasonable expectation that improved legume/grass pastures could raise animal productivity per hectare by a factor of 10.
303. Consequently CIAT commenced the Beef Production Systems Program in 1969 which had the very wide mandate of increasing "cattle productivity in the lowland tropics of Latin America." A review of this program in 1973 found that the mandate was too wide and that concentration was needed in priority areas. This Program, however, did establish that forage quality was the prime limitation to animal production.
304. Accordingly, the redefined Beef Production Program was initiated in 1976. This Program emphasized the collection and use of adapted germplasm, definition of fertilizer requirements and sequential evaluation of accessions to the stage where successful legume/grass mixtures could be successfully incorporated into farming systems. A deliberate decision was made to concentrate the research effort on the large areas of undeveloped savanna and grassland, typified by the Cerrado and Llanos.
305. To reflect this change of focus the program was renamed the Tropical Pastures Program in 1979. Since then the research and program objectives have been basically unaltered, as recommended by the 1977 QQR. The change of the program title was justified as it better reflects the main thrust of the program and also allows for the role of pastures in improving milk production. However, it must also be recognized that the end product of the Tropical Pastures Program is to provide an economic way of improving animal production. Pastures are only a means to an end and not an end in themselves.

### 1.2. Objectives

306. Thus the stated overall objectives of the Program are:
"(a) to increase beef and milk production and productivity,
(b) to promote economically and ecologically sound expansion of the agricultural frontier in tropical America, and
(c) to release mory fertile land for expanded crop production." 1
307. The Panel interprets this to mean that CIAT, through its appropriate research and collaborative activities, will assist in meeting these three objectives.
308. The strategy of the Program has been to avoid the use of large amounts of fertilizer but to adopt a low cost, low fertilizer input approach of selecting grass and legume species which are adapted to acid infertile soils and resistant to existing pests and pathogens. The tropical pastures cultivars available in the late 1970 s were soon found to inadequately cope with these conditions, particularly the legumes, necessitating a large input into germplasm collection and evaluation. Further studies on promising accessions defined their requirements for establishment, fertilization and, in part, management practices have been developed which enable promising species to be successfully used in persistent and productive pastures. The emphasis has been solely on beef cattle. These pastures are then to be incorporated into effective production systems, along with complementary animal practices.
309. This policy must be reconsidered due to a number of factors, primarily the following:
1) The majority of cattle in Latin America (69\%) are in the less acid areas. For example, of the 26 million head in Colombia, eight million are in the Llanos, although the Llanos comprise $64 \%$ of Colombia. Brazil has the highest concentration of animals on acid soils; $42 \%$ of the national herd are in the acid soil areas (60\% of the land area).
2) There is increasing evidence that cropping, currently of considerable importance in the Cerrado, will increase in the Cerrado and probably the Llanos, at least in Venezuela. The interaction between crops and livestock has been of benefit throughout the tropics and will modify the requirements for pasture research and technology and affect the rate of technology adoption.
3) There is a continuing national pressure for clearing forests in the humid tropics and increasing concern about the severe degradation of pastures established in

[^8]these areas.
4) With the progress made in developing improved pastures for the savanna ecosystems, as outlined later in this chapter, CIAT must consider whether it is now opportune to gradually reduce its input in these areas. This would allow the Program to commence research in other areas where small-sized farms predominate.
5) There has been a marked improvement in the research capabilities of Latin American countries in the field of tropical pasture research since the 1977 QQR, and this trend is continuing. Some of these improvements are attributed to CIAT's influence. Brazil, which has the largest national research network, is estimated to have more than 100 pasture scientists trained to Ph.D. or M.S. level. Throughout Central and South America there are approximately 175 research workers studying pastures on acid soils.
6) There has also been sustained development in rangeland and pasture research in ILCA and many national research institutes in the tropics outside of Latin America. The question arises as to what extent the program should extend its mandate into parts of Africa and Southeast Asia with acid soils and high rainfall.

### 1.3. Special Features of the Pastures Program

310. It must also be recognized that research in the Tropical Pastures Program is not concentrated on a single species, as is basically the case for the other commodity programs at CIAT, but covers a wide range of undomesticated species and even genera. Furthermore, although the final aim is to improve animal production, most measurements have to be plant-based. Likewise, improved legume/grass pastures have an extra degree of difficulty over an annual crop in that they must be managed and fertilized for persistence and productivity over an extended or indefinite time span. This inevitably lengthens the time span required for adequate evaluation.

## 2. Program Activities

### 2.1. Germplasm

311. Since the 1977 QQR there has been a large increase in the germplasm collection of tropical forage plants, from 3000 (1977) to approximately 11,300 (October 1983). There has been increasing cooperation between CIAT and other national institutions in germplasm collection. In 1977 only 23\% of the CIAT collection had been obtained
through collaborative collection, but this increased to $43 \%$ in 1983. This trend is supported by the Panel. Some $90 \%$ of the collection are legumes, the majority being from tropical America, particularly from areas of acid infertile soil. The collection of grasses has increased from 124 (1977) to 1134 (1983), most of these being from Africa and obtained through exchange from other institutions.
312. However, CIAT is not planning to and should not attempt to become the world germplasm center for all tropical pasture species. CIAT's germplasm mandate should still be to Latin America and on species for acid soil conditions in the higher rainfall tropics. ILCA is gradually building up its germplasm collection and will obviously become the major center for some collections such as that for the Trifolium species from the African highlands. CSIRO (Australia) has a large germplasm collection, with particular emphasis on species for drier conditions.
313. In practice, it would be impossible to rigidly define boundaries for each major collection, either by region or by species, as there will always be some overlap of interest. The objective should be to retain the best possible relationship with other germplasm centers, with some assistance from IBPGR, so as to avoid unnecessary duplication, competitive collection or waste of resources. CIAT could also consider holding back-up or "last resort" reserves in long-term storage at other reliable centers in case of extremely unlikely circumstances resulting in the loss of the CIAT-Palmira collection.
314. At this point there has been limited regeneration of the collection, as it is of relatively recent origin and is held under relatively good conditions, though better facilities for long-term storage would be desirable. However, this need will undoubtedly increase in the future. There are particular problems in regeneration of outcrossing grass species, as individual lines of such species must be grown far apart, which is difficult to organize in practice, or else in pollen-proof glasshouse type units. The potential problems arising from a lower level of outcrossing in some legume species must also be recognized. The Long Term Plan of the Pastures Program, supported by the Panel, is for the continuation of the germplasm position on minimum core.

### 2.2. Plant Breeding

315. The emphasis within the Tropical Pastures Program is primarily on the collection and description of existing variability rather than initiating breeding (hybridization) projects at an early stage. This strategy is supported by the Panel on two main grounds. Firstly, it is premature to commence breeding to combine characters until there has been a reasonably wide screening of the genetic base to discover what variability already exists, and in what combinations. Secondly, it is only after accessions have been widely grown that it is possible to clearly define, and give priority to, plant breeding objectives.
316. The only work on grasses to date has been to make preliminary studies of genetic variability for agronomic traits in the recently released Andropogon gayanus CIAT 621. This information will not only be of use if further selection is initiated, but may be helpful in understanding the genetic drift that is likely to occur in CIAT 621 when released as a cultivar in different countries and therefore subject to different selection pressures in different environments and seed production systems.
317. The emphasis in breeding has been with legumes. In Centrosema the objective of crossing $\mathbb{C}$. macrocarpum and C. pubescens was to retain the adaptation to grazing of C. pubescens while incorporating greater tolerance of low soil ${ }^{-} \mathrm{pH}^{\text {and }}$ low calcium and/or high aluminum, and also of diseases, in C. macrocarpum. The project on Leucaena also had the primary objective of increasing adaptation to acid soils. The program on Stylosanthes capitata was aimed at combining desirable qualities found in different accessions. All these projects are no longer funded by CIAT but are being continued at CPAC-Brasilia. The progeny are in the later stages of selection ( $F_{4}$ or subsequent) and the final lines warrant evaluation at different sites, comparing them with the main parent lines, the best available accession of that species, and with the best alternative species for that environment.
318. The current plant breeding program on Stylosanthes guianensis is aimed at combining the anthracnose resistance of the "tardio" types with the high seed yield of the common types. High seed yield is an important characteristic in reducing seed costs and may also be important in ensuring that sufficient seedling regeneration takes place under grazing for long-term persistence. The first $F_{2}$ populations in this program have been established at Carimagua and CPAC.
319. There is currently no need for major new initiatives in plant breeding although the Stylosanthes program should continue. The appointment of a second plant breeder is only marked as optional in the Long Term Plan, and higher priority is not warranted by present needs. At the same time, it is desirable to have the services of one plant breeder/geneticist within the core Pastures Program.

### 2.3. Plant Protection

320. At the time of the 1977 QQR the Program was without the services of a plant pathologist and an entomologist. Since their appointment, very useful information has been collected and CIAT is well recognized internationally for its expertise on diseases and pests of tropical pasture plants. The major impact has been to build up knowledge on the interaction between pest or disease by accession by environment. This survey has pinpointed key problems and helps to guide the choice of germplasm to be evaluated in different regions where there are different pest and disease problems. For example, some ecotypes of $\underline{S}$. guianensis, susceptible to anthracnose in the

Llanos and Cerrado are proving resistant to this disease in the humid tropics ecosystem, despite the presence of pathogenic races.
321. Possibly the most serious insect problem, particularly in the Cerrado, lies in the susceptibility of Brachiaria sp., particularly B. decumbens, to spittlebug. Three ways of attacking this problem are being investigated: use of biological control by a fungus, selection of tolerant or resistant Brachiaria accessions, and manipulation of grazing pressure.
322. The plant pathology position has been designated as continuing minimum core and in view of the importance of disease, particularly anthracnose, the Panel strongly supports this. The Program has planned to outpost a second pathologist, stationed in the Cerrado, on minimum core from 1986. The Panel supports the proposal for this second pathologist. The focus of attention must be on the broad species by environment by race of pathogen complex. It would be desirable if a plant pathologist from EMBRAPA-CPAC could also be imvolved in this project.
323. The Panel assumes that, if sufficient need arose, a limited amount of time could be given by the virologist within the Bean Program. There is currently a visiting nematologist studying the serious problem of stem gall nematode in Desmodium ovalifolium. Addressing this problem may require longer than the present two year plan.

### 2.4. Microbiology

324. As the CIAT approach to pasture improvement is based on the use of legumes, a microbiologist working with Rhizobium has been a minimum core position. From the practical viewpoint, it is highly desirable that legumes nodulate promiscuously, thus reducing or eliminating the need for farmers to inoculate legumes and the problems associated with supply of quality peat culture. However, it would also be illogical to eliminate promising legumes just because they did not nodulate with native Rhizobium.
325. Thus, the microbiology section maintains a substantial Rhizobium collection and is evaluating a promising technique where rhizobia are screened for effectiveness in undisturbed soil cores. With the continued introduction and evaluation of legumes, especially in new regions (section 9.3), there will be a continuing need for this expertise and the microbiology position is designated as continuing minimum core. However, the microbiologist has been able to give some assistance to the Bean Program and this is commended by the Panel.
326. Promising results have recently been obtained from research on mycorrhiza by a postdoctoral fellow. Clear but, to date, short-term responses to inoculation of pasture plants with mycorrhiza have been obtained with unsterilized soil in the field. It is not proposed to appoint additional core staff to continue this study, but to continue with existing resources. The Panel supports this, but
believes it is certainly premature to move into technological aspects of production of mycorrhizal inoculum. CIAT should not move into basic mycorrhizal research, but continue to seek to have this supported at research institutes in developed countries.

### 2.5. Plant Nutrition

327. The study of the nutrient requirements of the low fertility demanding species under test in the Cerrado and Llanos has been a key part of the Program. CIAT has identified species, such as Andropogon gayanus and Stylosanthes capitata, which can persist and produce under low fertility conditions where species such as Panicum maximum grow poorly. Satisfactory levels of basal fertilizer application have been defined, and some progress has been made in determining needs for maintenance fertilizer. Responses to maintenance phosphorus, sulfur, and potassium have been measured in different areas. The need for continued research on maintenance fertilizer is of high priority. Consideration should be given to incorporating maintenance fertilizer levels as a variable in grazing experiments, with associated measurements of animal production. The present use of small grazed areas, or of fertilizer treatments within exclosures in grazing experiments, is supported by the Panel.
328. There has been no evidence of requirements for trace elements in the Llanos or Cerrado, and a check for belated onset of these deficiencies is being kept on older long-term pastures. There has been no evidence of iron or manganese toxicity in pasture plants, apart from manganese on isolated areas of atypical soil at Quilichao.
329. The Pasture Program has been based on low fertilizer input although low is a relative term; what is "low" in the Cerrado or Llanos would be considered as "high" in other areas where soil fertility is not so limiting. However, some key species, such as Andropogon gayanus, have also shown that they are responsive to higher pevels of fertilizer. In view of the increasing crop/livestock in the Cerrado and the Venezuelan Llanos and the projected move into moderately acid soils and the humid tropics (sections 9 and 10), this finding is encouraging. The Panel suggests that the Program needs to consider this approach in earlier phases of evaluation and be more concerned with the full response range of fertilizer inputs and not just the "low" end.
330. Prior to 1982 there were two core-funded positions on plant nutrition. Currently only the Colombian position is core-funded and the Brazilian position is funded outside of CIAT but is integrated with the CIAT/CPAC program. The Panel recommends that this input of two scientists should be maintained and, if need be, the second position should go back to core funds. The Panel gives the position of the second soil/plant nutritionist position higher priority than the proposed position for regional cooperation based at ILCA (section 4.2).

### 2.6. Pasture Evaluation, Pasture Development, and Animal Production (Llanos and Cerrado)

331. The different stages of evaluation have been defined by the Pastures Program as:

I- Accessions in rows for one year, primarily descriptive;
II- Accessions in pure swards under cutting for two years;
III- Accessions under intermittent grazing, usually in mixtures, for more than three years;

IV- Grazing experiments with grazing mixtures with measurements of animal production, for more than three years;

V- Grazing experiments characterizing the profile of a species either on research stations or farms, this being followed by cultivar release by national programs.
332. These categories are, quite appropriately, not considered as a rigid system. CIAT diagrams indicate a decreasing involvement of CIAT from category I to $V$ where national programs dominate. In the Llanos there has been no clear involvement of ICA at any stage, while in Brazil CIAT and CPAC have worked together at all stages. Typically in any year there are some 900 lines in category I at Quilichao, and 700 category II, 30 category III, 10 category IV, and 5 category V at Carimagua. Numbers are lower at CPAC.
333. The availability of first round releases or promising lines effects future evaluation in two ways. Firstly, in some cases it will be clear what attribute is being sought in a certain species; for example, resistance to stem gall nematode and false rust in D. ovalifolium. Secondly, if there are no such clear cut objectives, as is often the case for grasses, evaluation is more difficult and is slower.
334. The Program is proposing to move the agronomy and pasture development positions at Carimagua from minimum core to optimum core in 1987 and 1989, respectively. The Panel agrees with the underlying principle that the input into evaluation at Carimagua could be reduced towards the end of the decade. This implies that some of the evaluation experiments, currently run by those positions, must be wound down prior to those years. Thus, the current flow of new accessions through the evaluation program in the Llanos cannot be maintained.
335. Considering CIAT's mandate, the present germplasm collection and stage I evaluation, with the concurrent seed increase and storage, should be continued. This collection can then be made available to CIAT or national programs; the demands from the latter are likely to
increase and they will become more specific in their requirements. CIAT will still be involved in evaluation at its new research sites (section 9), but will reduce its input into evaluation in the Llanos where more emphasis could be placed on new species or plant types, such as browse.
336. Trials in the Llanos have investigated the merit of different techniques of introducing legumes or grasses into both sown grass and native savanna. These have provided ways of reducing the risk of failure, initial costs, and erosion hazard associated with pasture establishment. However, when some of these experiments are completed, the Panel suggests that establishment studies should be initiated on undersowing with crops.

### 2.6.1. Grazing Methodology

337. Experiments at Carimagua and Quilichao, funded by IDRC, are studying various aspects of the methodology of evaluation under grazing. These experiments are supported by the Panel but the results, although useful, could be site-specific, and careful consideration about the principles that emerge will be required. However, the Panel commends the Program for their interest in improving research methodology, and see this as an appropriate role for CIAT.

### 2.6.2. Pasture Persistence and Animal Production

338. Some very encouraging results are coming from these experiments. One experiment was sown in 1978 to Brachiaria decumbens alone or with strips of kudzu. In 1983 the animal production from yearling grazers was 114 kg on Brachiaria alone and 196 kg on Brachiaria with kudzu. Such trials are investigating the effect of different stocking rates and grazing systems on the persistence of pasture species and on the animal production from different pastures. These studies on the Llanos and those on grazing methodology are primarily controlled by the pasture quality and animal production position, which is projected as continuing minimum core.

### 2.6.3. Ecophysiology

339. In grazing experiments there are usually changes in pasture composition and species persistence which are measured, but not explained. It is then more difficult to extrapolate away from the experimental site. For this reason the Program will, from 1984, replace the existing minimum core position on pasture management and productivity by an ecophysiologist who will give more insight into the reasons for some of these changes. It is visualized that the appointee will, to a considerable extend, work within existing grazing experiments. This move is supported by the Panel and it is suggested the emphasis be more on ecology than physiology.

### 2.6.4. Cattle Production Systems and Economics

340. This project is based on a new core experiment at Carimagua where three breeding herds are run without any siwn pasture and with a small ( $900 \mathrm{~m}^{2}$ per animal unit) and large ( $1800 \mathrm{~m}^{2}$ ) allotment of sown pasture in conjunction with native grassland. The sown pasture treatments are run at minimal and intensive management. Measurements are being taken of reproductive parameters and of the mineral status of animals. Early results clearly show that animals given restricted access to sown pasture still require mineral supplements.
341. The remaining experiments include on-farm trials in which a total of about 100 hectares of improved pastures were sown on each of eight farms on some $5-10 \%$ of the farm area. There was good economic data from these farms before the incorporation of sown pastures and the Program has followed the changes in management practices and output following the partial pasture improvement. Different farmers have utilized the pastures for different purposes as they desired:
improving reproductive performance, allowing for early weaning, etc. Results are encouraging; one farm with $5.5 \%$ improved pasture has almost doubled its stocking rate in animal units/hectare with an internal rate of return of over $31 \%$. The Pane1 supports these studies but would like to see an input from the national research programs and an increased use of these farms within the training program.
342. This impact of improved pastures can be more fully assessed because of the very interesting farm surveys, carried out by CIAT, GTZ (German Agency for Technical Cooperation) and the Technical University of Berlin,in the Cerrado, and Llanos of Venezuela and Colombia, in 1979-1981. These have given valuable data on farm resources, cattle management practices, animal production, farm tenure, use of labor, and farm inputs and output. They provide a good baseline for following the economic impact of new technology.
343. The Pastures Program is also running a small 300 hectare family farm at Carimagua but this is a "research station small farm" and the information is biased. The input of research advice and services are higher than for the typical small farm, and risks are much lower. However, the Unit is providing encouragement and some useful experience to research workers, especially with the current change to a dual product (milk and meat) output.
344. When considering all aspects of the Program that deal with pasture evaluation, development, and assessment the Panel commends the Pastures Program for its achievements. The Panel recommends that germplasm collection and characterization continue at approximately the present level and also that the Program gradually decrease the evaluation and development studies on the Llanos, and that ICA, the relevant national organization, be approached to join in the later stages (Categories III, IV and V) of evaluation. This would be of positive benefit to ICA in that their staff would gain experience with
potential cultivars. This participation of ICA would also help to ensure that the CIAT-based technology was appropriately considered in planning by the Colombian Government for development of the Llanos.
345. It should be emphasized that even if both the pasture agronomy and pasture development positions were phased out, Carimagua would still be the major site for the Pasture Program and the greater part of the program activities would remain there. This would include the programs of three staff positions involved in grazing studies (ecophysiologist, pasture quality, and cattle production systems) apart from the many other senior staff with experiments there (e.g. plant breeding), and studies by visiting scientists, postdoctoral scientists, etc.
346. The Cerrado CPAC site is not just a second savanna site, as the Cerrado ecosystem is appreciably different for the Llanos in such important characteristics as soil type, length of dry season, pests and diseases, etc. Consequently the continuing use of this site for some stage I studies is justified, although the number of accessions evaluated there will continue to be less than on the Llanos. Such activities are in accord with CIAT's mandate. However, it is visualized that CIAT's role in later stage evaluation at CPAC will gradually decrease.

### 2.7. Seed Production

347. The seed production section has three aspects: seed multiplication, the primary activity; applied research on seed production, particularly of new cultivars; and training. Most of the work input into seed multiplication is for the CIAT Pastures Program, some is for the RIEPT network (described in section 4), and a small amount for supplying basic seed, etc., to national institutions. Relations between the seed production section of the Pastures Program and the Seed Unit are very good.
348. Obviously supply of seed is critical to the whole CIAT Pastures Program and effective seed production from a wide range of grass and legume species, with a vast array of divergent seed production problems, is essential. Likewise, seed supply for the RIEPT network has been crucial for the successful operation of the network.
349. However, the Panel recommends that there should be more input in applied research into seed production. When new cultivars of species, unknown in terms of commercial seed production, are released, applied seed production research can make all the difference between a released species being widely used or just being a theoretical release which is unavailable commercially at realistic prices.
350. Applied seed production research on Andropogon gayanus has, for example, increased the seed production of the crop by defining appropriate crop management prior to harvesting, and by improving
manual and mechanical harvesting procedures. With the inevitable trend for release of further cultivars, the Panel considers that applied research into seed production be given higher priority. Such research would enhance seed production in the commercial sector and national institutions. Extra support for research into seed production could, for example, be given through the appointment of a post-doctoral fellow.
351. Although training in seed production has been given some limited attention to pasture plants, the Pastures Program will be offering specialized training courses in seed production of pasture plants, both at CIAT and in-country, from 1984 onwards. The Panel supports this action. The senior scientist also plans to spend more time discussing research on seed production with national research institutes. An increase in applied seed production research at CIAT must also be used as an opportunity to train national scientists in seed production research as distinct from seed production.

## 3. Staff and Facilities

352. Since the 1977 QQR, senior staff positions in the Tropical Pastures Program peaked at 20 core staff in 1979-1982, but were reduced to 16 following financial pressure. The senior staff is supported by approximately 5 visiting scientists or postdoctoral fellows.
353. Most senior staff are based at CIAT-Palmira, two (agronomy and pasture development) at Carimagua, and one (agronomist) is outposted at CPAC-Brasilia. There are three bilateral staff positions, not on CIAT core funds, two are in Brazil (Brasilia and Belem) and one in Panama.
354. The facilities at CIAT-Palmira are used for seed storage, limited seed multiplication, glasshouse and environment room studies, and for specialist laboratory research (e.g., in plant pathology). The CIAT-Quilichao substation, 60 km from Palmira, is on acid ultisols and carries a small cattle herd, and is used for initial characterization and multiplication of germplasm, methodological research, and seed production. Facilities are adequate for these purposes.
355. The main experimental site is at Carimagua, where the major experiments on pasture evaluation and development are carried out. Facilities on the station are good and although there have been occasional problems of slow service from Palmira, support has now greatly improved. Also there were minor difficulties in meeting occasional peak demands for labor which could perhaps be met by increased flexibility of funding for temporary assistance.
356. The facilities used by the outposted agronomist at CPACBrasilia are good, although there are occasional problems in getting adequate assistance for maintenance of small plots.
357. The senior staff of the Pastures Program are organized into three groups, each with a head scientist. The groups are germplasm development (seven scientists), pasture evaluation and development (six), pasture evaluation in production systems (three). The groups meet formally and informally to discuss proaress and plan experiments. The Coordinator frequently meets with the three heads, in addition to normal discussions with individual scientists, but they play an advisory role and no administrative or decision making role. The complete program, including visiting scientists and research associates, meets informally once a week and formally six times a year. At the minimum, planned experiments are discussed by the scientist concerned, group head, and program coordinator.
358. On paper, this arrangement of groups has the drawback that it splits a continuous program into somewhat arbitrary sections and could well reduce communication across the program. However, in practice there appear to be no such problems, so groups can remain as they are. But groups should not be seen as having an administrative role, which is suggested by their inclusion in the CIAT Organizational Structure Plan.
359. On the average each senior scientist has two professional support staff (research associate or assistant with an M.S. or Ing. Agr. degree), three technicians ("tecnicos" or experts) and five to six laborers or specialized laborers. The supporting staff are highly regarded. There is adequate provision for short specialized courses for support staff.

## 4. International Cooperation

### 4.1. RIEPT

360. International cooperation on Tropical Pastures throughout Latin America is largely through the International Tropical Pasture Evaluation Network (RIEPT). Since 1979 the network has aided coordination of evaluation trials and the flow of information between countries, assisted with funding from the International Development Research Centre (IDRC) since 1982. A senior scientist, core-funded, is in charge of coordinating CIAT support to the network. A second position on minimum core funds has been proposed for Central America in 1985 and this is supported by the Panel. When including the support given by other scientists, RIEPT would then be taking at least three and one-half CIAT core positions in terms of senior scientist time.
361. The first evaluation trials were established during 1979 and were of two types, $A$ and $B$. In the A trials a large number of entries are evaluated in a few sites, whereas in the B trials a restricted range of lines are evaluated at several sites within each main ecosystem. In both these categories, entries are evaluated in small plots according to detailed guidelines. At the end of 1983, 25 type A
trials and 65 type $B$ trials had been established. The first stage C trials (eight), examining the effect of grazing management in small plots, and the first stage $D$ trials (nine), measuring animal production, have also been sown.
362. The network has an advisory committee, made up primarily of national research leaders. As a service to RIEPT, CIAT produces a quarterly bulletin with reports on research information on pastures gathered from CIAT workers, network participants, or outside sources. The bulletin, published only in Spanish, goes to 900 workers. CIAT also publishes the data collected in the Network trials. The CIAT Tropical Pastures Program plays a major role in providing seed for the network.
363. While there is no doubt the network is fulfilling a very useful role, the Panel offers the following comments:
1) The use of "International" in the network title is unfortunate. The network is confined to Latin America and results are published only in Spanish. Thus, it is of little value in Africa and Southeast Asia. The Panel commends plans to publish the newsletter in English. A pasture network for Southeast Asia is in the detailed planning stage by CSIRO, although on a smaller scale than RIEPT, and newsletters could be exchanged between the working centers. The same could be done if a newsletter was published in Africa.
2) While coordinated multi-site trials are currently a good concept, care must be taken that the continuing large input of CIAT and by national institutions, is justified. Multi-site trials, which were an integral part of the network when it was established, may in time be of decreasing importance as national programs focus on their own priorities.
3) Standardized operations between sites in A and B trials, while desirable, can cause problems in that what is appropriate and possible in one site may be inappropriate or impossible in another.
4) The publication of network material by CIAT is a very useful service to national programs. Likewise, CIAT assistance in network meetings serves a useful role in bringing together pasture workers in Latin America.
364. In summary, while the Pastures Program's initiative and involvement in RIEPT are to be commended, the Panel points out that care should be exercised that the network does not become too large a demand on CIAT resources.

### 4.2. International Cooperation Outside of RIEPT

365. CIAT plans to appoint an outposted liaison scientist on minimum core position at ILCA in 1986. The Panel does not support this and recommends that any decision be left until the implementation of the planned headquarters forage agronomy program at ILCA has been fully effected; the reasons for this are given in Chapter XI. For similar reasons the Panel does not endorse the outposting of a CIAT scientist, projected for 1989, to Southeast Asia. The Panel believes that CIAT Tropical Pastures Program should concentrate its effort in Latin America, although supporting cooperation with ILCA and other institutions in such activities as exchange of information, provision of germplasm, and pooling of resources for plant collection, etc. Even if the Pastures Program's CGIAR mandate is extended globally to lowlands in the humid and subhumid tropics with acid and infertile soils (see Chapter II), this does not necessarily mean that scientists must be outposted.

## 5. Training

366. Since the objectives of the Pastures Program were clearly defined in 1977, training has concentrated on building up the expertise of pasture research workers, particularly from regions with acid soils. Between 1977-1983, 255 pasture scientists received some training at CIAT, with the biggest representation from Brazil (44), Colombia (43), Peru (21), Cuba (20), and Panama (19). Sixty-eight percent of the trainees came for an intensive 10 -week course, usually followed by a three to four month period when the trainee is closely associated with one particular aspect of the research program. Many of the trainees have subsequently been involved with the RIEPT Network, so the close contact with CIAT has been maintained.
367. The second major group of trainees were visiting researchers studying for a Ph.D. (13 trainees) or M.S. degree (19). These represent 14\% of all trainees. Usually the research is conducted at CIAT and the course work studies at the cooperating universities. With the increasing emphasis on later stage evaluation experiments, where there are usually pastures of contrasting species and/or fertilizer levels and/or stocking rates, there was a commendable trend to carrying out detailed thesis studies on plants or plant/animal relationships within these experiments.
368. Since 1977, 18 post-doctoral fellows have been attached to the Program. Some of these have later become senior staff and the advantages and disadvantages of this are discussed in Chapter XIII. Comments on the relevance of training procedures are in Chapter IX.

## 6. Achievements and Impact

369. After the failure of the accepted tropical pasture cultivars in the Llanos and Cerrado during the late 1970s, CIAT initiated a successful search for suitable germplasm and has found out much of the information required to form successful pastures out of these new species. The main achievements of this Program have been the following:
1) Four cultivars of tropical pasture plants, specifically selected for use in the lowland tropics of America, have been released. The most widely used is Andropogon gayanus (CIAT 621) which has been released by five countries under different names. The area sown to Andropogon has continued to expand, and in Colombia much of this expansion has been outside the Llanos areas where it was developed as a pasture cultivar. A survey made of 57 "early adopter" farms in Colombia showed that the area sown to Andropogon had increased from 42 hectares in 1979 to 5000 hectares in 1983. Such a rapid acceptance is very gratifying.
2) Another new cultivar released as a result of CIAT research is Stylosanthes capitata (CIAT 10280) as cv. Capica by ICA in 1983. Basic seed of this species is currently being sold by ICA to commercial seed producers. Two recent releases by EMBRAPA in Brazil are S. guianensis "tardio" type (CIAT 2243) as cv. Bandeirante and S. macrōcephala (CIAT 1281) as cv. Pioneiro. There are also several other promising accessions of legumes and grasses under test, including S. guianensis (CIAT 136) which is at the release stage in Peru.
3) Along with the increase in the germplasm collection, there has been a buildup in the collection of Rhizobium strains and considerable knowledge has been accumulated about the susceptibility of different accessions to pests and diseases.
4) Much of the land surface of South America has been classified into five major ecosystems. While this had been done in part by national institutions, CIAT has put together the existing studies on a common basis and carried out extra survey work. This classification is being used to select the most appropriate experimental sites. At the farm level, good base data has been obtained on the resources and mode of operation of farms in the Llanos and Cerrado. The profitable impact of improved pastures is being documented on some of these farms.
5) Good progress has been made in defining the establishment, fertilizer requirements, effects of management, and carrying capacity of pastures based on recently released and other promising species. The early results from animal production trials have been very encouraging. Contrasting with annual gains of 15 kg live weight/ hectare from the native Llanos savanna, improved pastures have produced up to $300 \mathrm{~kg} /$ hectare. There are encouraging indications that
sowing improved pastures on a small proportion (10\%) of a holding formerly based on grazing only native pastures can have a meaningful impact on farm output and yield a very satisfactory rate of return.
6) There has been an appreciable impact of CIAT on enhancing national research programs in tropical pastures. This is evidenced by the number of trainees from these programs that have gone to CIAT, the substantial collaboration of national institutes in the pasture network, and the release of CIAT lines as cultivars by national institutions. CIAT has also played an important role in initiating and maintaining the tropical pasture network (RIEPT) which is serving a very useful function in Latin America.

## 7. Weaknesses and Constraints

370. Senior staff interviewed were basically content with facilities and support given for the Program. Provision of funds for travelling to conferences is perhaps marginally limiting and must not be further restricted, particularly for travelling to major conferences such as the International Grasslands Congress held every four years.
371. Access to the computer system has been somewhat difficult, but with two terminals due to be installed in the Program's offices this difficulty should decrease. There have been some problems with Administration, particularly dealing with supply of goods. This position should improve as action is taken along the lines recommended in the report of the Management Review.
372. Up to 1984 the publication record for the senior scientists in the Pastures Program represents less than one paper or technical report per person per year. If publication is inadequate scientists may jeopardize their own careers, and also the scientific merit of the Program is not adequately recognized. The other value of publication is obviously that scientists are forced into a much more detailed assessment of their results. This should, in turn, lead to better planning of future research. This problem has been noted within the Pastures Program and a committment has been made to greater publication. The Panel endorses this move; whether this can be achieved will depend on there being an equal committment to doing less research work or more unpaid overtime.
373. Future Plans
374. No basic change was contemplated in the Pastures Program's basic philosophy based on the use of legume-grass pastures. The Program has not envisaged any changes in the minimum core status of the headquarters research group except that two positions in the Llanos would become optimum rather than minimum core in 1987 and 1989 and the entomology position would become optimum in 1988. From the
one outposted position in 1983 and projection of two in 1984, there was a projected increase to eight in 1989-1990. The increase of seven positions, over the present position in the Cerrado, would be due to one in the Cerrado, two in the humid tropics, one in Central America (RIEPT), one in moderately acid soils, one in Africa (ILCA and regional cooperation), and one in Southeast Asia (regional cooperation).
375. Bilateral programs, funded outside of CIAT, were projected to increase from three (Brazil and Panama) in 1984 to five in 1988 (the humid tropics and Central America).

## 9. Assessment and Recommendations

375. The overall conclusion of the Panel is that, particularly over the last three years during which there has been no staff turnover, the Pastures Program, based on a cooperative team effort by competent and keen scientists, has made good progress.

### 9.1. Implementation of Recommendations by the 1977 QQR

376. As this review was undertaken soon after the reorganization of the Beef Production Program, there were few specific recommendations for this Program.
377. One major recommendation (item 300) was that sufficient senior scientists in the field of animal health should be retained in the Beef Program. This recommendation was not followed by CIAT, their reasons being given in Annex V, and this Panel supports their decision. However, it must be recognized that the development of improved pastures opens options for new herd management practices so as to best utilize these pastures. The Pastures Program, for example, plans to commence experiments in 1984 with early weaned calves grazing improved pastures. It would be appropriate if this were undertaken jointly with ICA, as the national research institutes should be encouraged to join in work of this type.
378. 

The 1977 QQR also commented on mineral nutrition of animals (item 192 dd). CIAT and ICA already have sufficient data to show that cows grazing solely or primarily on native pastures have markedly higher fertility when provided with phosphorus licks. There is evidence, from outside of CIAT's mandate, that animals may still be phosphorus deficient when grazing 'good' Stylosanthes pastures grown on low fertility soils. The present policy of providing mineral licks within grazing experiments to supply any deficiencies in sodium, phosphorus, and other elements is supported. However, there is a need to study the phosphorus and mineral requirements of animals grazing on improved pastures for extended periods of time, preferably cooperating with ICA.
379. In item 293 the 1977 QQR recommended that the mineral balance needed to be monitored in low input situations to ensure that there was adequate maintenance of nutrients in low fertility systems. Two soil/plant nutritionists were then appointed to the Tropical Pastures Program (section 2.5), and studies have been carried out on maintenance fertilizer needs. However, it is not necessary to move into a full study of nutrient cycling as implied by item 293. Measurements of cycling inevitably involve measurements of rates between different nutrient pools and this is extremely time-consuming. Measurements of states and not rates would be adequate at this stage.
380.

In items 193 and 195 attention was given to the use of improved pastures within farms. CIAT is studying the integration of improved and native pastures within the Llanos. As additional knowledge is acquired about improved pastures, such action will be of continuing importance, preferably being done in collaboration with, or eventually mainly by, national institutions. However, CIAT has not given adequate attention to the cropping/pasture interface (item 193 bb).

### 9.2. Crop/Livestock Interactions

381. Where there is a mixed farming system there must be adequate appreciation of the livestock/cropping interaction in pasture research. For example, productive species with a limited life span may be quite unsuited for use as perennial pastures but may be ideal for a pasture phase in cropping rotations. Pastures can also aid in control of erosion. The CIAT/GTZ surveys have shown that in the Cerrado and Venezuelan Llanos there were significant crop/livestock interactions, with crop stubbles, from upland rice and sorghum respectively, being important in dry season grazing. This, for example, could effect the seasonal demands that farmers are going to impose on sown pastures and hence, the choice of species and wet season grazing management. Such interactions are likely to increase.
382. 

Also pastures can be sown with or underneath cash crops. This gives quick cash returns from fertilization and may enable higher rates of fertilizer to be used allowing the growth of more demanding pasture species. CIAT has carried out considerable research on pasture establishment, but no attention has been given to undersowing.
383. Thus, without directly engaging in farming systems research, the Program must take into account current and likely changes in farming systems.

### 9.3. Regional Priorities for Pasture Research

384. The Pastures Program to date, with the exception of RIEPT activities, has been directed to the frontier and highly acid Llanos and Cerrado, and thus will mainly benefit large-scale farms. However, the Pastures Program has initiated a proposal, with a minimum core position in 1988, to commence work on the moderately acid soils that are generally associated with small farms in more closely settled
areas with mixed farming systems throughout Central and South America. Some of the technology developed in the acid savannas will be appropriate but certainly some new ideas will be required (establishment, choice of germplasm for evaluation, use of browse shrubs, etc.). The potential for short- to medium-term adoption of pasture technology in these areas could be higher than it is for the savannas.
385. It is also proposed to commence work in the humid tropics with two positions (one in 1984 and one in 1986). The work is to be based in Peru, in an area where the typical farm size is $30-50$ hectares with a livestock-cropping base. Both the moderately acid soils and humid tropics offer the possibility of aiding dual purpose (meat and milk) animal production.
386. The case for moving into the humid tropics is based on the increasing degradation of cleared forest land. It is estimated that half of the six million hectares of cleared forest land is already degraded and this can only enhance the pressure for further clearing. The objective of this project is to develop technology to avoid degradation and reclaim degraded land. The latter objective is particularly difficult but is a large and increasing problem which warrants CIAT's attention. It is more appropriate to commence this project now that good progress has been made with the savanna projects. This qualification was also made by the 1977 QQR (point 187 cc) which considered this topic.
387. The Panel recommends that both the moderately acid soil and humid tropics projects go ahead, with the provision that both projects be linked in with and given some parallel support by national institutions. The humid tropics project must focus on degraded or degrading land and not on clearing of new land. They would be organizationally similar to the successful CIAT-CPAC project. Additional support for both these projects will be required from headquarters (i.e., supply of seed, studies and advice on soil fertility, Rhizobium, etc.). Thus, the impact on the Program will be greater than the three positions directly involved. The Panel endorses the decision to postpone indefinitely work on the poorly drained savannas, drier regions, and the chaco ecosystem. With this new input there may have to be a decrease in the Llanos work as is predicted in the revised Long Range Plan. Nevertheless, sufficient resources would still be available to consolidate the Llanos project.

### 9.4. Recommendations

388. The recommendations made throughout this Chapter are as follows:
1) The Pane recommends that the Program retain the two soil/plant specialists in nutrition. If the current bilateral position at CPAC is not renewed after 1985, as is indicated by CIAT, the position should be on minimum core funds. The position need not
be retained in the Cerrado, but may be needed to support the two new regional projects.
2) The Panel recommends that the germplasm collection and characterization of germplasm continue, and also that the Program gradually decrease the evaluation and development studies on the Llanos and ICA be approached to assume more of this role.
3) The Panel recommends that applied research into seed production be increased, taking opportunity of this increase to train personnel from national programs, and also that liaison with national institutes on seed production be increased.
4) The Panel recommends that the proposed minimum core position for an outposted scientist at ILCA be delayed until planned reorganization of the headquarters forage program at ILCA has been fully effected. The proposition should then be reexamined in consultation with ILCA.
5) The Panel recommends that both the projected moderately acid soil and humid tropics projects go ahead with one and two core funded scientists, respectively. The proviso is that both projects be linked in with, and given some parallel support by national institutions. The humid tropics project must focus on already cleared areas and not on clearing of new lands.

## CHAPTER VII - SEED UNIT

## 1. Background and Objectives

389. The rationale for the Seed Unit at CIAT is described in the Seed Unit Position Paper (April 1983):
390. "The need for a Seed Unit grows out of two overlapping problem areas that impinge negatively on rapid progress in agricultural development based on improved production technology: limited availability of improved seed, and a but incipient seed industry at the national level which is in need of determined and systematic outside assistance in order to further develop."
391. This need was recognized in 1977 when CIAT Management determined that it would be beneficial to establish a unit to assist in training and development of programs for seed activities in Latin America. The Rockefeller Foundation granted the assignment of an experienced seed specialist and US $\$ 25,000$ in support funds to initiate such activities. In November 1978 the Swiss Development Corporation (SDC) granted US $\$ 3,354,000$ to create and fund a Seed Unit at CIAT for five years (1979-1983). This grant recently was extended by SDC for the period 1984-1986 in the amount of US\$2,284,000. Supplementary support for the Seed Unit has been provided by CIAT (US $\$ 179,500$, facilities and equipment), various equipment suppliers (US\$38,949, gifts and loans of equipment), Mississippi State University/AID (US $\$ 124,000$, technical assistance), Caribbean Food Corporation/EEC (US $\$ 33,912$, training grant), and the German Foundation for International Development (US $\$ 25,000$, training grant). Non-monetary support has been provided by many individuals and organizations.
392. The objectives of the first agreement with SDC were:
"To create a Seed Unit at CIAT to:
a) Train personnel in government and private institutions, primarily from Latin American and Caribbean countries, in various aspects of seed industry and seed program development.
b) Extend technical collaboration to countries in the region interested in seed program development, with the aim of expanding the production of high quality seed of improved cultivars at all levels, from the breeder to the commercial stage, with main emphasis on, but not restricted to, the commodities with which CIAT works.
c) Conduct specific research in seed technology highly relevant to CIAT commodity interests and relevant to problems of the impact areas.
d) Provide CIAT with a single unit to cooperate with commodity programs in multiplying, processing, storing, and distributing advanced experimental material, or breeder and basic seed, to collaborating countries for their further multiplication."
393. The objectives of the second agreement with SDC are discussed later in Section 8, Future Plans.

## 2. Organization and Activities

394. The Seed Unit was initially supported as a special project at CIAT but now is funded through restricted core project funds. It is organized into two sections, Seed Production and Industry Development, and Seed Technology and Quality Control. Both are administered by the Head of the Seed Unit, who reports to the Director of Crops Research. As described in the Seed Unit Position Paper, "The activities engaged in by the Unit are nonconventional for an International Agricultural Research Center in that they are not directly related to research, but, rather are in the areas of training, development, and promotion of national seed programs and enterprises."

## 3. Staff and Facilities

395. There are two senior staff positions in the Seed Unit. It is headed by a Senior Seed Specialist, and the Seed Production and Industry Development Specialist position (occupied for three and a half years) is currently vacant. The functions of training, production, drying and conditioning, quality control, and communication are performed by five Colombian university graduates. Clerical and field responsibilities are performed by three full-time and some part-time personnel. Production and quality control activities are performed by two technicians and two laborers (these four positions are paid from seed production and conditioning revenues). The services of the Seed Health Laboratory in the Genetic Resources Unit are available to the Seed Unit for routine testing and assisting in training activities.
396. Existing CIAT buildings were remodeled and there was some new construction to develop $1164 \mathrm{~m}^{2}$ of space for the Seed Unit. A seed conditioning plant and a solar collector were constructed, and an existing grain handling facility moved and improved. These steps plus the addition of other donated and purchased items have resulted in facilities and equipment at the Seed Unit being valued at approximately US $\$ 500,000$. A deliberate effort has been made to purchase or construct simple, but adequate, facilities and equipment in order to remain relevant to the Unit's mission and the local situations of the trainees.

## 4. International Cooperation

397. The role and function of the Seed Unit in international cooperation is described in the internal working document entitled "CIAT's International Cooperation Strategy" (30 January 1984):
398. "The availability of good quality seed of the improved varieties coming from the national and international research programs is basic to the ultimate impact of the CIAT cooperation strategy.
399. National programs have the primary responsibility in developing effective seed programs and industries, but many countries in the region are having difficulties building a cadre of trained people, in establishing clear strategies, and in developing strong seed production systems."
400. Country profiles developed by the Seed Unit indicate that only seven of 22 Latin American and Caribbean countries have clearly defined seed policies. Thus, there exists a significant role in international cooperation, especially in training, technical collaboration, and basic seed production, for the Seed Unit at CIAT. Another aspect of international cooperation is communication. This is being handled effectively in the region by the Seed Unit with its newsletter "Semillas para America Latina" (in Spanish, with a circulation of 1500).
401. The Seed Unit works with other Centers and agencies with programs in the region (CIMMYT, CIP, ICRISAT, IICA, World Bank, and IDB). All of these agencies have contributed to workshops, and the Unit assists CIMMYT training activities.
402. Training
403. Training has been the first objective and priority of the Seed Unit. Training activities include courses at CIAT, in-country courses, in-service training (individualized), workshops, and thesis and research supervision. There have been six intensive (seven to nine weeks) courses and four advanced short (four weeks) courses offered at CIAT in the 1979-1983 period. There were 167 participants in the intensive courses and 116 participants in the short courses. These participants represented at least 26 countries. In-country and subregional courses have been offered 12 times to 267 participants. Individualized in-service training has been provided to 15 participants. Five workshops have been held at CIAT and two regional workshops were co-sponsored. The number of participants and countries represented in the workshops at CIAT exceeded 320 and 26, respectively. Thesis and research supervision to date has involved candidates for five M.S. and one Ph.D. degree. Visiting scientists, specialists, and consultants to the Seed Unit have averaged about five persons per year.
404. Excellent course materials, audiotutorials, and publications, prepared by CIAT staff, often with outside assistance from visiting scientists, specialists, and consultants, are significant components of the training program. CIAT now has 16 different audiotutorials developed on various aspects of seed production, propagation, and technology. Over 425 copies have been sold.
405. Although evaluations are made following individual courses, all former course participants have been asked to evaluate the effectiveness of Seed Unit courses in preparing them for their current activities. Their responses will be used to facilitate changes, where beneficial, in future courses. The Panel commends the quality and scope of the Seed Unit's training programs.

## 6. Achievements and Impact

405. The major achievements of the Seed Unit include its establishment and construction of facilities, the development of a training program, and the production of basic seed of several species.
406. The impact of the Seed Unit has been considerable, especially in view of its five year existence. The impact of its training program has been felt in at least 26 countries through their personnel's participation in courses, in-service training, workshops, and thesis and research supervision.
407. Training in the five year period was planned for 402 individuals, but more than 870 have been trained. Following this training many of these individuals have assumed important positions in their domestic seed industry and are in turn training others.
408. Through technical collaboration some national program policies and strategies are improving, new seed associations are forming, improved guidelines for seed production are being developed, and more and better quality basic seed is being produced.
409. The impact of basic seed production by the Seed Unit has been realized in three of the four commodity areas at CIAT. Seed of 49 varieties or lines of beans, rice, and tropical pasture species, totalling 152 tons and valued at US $\$ 191,000$, has been produced and supplied to 16 different countries. Seed of important germplasm or species also has been increased to complement efforts in the commodity programs, especially for the Tropical Pastures Program.
410. From these combined efforts, the Seed Unit is helping the development of four seed networks, national seed programs and former trainees, subregional efforts, universities with an emphasis on seed production and technology, and seed associations. A working technical committee on seed matters now exists because of Seed Unit efforts. Similar plans are underway in the Andean Zone. A collaborative
agreement signed with a seed technology and training center in Southern Brazil can contribute significantly to work in the Southern Cone.
411. The motivation of former trainees and the Unit's efforts have resulted in new seed trade and technology associations forming in Costa Rica, Guatemala, Panama, and Dominican Republic. Similarly a subregional association has started in Central America and the Caribbean, and a region-wide Latin America Association of Seed Experts is being initiated with the Seed Unit to act as its secretariat. A total of 15 associations are now operative in the region.
412. The Workshop on Improved Seed for Small Farmers was attended by 65 participants. The Workshop stimulated an awareness of what is required to assist the small farmer in improving his seed for planting. The Panel endorses the Seed Unit's emphasis on the needs of small farmers.

## 7. Constraints and Weaknesses

### 7.1. Staffing

413. The limited number (2) of senior staff and the important role of this Unit necessitate that the Seed Production and Industry Development Specialist position be filled.
414. The Panel recommends that this position be filled as soon as possible.
415. Outposted staff members are necessary in both the Andean region (Peru) and Central America (Costa Rica) to provide follow-up assistance with trainees, to assist basic seed production efforts, to work in the development of seed enterprises in countries, to contribute to improving seed supplies to small farmers, and to strengthen subregional networks.
416. The Panel suggests that consideration be given to establishing two outposted staff positions for the Andean and Central America regions. This could be approached on a step-wise basis with extra-core funding.
417. An individual with seed production experience should be appointed to the Experimental Station Operations Unit and assigned to oversee seed growing activities at all CIAT locations, if extra-core funding can be obtained. This would facilitate and greatly increase the efficiency of the total seed production effort through the Seed Unit in cooperation with commodity programs.
418. The Panel supports this appointment, but funding should be from extra-core sources.
419. Activation of the senior fellow program would be beneficial to the Seed Unit and all other CIAT programs.

### 7.2. Facilities

420. Additional air-conditioned seed storage space is essential. The reduction of the space initially proposed has already resulted in improper storage and rapid loss of germination of Andropogon gayanus seed (US\$15/kilo production costs).
421. Capacities for seed cleaning, holding, and drying must be increased.
422. As the production effort increases, additional highly productive land must be made available to the Seed Unit both at Palmira and appropriate off-station locations to facilitate efficient production of basic seed. In certain situations this land may be outside of Colombia. It may be desirable to contract some seed production functions.
423. The Panel recommends that the required additional physical facilities and land be provided to the Seed Unit.

### 7.3. Research on Seed Production

424. The uniqueness and diversity of the plant species researched at CIAT require that research be done on seed production methods per se. Some research can be done within the Seed Unit when fully staffed. Limited complementary research is being done on tropical pasture species by the senior seed scientist of that program. More seed production research could be done by that scientist if additional time and technical assistance are made available by the Tropical Pastures Program for this purpose. The close working relationship between this scientist and the Seed Unit is noted by the Panel and might be examined and emulated to the degree necessary by the Bean and Rice Programs.
425. The seed technology research now done in a few universities in the region is totally unrelated and the results are not readily available. The Seed Unit needs to play a more direct collaborative role with other regional bodies to identify priorities, catalyze research efforts, and serve as an information and data base for work done. Key areas for research include seed pathology, economics of seed production and marketing, drying, packaging, and storing seed in the tropics, and constraints in seed supplies for small farmers.

### 7.4. Communication

426. Greater follow-up with trainees is necessary. This could be accomplished by appointment of the two regional outposted senior staff or an additional senior staff position at CIAT-Palmira.
427. Greater understanding is necessary among the CIAT staff of the nature and value of a good seed program to their own commodities and to development of the region.
428. More technical information is needed in Spanish in easily accessible form through bulletins, handbooks, training manuals, and audiovisual materials.
429. Better communication and coordination are necessary with the regional FAO seed program.
430. The Panel recommends that better communication on seed matters be established between FAO and the Seed Unit.

## 8. Future Plans

431. The future plans of the Seed Unit for the 1984-1986 period are described in the Memorandum of Agreement with SDC. These include:
1) increasing the number and competence of seed technologists in the region through a continuation of the basic, and development of more advanced, training opportunities;
2) strengthening seed programs and enterprises within countries through technical collaboration with former trainees and the developing seed networks;
3) stimulating seed production and accelerating the use of the best varieties and hybrids available;
4) performing research on those problems limiting seed production and distribution;
5) disseminating information on seed activities, advances in seed technology, and the existence and availability of desirable new materials in the region.
432. Concurrently, the Seed Unit will continue to provide centralized support for the production, processing, and distribution of seed of improved materials and to assist national program efforts to produce and distribute improved seed developed in the CIAT/national commodity research programs.
433. It is clear that a need will exist after 1986 for the
activities performed by the Seed Unit. In fact these activities will probably increase and be necessary on a global basis, especially in the area of international development activities. Therefore, a mechanism must be found to enable the Seed Unit organization and mission to evolve with that increasing need. A more autonomous role may be necessary so that the Seed Unit may serve in a more consultative or coordinating role on a regional and global basis for the establishment and operation of similar units.
434. One possibility is that the Seed Unit become a semi-autonomous unit of CIAT, still under the umbrella of CIAT's Board of Trustees, but with its own Board, chosen to represent the broad activities and regions of service of the Seed Unit. This possibility also is discussed by the EMR in its report.
435. The Panel recommends that a study be done to determine whether the Seed Unit could best fulfill its functions as part of the CIAT core budget, by becoming a semiautonomous unit, or by a combination of these or other possibilities. This is especially pertinent in regard to the necessary future international development activities of the Seed Unit, and perhaps the whole CGIAR system.

## 9. Assessment and Recomendations

### 9.1. Assessment

436. The Seed Unit has made a very significant impact on the seed industry of Latin America in a period of only five years. It has responded to a major need of the region by developing an excellent training program, improving seed technology, providing basic seed, and increasing communication among seed professionals. The continued evolution of the activities of the Seed Unit demonstrates that it is dynamic and responsive to the needs of its clientele. The Panel commends the staff of the Seed Unit and those who have contributed to its development.

### 9.2. Recommendations

437. The Panel recommends that a study be done to determine whether the Seed Unit could best fulfill its functions as part of the CIAT core budget, by becoming a semiautonomous unit, or by a combination of these or other possibilities.
438. The Pane1 recommends that the Seed Production and Industry Development specialist position be filled as soon as possible.
439. The Panel recommends that the required additional physical facilities and land be provided to the Seed Unit.
440. The Panel recommends that better communications on seed matters be established between FAO and the Seed Unit.

## 1. Introduction

441. The staffing structure and commodity (rather than discipline) orientation of CIAT has undoubtedly contributed significantly to the cooperation and rapid progress of the commodity programs. The Panel recognizes and commends this. However, can the commodity approach alone adequately provide the necessary supporting research in specialized areas such as tissue culture, virology, and microbiology?
442. This subject was addressed recently by Director General Nicke1 ("Agricultural Research Management", presented at the Workshop on Agricultural Research Policy and Management in the Caribbean, Port of Spain, Trinidad, 26-29 September, 1983), when he stated that "even in a large organization with few commodities to cover, it may not be possible to assign scientists in highly specialized disciplines to each program on a full-time basis. A useful compromise is to organize most of the institution along interdisciplinary, commodity program lines and to conduct the more specialized research within a scientific support unit serving all programs."
443. During the EPR the Panel determined a need for two new, but related, initiatives at CIAT.

## 2. Proposed Interdisciplinary Research Unit

444. The Panel held extensive discussions on the concept of CIAT modifying its organizational structure to the degree necessary to develop a small, new unit comprised of those disciplines which will interact increasingly with all commodity programs in the future. For example, tissue culture, an aspect of applied biotechnology, is being used in the Cassava Program to free germplasm of pathogens; promising forage species of the Tropical Pastures Program are being regenerated from callus cells; culture of anthers from $F_{\text {h }}$ hybrids of rice has shown great potential for accelerating the breeding process for this commodity; and interspecific crosses necessary in the Bean Program can be facilitated by embryo rescue and plant regeneration from protoplasts and callus cells. These and additional applications of tissue culture such as screening for stress tolerance, somaclonal variation, protoplast fusion, and uptake of genetic material will become increasingly important to all commodity programs in the future.
445. However, the current structure at CIAT and the work load on the scientist directing the tissue culture program do not permit the optimum use of tissue culture by any of the programs; nor do they
allow the scientist time to concentrate on modification and development of tissue culture techniques which might be specific for one commodity or useful with all commodities. Other senior staff at CIAT facing this same situation to varying degrees are those involved with mycorrhiza, Rhizobium, and virology.
446. The development of a Science and Germplasm Resource Unit (SGRU) at CIAT and the transfer to it of a limited number of senior staff would provide greater and more capable responsiveness by these disciplines to the needs of commodity programs. Components of the SGRU might include the Germplasm Resources Unit, applied biotechnology, the seed pathology position proposed below, virology, mycorrhiza, and Rhizobium, with the latter two perhaps grouped as microbiology. Interaction between commodity programs and the SGRU would be via Research Associate level staff, whose support and first loyalty would be in the commodity programs. The number of Research Associates utilized in this manner and in which disciplines of the SGRU would be determined by the current needs of a particular commodity program. Post-doctorals and visiting scientists would be retained to advance knowledge in critical research areas in which continuity was not essential.
447. The structure and method of operation for the proposed SGRU would cause a minimum amount of reorganization, no relocation, and no discuption of ongoing research. It not only addresses the reality of future limitations in the number of senior staff positions, but also generates the critical masses of scientists working in advancing research areas and increases the bi-directional flow of skills and information between the constituent disciplines and the commodity programs. It also would accommodate the future addition of other needed disciplines, such as nematology.
448. The Panel recommends that CIAT give serious consideration to establishing a SGRU-like structure on a trial basis for three to five years. The SGRU could be administered by a current core-funded senior staff member in one of the disciplines, the proposed senior staff person to coordinate Research Services, or the position could rotate among the constituent scientists during the trial period.

## 3. Proposed Seed Pathologist

449. There is an increasing awareness in all of the commodity programs at CIAT of the hazards associated with the possible importation or exportation of diseased plant materials. There also are several problems of seed health and their impact on crop establishment and seed production. Yet there currently is no mechanism to address these problems CIAT-wide. The Seed Health Laboratory in the Germplasm Resources Unit (GRU) represents a beginning, but it will be unable to deal at the professional level with all the current and potential needs of all commodity programs.
450. To address this need the Panel recommends that a new senior staff position of Seed Pathologist be created and filled as soon as possible. The responsibilities of this position would be to direct the Seed Health Laboratory, assist the commodity programs and the GRU and Seed Unit in areas of seed health and phytosanitary measures, and to develop rapid and sensitive techniques for the detection and identification of pathogens in plant propagules.
451. The Panel believes that CIAT could assume international leadership in the area of phytosanitary measures, which is of increasing concern to all the IARCs.
452. Recommendations
453. The Pane1 recommends that CIAT give serious consideration to establishing a Science and Germplasm Resources-like structure on a trial basis for three to five years.
454. The Panel recommends that a new senior staff position of Seed Pathologist be created and filled as soon as possible.

# CHAPTER IX - TRAINING AND CONFERENCES, COMMUNICATIONS AND INFORMATION 

## (A) TRAINING AND CONFERENCES

1. Background and Objectives

### 1.1. Background

454. Since 1976, CIAT's training and conference activities (TCA), formerly an independent program, have been carried out within each commodity program. A coordinating Head serves on a Center-wide basis and nine training associates have been appointed, two to each commodity program and one to the conference section. This small staff provides organization and methodological support for the courses, helps in developing training materials, and assists in the conduct of in-country courses.
455. The percentage of estimated time that senior staff devote to TCA varies from about 11 to $17 \%$ for the four commodity programs, with additional contribution from some supporting units (especially the Biometrics Section). TCA comprised only $4.3 \%$ of the CIAT core budget (1983). This percentage was much higher before 1982 ( $6.1 \%$ in 1980), but the decrease in CIAT's contribution has been compensated for by extra-core funds (UNDP, Swiss Government, GTZ, etc.) and direct funds for some national research and development institutions.

### 1.2. Objectives

456. The objectives of TCA were revised in 1976 and are stated as follows:

- "To contribute toward developing cooperative networks on field beans, cassava, rice, beef, maize, and swine for the purpose of validating, adapting, and disseminating technology from the Center.
- To help national institutions strengthen their agricultural research and development capabilities regarding CIAT's commodities."

457. Later, in May 1981, the CIAT Program Committee proposed a narrower definition amalgamating the two aforementioned objectives: "Through a program of advanced level training and conferences, to help prepare scientists with leadership capabilities for collaborative research in the areas of CIAT's commodity mandate, thereby strengthening networks of professionals who can exchange, test, validate, and generate improved germplasm."

## 2. Training Activities

458. CIAT offers a wide range of options to meet the training needs of the national research and development institutions in its mandate commodities. These options have developed in accordance with the evolution of CIAT's overall activities, and of each of its commodity programs and the Seed Unit, and also with change in national research and development institutions. In recent years, increasing emphasis has been given to research training at CIAT and to assistance with in-country training.
459. Most training has been organized on a group basis, groups being organized in different ways:
1) Short intensive courses in seed technology and production, directed to specialists employed by public and some private Latin American enterprises.
2) Short multidisciplinary commodity courses organized, normally once a year, by each commodity program, attended by research and development workers.
3) Commodity training programs, commenced in 1978, combine the above short multidisciplinary commodity course with a subsequent period of individual training. This specialized training is more and more directed to young national research scientists.
4) In-country training courses for extension workers are organized outside of CIAT on a national or regional basis.
460. The individualized training activities include degree (M.S. and Ph.D.) related training and in-service internships of postgraduate and post-doctoral fellows.
461. These activities, the relative importance of which are shown in Table 1, will be analyzed in turn.

### 2.1. Short Intensive Courses

462. The short intensive courses on seed technology and production, generally organized twice a year, meet the strong demand of public and private enterprises of Latin America and other regions. Attendance at these courses comprised about 25\% of total CIAT trainees ( $10 \%$ of total months) in recent years. The collaboration between CIAT senior and associate staff and highly experienced national seed specialists makes these courses very effective and appreciated. The Panel endorses the quality and the approach taken by these courses.
463. The short multidisciplinary commodity courses are mostly attended by young scientists of national research institutions and

Table 1. Number and Man-Months of Professionals Trained at CIAT in 1982-84, by Training Category in Each Commodity and Support Unit

| PROGRAM OR UNIT | GROUP TRAINING |  | INDIVIDUAL TRAINING |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Multidisc. Intensive Courses | Commodity Training Programs | Degree <br> M.S. | raining Ph.D. | Visiting Visit R. (graduate) | Researchers (VR) <br> V.Associate R. (with M.S.) | Total |
| 1982 | No. (month) | No. (month) | No. (months) |  | No. (months) |  |  |
| BEANS | 9 9 9) | 11( 56) | 10(60) | 5( 44) | 7 (17) | 1(6) | 43(192) |
| CASSAVA | 5 ( 5) | 11 ( 41) | 2( 24) | 3( 26) | 17 (25) | 1(4) | $39(125)$ |
| RICE | $3(6)$ | 12( 56) | $3(30)$ |  | 1(1) |  | 19(93) |
| T. PASTURES | $2(4)$ | $14(70)$ | 8( 62 ) | 6( 52) | 13(18) | 5(11) | 48(217) |
| SEEDS | 75(122) | 2(13) |  |  | 4(4) |  | 81(139) |
| OTHERS |  |  |  |  | 6 (19) | 1( 1) | 7 ( 20) |
| TOTAL 1982 | 94(146) | 50(236) | 23(176) | 14(122) | 48(84) | 8(22) | 237 (786) |
| TOTAL 1983 | 130(155) | 40(192) | 19(104) | 14(86) | 39(143) | 8(32) | 250(712) |
| TOTAL 1984 (provisional) | 114(156) | 60(320) | 20(200) | 15(150) | 12(112) | 13(72) | 234(1010) |

universities, although some key specialists of national extension and development institutions also attend. There is evidence that these current courses cannot accommodate the specific needs of these two types of participants who usually have different backgrounds and interests in science and technology. Therefore, the Panel emphasizes the need for separating training for these two types of participants.
464. The Panel strongly suggests that:

1) the current short multidisciplinary course be reserved for young scientists, and also the subsequent specialization phase (see Section 2.2.);
2) CIAT meets the existing demand for training of key extension and development specialists with new specifically planned short course for extension and development specialists. These courses should involve only a minor participation of CIAT's senior staff, and a rather major participation of the best national Latin American professionals in extension and development within CIAT's commodities. These courses should preferably take place outside of CIAT and be organized on an in-country, regional, or continental basis as is appropriate.
465. The Panel commends the initiation of the first on-farm research short course held recently by the Bean Program. The Panel suggests CIAT considers whether it should initiate a new course dealing with on-farm research. This could commence with a general section dealing with all commodities, followed by specialization in the different commodities. This initiative would necessitate the recruitment of a specialist in on-farm research, possibly with the support of extra-core funds.

### 2.2. Commodity Training Programs

466. The annual "short course plus specialization" combination has become CIAT's main training activity during recent years (about $30 \%$ of the total trainee months). These programs begin with a multidisciplinary phase or group intensive course of four to ten weeks, a review of the "state-of-the-art" on each commodity, followed by an individualized phase of specialization in a single discipline applied to the same commodity.
467. 

Program participants are, with few exceptions, young research workers, mostly from Latin America, nominated by their respective institutions. Their selection is carried out by an internal CIAT committee formed by the Training Head and associates, and potential discipline research supervisors, taking into account the profile of studies and experience of the applicants, institutional and country needs, and availability of institutional financing . On the average, one of every two applicants is selected. Over the last few years, the participants' prior professional experience increased
from an average of 1.5 years in the $1975-80$ period to 3.5 years in 1983.
468. The teaching procedures during the intensive first phase of the coursehave been improved. The ratio of lectures to laboratory and field practices has currently decreased to $50: 50$. More materials, such as audiotutorial units, mimeographed papers, and books are being used, making the teaching process more dynamic and interesting. Senior staff participate less in teaching, are partially replaced by research assistants, and are able to dedicate more time to seminars and direct interaction with the participants. The gradual reduction in the duration of the intensive course, with the corresponding increase in the specialization phase, also has been an improvement, at least for the Bean (from 8 to 5 weeks) and the Tropical Pastures Program (from 12 to 10 weeks).
469. The specialization phase which follows may last from three to seven months depending on the commodity, and it involves typical research activities. Each participant works side-by-side with a CIAT researcher, on a discipline-oriented subject, related wherever possible to his/her country's needs.
470. The Panel commends the favorable changes in the commodity program training, especially in the first short intensive period, over the last years. The Panel urges that this effort be pursued. The reserving of this course for young national scientists, as proposed above, would allow CIAT to better meet their needs. In this respect, the Panel suggests:

1) An even greater reduction in the multidisciplinary phase, made possible due to greater professional experience of the participants, and a corresponding increase in the specialization phase, allowing participants to become more actively engaged in research. This would avoid the impression that some trainees have had in the past of being considered as "technicians" working for CIAT researchers. This year the Rice Training Program can be considered as a good example of change toward the desired balance between these phases.
2) A continued attention to increased training of participants on research methodology which gives more consideration to the problems and work conditions of their respective countries. This would imply a critical or analytical presentation of CIAT research activities and sometimes its methodologies, as these reflect CIAT's international mandate and may be less appropriate to national programs. Care must be exercized not to overemphasize network activities within training courses which may lead to national scientists participating in networks of limited value to their respective countries.
3) That to insure that young scientists appreciate the importance of key development and extension issues in assessing research priorities, some discussions on relevant issues should be included in the training program through invited specialists.

### 2.3. In-Country Training

471. In-country training on CIAT's commodities is considered an effective means of bridging research with extension. Assistance is offered to interested national programs to organize and conduct two to eight week courses for personnel in extension, credit, and other development services. In all cases these courses are timed to coincide with introduction of new varieties and other technologies with high potential for making an impact on production. These in-country training activities have developed rapidly during the past few years (Figure I). CIAT restricts its contribution to a limited participation in instruction (about $20 \%$ ) and the contribution of teaching materials such as articles and audiotutorials. Normally, CIAT's participation is limited to the first course in each country, subsequent courses being under the complete responsibility of national specialists. However, in certain countries CIAT has had to reasume its participation due to changes in national personnel and leadership.
472. The Panel commends the attention CIAT is giving to in-country and regional courses and especially to regions where it is expanding its activities, such as Southeast Asia and Africa. In these regions, CIAT takes note of both national needs and the different regional and cultural contexts.
473. However, taking into consideration the lower scientific requirements of these in-country training courses and the existence of an appreciable number of well trained and experienced national specialists in research and development, the Panel proposes a rapid reduction of senior research staff participation in in-country training courses, compensated for by the greater participation of specialists of other countries. These personnel could be proposed by CIAT to the respective national program and given CIAT assistance. Thus, the horizontal cooperation among countries would be favored and, at the same time, the senior staff could devote the time saved to other activities.

### 2.4. Degree-Related Training

474. The conduct of M.S. and Ph.D. research studies at CIAT is considered of high importance in relation to the development of scientific staff in national programs. In the 15 years since CIAT's founding, 85 and 89 trainees, respectively, have conducted their M.S. and Ph.D. research at CIAT. Relationships for such training have been established with 21 universities or graduate programs in 12 countries of North America, Europe, Africa, and Latin America. Of these, 79 M.S. and only 29 Ph.D. trainees have come from Latin America and other developing countries. CIAT considers these numbers to be very low in


FIGURE 1. NUMBER OF PARTICIPANTS OF IN-COUNTRY TRAINING COURSES ASSISTED BY CIAT 1974 - 1983.
relation to the needs of national programs and CIAT's training capacity. The main reason for these low numbers is lack of financial support for academic degree studies in developed countries.
475. The Panel notes the importance of the degree-related training activities and it supports the focus CIAT wants to give to this form of training in the long-term. For that purpose, the Panel urges that CIAT continue its efforts to sponsor academic studies with extra-core funds, and recommends that it explore the possibilities of relationships with advanced universities which allow flexibility or have no fixed academic course requirements in the academic programs for postgraduate degrees. The Panel also suggests that CIAT ensure that more scientific publications are written from the thesis studies carried out at CIAT.

### 2.5. Post-Doctoral Fellows

476. Initially CIAT's objective was to train new Ph.D. graduates of national programs in research work on the commodities of CIAT's mandate. However, the marked shortage of these professionals caused CIAT to use large amounts of the core-budget to train new Ph.D.s from developed countries. The goals were to: (1) to increase the number of scientific personnel trained in CIAT-mandated commodities, and (2) identify possible new senior staff members. Some of these post-doctoral fellows (four out of 17 in 1983) are financed by other funds (IDRC, GTZ, etc.). The Panel suggests that CIAT attempt to increase, when possible, the proportion of the extra-core funds for this activity.

## 3. Conference Activities

477. Conferences and international seminars are organized by CIAT, their frequency having increased in recent years. These have a dual purpose:
1) to exchange updated scientific information on either broad or specialized subjects, always related to CIAT's programs;
2) to support the operation of the international networks promoted by CIAT (IBYAN, IRTP, RIEPT), with discussion of research methodology and strategy.
478. Senior staff consider these activities very beneficial and they could be even more so if there were greater financial possibilities of inviting eminent international scientists. The Panel supports this concept as it would stimulate scientific discussion and reduce the risk of inbreeding due to the very high proportion of CIAT-trained participants in international meetings organized by the Center.

## 4. Results and Achievements

479. In fifteen years, about 2400 persons from 55 countries have been trained at CIAT programs and units, 1772 since 1977, with significant consequences on the strengthening of national programs, the transfer of CIAT technology, and the growth and operation of international networks.

### 4.1. Strengthening of National Programs

480. Almost all national programs for all four commodities, and their counterparts in the Cassava and Bean programs in Asia and Africa have had a major part of their research staff trained at CIAT. This result was obtained in spite of the large turnover of ex-trainees into other activities. According to a survey done by CIAT, about 54\% of the professionals trained in research during the 1970s remained active in research on their commodity. More recent trends indicate more permanency of CIAT-trained scientists in their programs in several, if not all, countries.
481. Some of these national programs have already proved their maturity by releasing new technologies, taking increasing responsibility toward self-sufficiency in applied research, and taking up, on a national or regional basis, more of the work previously performed by CIAT.

### 4.2. Transfer of CIAT Technology

482. Researchers trained at CIAT have been instrumental in collaborative research and interinstitutional transfer of research methodology, germplasm, and new technology. Numerous examples of such transfer are presented in the commodity chapters.

### 4.3. Contribution to the Growth and Operation of Research Networks

483. As stated by CIAT (Training and Conferences: A Strategy Document, 8 May 1981): "A very large proportion of the members of research networks, formal or informal, on beans, cassava, rice and tropical pastures, and on seeds are CIAT alumni. Their communication, exchange of information, and consolidation of common research and development strategies are promoted and assisted by means of periodic conferences (workshops, seminars, meetings), an effective and efficient mechanism to foster cooperative research and accomplish technology transfer. Both training and conferences have thus contributed much to the development and operation of those networks."
484. Future Plans
485. Future plans propose the continuation of current activities with the following changes:

- expansion of training giving more attention to regional and subregional problems, especially in Africa and Asia;
- further expansion in assistance to in-country courses (mostly for production);
- assessing national needs and proposing short- and long-range plans for development of scientific capability in beans, cassava, rice, pastures, and seeds;
- giving more attention to degree-related training.

485. The Panel agrees with all these changes, but has a qualification for the second change. While there is a need for expansion of in-country production-oriented courses, the structure of these courses should be changed as suggested in 2.1.

## 6. Assessment and Recommendation

486. The Panel believes that CIAT's training activities and conferences have been very valuable in the development of science and technology in the commodities of its mandate, especially in Latin America. The Panel commends the overall dynamic training strategy that CIAT has been developing in the past and proposes for the future. The Panel emphasizes the consistent efforts made by CIAT to evaluate its training activities in order to improve them, and CIAT's very important production of scientific and technical audiotutorials which are not only used in the courses organised by CIAT but also in an increasing number of in-country courses organised without direct CIAT participation.
487. To assist scientific staff in national programs, the Panel recommends that CIAT explore the possibilities of relationships with advanced universities which allow flexibility or have no fixed academic course requirements for postgraduate degrees.
(B) COMMUNICATIONS AND INFORMATION
488. Introduction
489. 

information in a way that makes it as accessible as possible to CIAT staff and the other members of the commodity research networks. CIAT contributes to the transfer of technology to appropriate audiences in 55 countries. This is done through a set of information services:

1) annual CIAT and program reports;
2) network publications and newsletters;
3) books, technical reports, materials and teaching journal articles;
4) seminar and conference proceedings;
5) abstracts. journals, and bibliographic services;
6) Pages of Contents;
7) specialized information centers.

## 2. Staff and Facilities

489. The Communication and Information Support Unit (CISU), which is responsible for all the corresponding activities at CIAT, is staffed by a Head, two senior scientists, one visiting scientist, one supervisor, and supported by 79 other staff members.
490. The CISU budget represents $6-7 \%$ of the CIAT core budget, and has been maintained even in years of economic restriction, demonstrating the priority assigned by CIAT to these activities.
491. The library houses a large collection of books (45,000 in 1983) and many other documents, including approximately 3500 for tropical pastures, 6000 for beans, 6500 for cassava, 3200 for agricultural economics, 1100 periodicals, 1620 microfiches, 61 CIAT-produced audiotutorial units, 6900 slides, maps, microfilms, etc. Access to DIALOG computerized data bases (Lockheed, California) will be completed with the acquisition of adequate computation and telecommunication equipment.

## 3. Achievements

492. There is worldwide praise of CIAT's documentation program. It has been adopted as a model by several institutions in the world, including IITA and ICRISAT.
493. The CISU publishes the CIAT annual program reports, newsletters of the research network, books, technical reports, scientific journal articles, manuals and proceedings, key journals, and pages of contents. Documentation and information on beans, cassava, rice, and tropical pastures is offered as a specialized service through the commodity-oriented Documentation Center which is being substantially reinforced by a special project funded by IDRC.
494. Most of these publications are sold. During 1983, books were purchased by 27 countries, bestsellers being those on cassava, biological nitrogen fixation, rice, and seeds. Others are distributed free of charge or on an exchange basis.
495. Services such as photocopies and specific bibliographic searches are charged; however, CISU gives such services free of charge to research institutes in developing countries that form part of CIAT's networks or to those who are unable to pay.
496. Audiotutorial training was offered to communication specialists of nine national institutions: ICA, INIAP, VALM, IBTA, VCR, MAG, EAP, ISA, and INIA, which have assembled audiotutorial design and production units.
497. The Pages of Contents Service of SilICA (Sistema Nacional de Informacion en Ciencias Agropecuarias) was organized on the model of CIAT's service and is using CIAT's Pages of Contents as a base.
498. Future Plans
499. The principal proposed changes are the following:
1) Each commodity program will take over the production of its Annual Program Report, and present it as a "working document." The Panel endorses the future proposal of annual working document plans. Complete and definitive program reports on specific areas should be published only when the accumulated information warrants publication in either monograph or scientific paper form.
2) New publication efforts in the Bean Program will be directed to English and French speaking countries of Africa and the Caribbean.
3) In the Cassava, Rice, and Pastures Programs, emphasis will be given to the improvement of their newsletters by including more technical and scientific information from CIAT and national programs. Some of these newsletters, currently only available in Spanish, will be published in English.
4) The Unit needs to assess jointly with the respective programs the needs for region-specific information/documentation support in relation to the Regional Commodity Projects and Networks, particularly for beans in Africa and cassava in Asia.

## 5. Assessment and Constraints

499. 500) The Unit is adequately equipped and changes in its physical structure are not visualized in the short-term.
1. 2) The CISU is very active. According to CIAT researchers and national programsit works well and is very efficient in disseminating information about CIAT's activities and achievements. Thus, it contributes actively to the Commodity Research Networks as well as to CIAT's prestige and reputation with outside institutions . The Panel recognizes the value of CISU activities and commends the attention paid to them by CIAT administration.
1. 3) In view of the deficiencies in communication activities of many national research institutions, CISU has been providing highly valuable services to national institutions and researchers. The Panel approves particularly the frequent free-of-charge services offered to national research institutions of developing countries.
1. 4) The Termatrex system of information recovery, acquired as a result of recommendations of the 1977 QQR, is presently inadequate. The large amount of manual work required to register documents highlights the need for computerizing this information. Therefore, the Panel recommends that the Computation Unit and the BiometricsSection carry out the studies necessary to solve the computation needs of the CISU. Due to the type of activities conducted, the Panel considers that the Unit should also be supplied with the necessary word processing equipment.
1. 5) The Unit does not have an English or French editor; these needs are currently covered by the services of a senior staff member.
1. 6) The Audiotutorial Materials Section should ideally be under the responsibility of a permanent staff member. Currently it is under the responsibility of a visiting scientist. Therefore, the Panel recommends that the Audiotutorial Materials Section be managed by a permanent staff member in close consultation with the Training Program. It also suggests assessing the feasibility of contracting̣earliest an English editor.
1. 7) With the continued information expansion of commodity programs, there will inevitably be an increase in the need for information and communication support. The Panel recommends that, whenever possible, regional and special projects should provide funding to support these activities, e.g., publication of newsletters and workshop materials, translations, etc.

## 6. Recommendations

506. 507) The Panel recommends that the Computation Unit and the Biometrics Section carry out the studies necessary to solve the computation needs of the CISU. Due to the type of activities conducted, the Panel considers that the Unit should also be supplied with the necessary word processing equipment.
1. 2) The Panel recommends that the Audiotutorial Materials Section be managed by a permanent staff member in close consultation with the Training Program. It also suggests assessing the feasibility of contracting earliest an English editor.
1. 3) The Panel recommends that regional projects include the necessary components for information/communication support to assure success of regional programs. When regional projects are financed through special projects, such expenses should not be borne by CIAT's core budget.
(Note that there also is a recommendation in Section 6, Assessment and Recommendations, of Subchapter A).

## 1. Introduction

509. In order to achieve an efficient performance of research activities, it is necessary to provide the researchers with the essential support services to successfully carry out their projects.
510. An analysis of the accomplishments and needs of the supportive research services and facilities of CIAT is presented below.
511. CIAT Headquarters

### 2.1. Organization and Administration

511. Under the Director General are three Directorates: Crop Research (DCR), Resources Research and International Cooperation (DRRIC), and Finance and Administration (DFA). (See Organization Chart, Chapter II, Figure 1.)
512. The structure of the administrative division is functional, based on division of work by a detailed assignment of functions, norms, and procedures. Decisions are centralized with defined lines of authority, and communications are predominantly vertical.
513. Administration and research areas are horizontally linked through committees. This structure has the advantage of promoting discussion and interaction between administrators and scientists.

### 2.2. Headquarters Facilities and Staff

514. The Center's headquarters are on a tract of 522 hectares located between the cities of Cali and Palmira, Colombia. The land is leased to CIAT, at a nominal fee, by the Instituto Colombiano Agropecuario (ICA). The present lease runs through the year 2000, with no difficulties foreseen for further extension.
515. The headquarters installation include complexes for food and housing, conferences, administration, laboratories and office space for scientific staff, warehouses, motor pool, greenhouses, screenhouses, germplasm resources, graphic arts production, communications, recreational facilities, and field experimentation.
516. All facilities are kept in very good condition. It appears that, apart from a few specific exceptions mentioned below, the infrastructure is fully adequate to meet the research, administration, and training needs of CIAT.
517. There are 954 staff members at the Center, comprised of 76 international staff (senior staff, visiting scientists, post-doctoral fellows), 115 professional support staff (associates, assistants, general administration), and 763 other support staff.

### 2.3. Constraints and Weaknesses

518. The current approach of the Directorate of Finance and Administration is viewed by the staff as being overly bureaucratic. Steps should be taken to review financial and control processes and to improve communication at all levels between the administrative and the scientific staffs.
519. Except for the addition of a long-term germplasm storage facility and one greenhouse, referred to later in this chapter, no major additional facilities are required at headquarters.

### 2.4. Assessment

520. The CIAT headquarters in Palmira are well maintained. The buildings and gardens are impeccably clean and well ordered. The offices, conference rooms, and visitors' accommodations are comfortable, functional, and adequate.
521. The activities carried out within the administrative area provide important support for research. Efficiency, discipline, and a good collaborative spirit were observed at all levels within research support administration. These were later confirmed when the activities were analyzed in depth. Relationships among staff are respectful and cordial. The research administration has shown great interest and accomplishment in personnel development.
522. Even though the research facilities, requiring maintenance activities, have increased substantially, the number of personnel assigned to those activities has not increased in the same proportion. This reflects a higher productivity, perhaps a consequence of improved preparation and better educational opportunities for personnel.
523. CIAT's Off-Campus Research in Colombia

### 3.1. Research Locations

523. From the beginning the Palmira farm was recognized as being an excellent site for CIAT headquarters and some limited field research facilities; however, subsequent experiences and program changes made it necessary to develop modest substation facilities in other agroecosystems.
524. Other locations in Colombia include:

## CIAT-Quilichao

525. This 189-hectare farm, located 40 km south of Cali, is dedicated to the preliminary screening of germplasm (especially cassava and forage species) and plant nutritional studies. The station has 14 resident farm staff. Additional staff assignments by commodity programs are: Tropical Pastures, 35; Cassava, 10; and Bean, 4. Minor users are CIMMYT, INTSORMIL, and formerly, the IFDC Phosphorus Project.

## CIAT-Popayan

526. This station, about 100 km south of Cali, is at a higher altitude ( 1700 m ). The site, 72 hectares, provides excellent conditions to screen bean and cassava for diseases which cannot be adequately tested at lower altitude. Bean and cassava personnel commute to these stations; all farm operations are done by 16 resident support staff. (Popayăn and Quilichao stations were purchased and subsequently leased to CIAT at a nominal fee by the Fundación para la Educación Superior - FES.)

## CIAT-Santa Rosa

527. In 1983 the station was made available to CIAT by FEDEARROZ (Federation of Colombian Rice Growers). The 30 -hectare station is the main breeding site for favored upland and irrigated rice. The development of this site and collaborative experiments using 16 hectares of the nearby La Libertad (ICA) station represent a key element of CIAT's extension of efforts into upland rice. Three ecosystems are available within a short distance.

## CNIA-Carimagua

528. Occupying 22,000 hectares in the Colombian Llanos, this is the main station for the Tropical Pastures Program research and is administered jointly by ICA and CIAT. The director is an ICA employee. Two senior scientists live in Carimagua while other scientists visit from Palmira. There is an annual "scientific" review of the ICA and CIAT Pastures and Cassava Programs. CIAT provides 75\% of the scientific input to the program and of the 20 technicians, 16 are from CIAT (Pastures Program, 15; Cassava Program, 1); ICA supplies all the labor and is reimbursed by CIAT. The station employs 300 laborers.
529. Through specific cooperative agreements CIAT conducts research at the ICA-Caribia, ICA-La Libertad, ICA-Obonuco, and ICA-La Selva stations and at CPAC (EMBRAPA) in Brazil. Therefore, research is performed over a wide range of agroclimatic zones.
530. At all the stations the Panel was pleased to see that the facilities of housing, storage, roads, fencing, irrigation, etc., are well developed and maintained. In general, the good team spirit of program personnel was much in evidence. There were many encouraging
features and results of experiments at all sites. The Panel is pleased to see the good cooperation existing between ICA-CIAT staff at Carimagua and other stations and urges CIAT to continue giving this important relationship the attention it deserves.

### 3.2. Constraints and Weaknesses

531. The back-up support from Palmira to Carimagua is adequate but could be improved in the case of unforeseen circumstances when prompt attention is required.
532. The scientists working in the Cassava Program in the area of Media Luna have poor facilities and accommodations. The Panel recommends that if CIAT is to continue working in that area, a solution be found to the problem of housing. One solution would be to provide small trailers for temporary living quarters for staff.

## 4. Genetic Resources Unit (GRU)

### 4.1. Background

533. The objectives of the Genetic Resources Unit (GRU) are to collect, evaluate, maintain, document, and distribute the germplasm of Phaseolus beans, tropical pastures, and cassava in support of the crop improvement programs of CIAT. These activities are designed to allow full utilization of the valuable genetic resources and at the same time to provide for their conservation.
534. To date the Phaseolus collection contains over 33,000 accessions and is the most complete worldwide. Since the GRU's inception Phaseolus bean germplasm has increased from 12,896 to 33,295 accessions in 14 species including an increase in germplasm exchange from 6500 to 17,042 . There are more than 11,000 accessions of tropical pastures species and 3400 accessions of cassava. Given the nature of the GRU, its continuous interaction with the commodity programs, especially with the breeders, is of paramount importance.
535. The GRU has been organized into three sections: Phaseolus bean, tropical pastures, and cassava. The new section of Seed HeaTth Testing is charged with the application of rapid indexing techniques to monitor the phytosanitary status of the germplasm in the Unit.
536. In 1978 the GRU became established in a remodeled preexisting building. A new tissue culture laboratory was developed in 1984 in the west wing laboratory building and controlled environmental rooms for long-term in vitro germplasm storage, especially of cassava, are part of this facility. A glasshouse was added to the GRU in 1979.
537. Isolated field plots in Palmira, Popayan, and Dagua are utilized to increase germplasm accessions. The Acting-Head of the GRU
is a senior scientist who specializes in tissue culture. There are two research associates, six research assistants, nine technicians, twelve laborers, and one secretary. The IBPGR Regional Coordinator for Latin America is located at GRU. The arrival of an FAO expert is expected soon.
538. Expeditions since 1977 to Spain, Portugal, and Latin American countries have yielded valuable collections of Phaseolus germplasm. In addition there is continuous receipt of germplasm from collection expeditions funded by IBPGR to Africa and Asia.
539. The last release of 5000 accessions was in December 1981, following clearance through ICA quarantine regulations. Released material is usually made available at the rate of 1800 per year.
540. After the first meeting of the Bean Advisory Committee (comprised of five IBPGR appointees and one member from CIAT) in 1976, the GRU recommenced the characterization of available germplasm. Classification of the increased germplasm of $P$. vulgaris is underway by using passport information (country of origin, CIAT entry No., etc.) and seed characterization data. In the five years up to February 1984 the GRU has distributed 98,686 samples of Phaseolus germplasm.
541. During the last few years, the GRU has been increasing collaboration with the Tropical Pastures Program. The whole tropical forage germplasm collection is now maintained by the GRU under short/mid-term storage conditions. The pasture collection comprises more than 11,500 accessions, $90 \%$ of which are non-domesticated tropical legume species. The rejuvenation of entire collections of a series of species has become a routine activity, and is carried out in the field and/or in the GRU greenhouse.
542. During the first two months of 1984, approximately 1500 samples have been distributed to other institutions. The GRU documentation activities are limited to: (1) updating and periodically producing a computerized germplasm catalogue; (2) maintaining and updating of a reference herbarium.
543. The tissue culture work with cassava at CIAT has resulted in an in vitro scheme to free cassava stocks of pests and diseases. In the Tast four years 745 cassava lines have been rendered free of frog skin disease, and of other viral, bacterial, and fungal diseases. In the last five years, 1348 cassava lines have been transferred to CIAT in the form of meristem cultures. With these introductions, CIAT's cassava collection has increased to over 3400 accessions. During this period over 400 cassava lines also have been shipped to several countries. Germplasm, particularly hybrids, are increasingly being sent as true seed.
544. A technique, "minimal growth storage", has been devised to minimize the vegetative growth of meristem-derived cultures. Meristem tip culture techniques have been developed to micropropagate

Andropogon, Pennisetum, and Brachiaria spp. Differentiation of plants from cell/callus cultures of Stylosanthes guianensis and S. capitata has been achieved. Work with anther culture has resulted in the production of homozygous diploid lines with many conventional $F_{1}$ hybrids of rice.
545. The Panel commends the increased work on in vitro storage of cassava germplasm and the use of in vitro culture in freeing cassava lines from disease.

### 4.2. CIAT's Relationship with the IBPGR

546. An agreement between CIAT and IBPGR has permitted the stationing of the IBPGR Latin American Regional Coordinator at the Genetic Resources Unit since the beginning of 1982. This has strengthened CIAT-IBPGR collaborative efforts in various aspects of genetic resources.
547. In 1983, a short course in genetic resources for 15 Latin American scientists was offered at CIAT.
548. Collection of Phaseolus bean germplasm through specific annual expeditions to Latin America as part of multicrop expeditions has been ongoing since 1982. An analysis of existing germplasm of wild Phaseolus species is being made by a scientist in Belgium.
549. A report has been published on germplasm resources of Manihot spp. in Latin America. Collections of germplasm have been made in Central America, Mexico (INIA), Brazil (CENARGEN), and Paraguay (IAN). Clones have been transferred from national programs and collection expeditions via in vitro cultures.
550. Support from IBPGR will permit scientists of CENARGEN, INIA, and CIAT to study problems of propagation and conservation using in vitro embryo and meristem tip cuiture to exchange, propagate, and conserve the wild species.
551. Tropical pasture species, particularly legumes, have been collected in Southeast Asia (Thailand, Malaysia, and Indonesia) since 1979. Several collection trips throughout Latin America have resulted in a large collection of native legume species. Through interchange CIAT has amassed a valuable germplasm inventory of grasses from Africa.

### 4.3. Constraints and Weaknesses

552. The estimates made in 1975-1976 of the potential size of the CIAT germplasm collection have been greatly exceeded in the last few years. Should this rate of growth continue to 1990, a conservative estimate of the final collection size will be 50,000 accessions of Phaseolus beans, 20,000 of tropical pastures, and 6000 of cassava. Thus, adequate provision must be made in the physical facilities and staffing of GRU to enable them to handle these large and important
collections. The major constraints are as follows:

## General

553. The position of Head of the GRU has been vacant for an extended period. The Panel recommends that this position be filled as soon as possible.
554. Additional greenhouse space (approximately $400 \mathrm{~m}^{2}$ ) will be needed. There is a major limitation on data handling. Current updating and compiling of germplasm data is unnecessarily slow. A computer terminal to interact with the mainframe computer at the Data Services Unit, needs to be stationed within GRU. In addition, the daily management of several germplasm inventories, seed viability tests, planting plans, in vitro storage inventories, etc., requires that a microcomputer (which can also serve as terminal) be located at the GRU.

## Phaseolus bean

555. Following necessarily strict ICA regulations on germplasm introductions has caused a bottleneck for material coming from the so called "high risk" countries. ICA does not have facilities to handle a large number of accessions.
556. The Pane 1 recommends that provision for the use of a "third country quarantine" be made to overcome this risk and constraint. (See also Chapter III.)
557. Germplasm storage is both short-term ( $5-8^{\circ} \mathrm{C}, 12-14 \%$ seed moisture) and long-term ( $-6^{\circ}$ to $-2^{\circ} \mathrm{C}, 5-8 \%$ seed moisture). However, at present only 60 samples can be handled per week. Improved infrastructure for short- and long-term storage is needed. In addition, adjustments in the refrigeration system are needed to lower the long-term room temperature to at least $-10^{\circ} \mathrm{C}$.

## Tropical Pastures

558. The inadequate support staff situation makes it impossible to efficiently handle the large collection of tropical forage species. Sufficient resources should be sought to multiply seed for long-term storage.

## Tissue culture

559. New research should be carried out to explore applications of in vitro techniques to breeding problems of cassava as well as beans.
560. The rate of putting the cassava germplasm into in vitro storage should be increased. The Panel does, however, indicate its awareness of the possibility of genetic modification of germplasm under storage in tissue culture. This must be monitored regularly.

### 4.4. Future Plans and Assessment

561. The future plans of the GRU are:
1) to continue to expand collaborative efforts with the IBPGR;
2) to continue collection expeditions, especially for wild types of Phaseolus;
3) to continue to transfer to CIAT both existing and new collections of cassava from Latin America;
4) to identify places and procedures in developed and developing countries for long-term storage of duplicate samples of CIAT's Phaseolus, cassava, and pasture collections;
5) to conduct clustering studies with bean germplasm to determine the range of genetic variability existent within the Phaseolus collection;
6) to develop long-term storage techniques for all germplasm;
7) to completely implement the Seed Health Testing Section at the GRU;
8) to study the potential of protein and enzyme electrophoresis as a means to characterize the genetic variability of the germplasm collections;
9) to continue to transfer the cassava collection from the field to an in vitro tissue culture bank;
10) to develop in vitro culture techniques to facilitate wider interspecific crossing of Phaseolus spp. using embryo rescue technique;
11) to develop in vitro culture methods to regenerate plants from cell/callus cultures of Phaseolus bean.
562. The Panel commends the strengthened CIAT-IBPGR collaboration efforts in all the aspects of genetic resources.
563. The Panel believes the GRU has been very productive and is forward looking in its planning, but it is constrained by staff and facility deficiencies. The Panel therefore recommends that due to the projected increase in the germplasm collection, the necessary measures be taken to provide additional staff, an additional greenhouse and improved storage and refrigeration facilities.

## 5. Research Services Unit

### 5.1. Objectives

564. The Research Services Unit provides the following services: (1) routine analyses of soil, plant tissue, water, and fertilizer samples submitted by program scientists for research purposes; (2) routine quality evaluation and consumer acceptance of CIAT's commodities, especially beans and cassava; (3) management and maintenance of CIAT's greenhouses, screenhouses, and growth rooms, including soil storage and sterilization facilities; (4) maintenance and repair of all CIAT laboratory instruments and equipment, and coordination of the use of laboratory facilities.

### 5.2. Organization

565. Each CIAT Commodity Program has been assigned laboratory facilities to carry out specific research activities. Also, there are some laboratory facilities which are shared by two or more sections within a program, or by more than one program. Certain equipment, especially the more expensive items, is also shared by programs. For example, the new electron microscope is shared according to arrangements agreed upon by the Research Service Committee which consists of one scientist of each commodity program.
566. In order to properly manage all these facilities, the Research ServicesUnit has been organized into the following sections: (1) Analytical Services Laboratories; (2) Commodity Quality Laboratories; (3) Greenhouses, screenhouses, growth rooms and related facilities; (4) Instrument Maintenance Service.
567. These activities are supervised, on a part-time basis, by various senior staff members who are part of the Research Service Committee.

### 5.3. Activities

Analytical Services Laboratory (ASL)
568. Routine analyses of soil, plant tissue, fertilizer, and water samples are conducted for all programs at CIAT. During 1983 a total of 135,385 determinations were made ( $60 \%$ plant samples, $37 \%$ soil samples, and $3 \%$ proximal analysis). The scientist in charge of the ASL also oversees the Central Services Laboratory and the Research Laboratory.

## Commodity Quality Laboratory

569. This facility evaluates nutritional quality and consumer preference factors for the Cassava and Bean Programs. The former uses the laboratory for quality evaluation related to the CIAT/TDRI root
storage project. The latter uses it for routine analysis of approximately 300 entries per year. The only nutritional evaluation is that of protein content.

## Greenhouses, Screenhouses, Growth Rooms, and Related Facilities at CIAT Palmira

570. The wire greenhouses, screenhouses type I and II, wire-mesh greenhouses, growth rooms, and the complementary sections at the head house facilities are adequately equipped, well-managed, and contribute significantly to the research program.

### 5.4. Assessment and Recommendations

571. The requirements of the GRU for extra glasshouse and storage facilities have been considered in Section 4 . The Panel urges that CIAT give appropriate attention to the maintenance and repair of instruments and sampling equipment, especially with the recent additions of expensive and sophisticated equipment. To ensure proper management and maintenance, the Panel recommends creation and filling of a staff position for Coordinator of Research Services.

## 6. Data Services Unit

### 6.1. Biometrics Section

572. The Biometrics Section is one of the three sections that currently comprise the Data Services Unit. The other two are the Computing Section and the Agro-ecological Studies Unit.

## Functions

573. The functions of the Biometrics section are (1) to provide statistical consultancy in the stages of planning, design, data collection, analysis, and interpretation of research projects;
(2) to provide consultancy and analysis in mathematical programming, econometrics, and simulation; (3) to provide a statistical computing service, to implement the computer programs required in the analysis stage, via statistical packages or specific programs developed in the section; (4) to work on methodological projects in collaboration with the research programs and units; (5) to provide training in statistical methods to visiting research fellows, participants in training courses and CIAT staff.

## Personnel

574. There are three consultants supporting the Head of the Section and five statistical technicians (one budgeted under each of the four commodity programs, and one in the Biometrics section).
575. Each consultant is assigned a group of projects; as far as it is possible, the same consultant attends all of the researchers of one program so that he can become acquainted with its specific research methodology and objectives. New projects are initially discussed with the Head of the Section and are then assigned to one of the consultants. It appears that there are differences between programs in the extent to which statistical advice is sought during planning of experiments.
576. The statistical technicians aid consultants during the programming and implementation of the programs in the computers in addition to aiding the training associate staff in the use or programmable calculators.

## Achievements and Future Plans

577. For the last five years the Biometrics Section has been responsible for providing consultation and advice on experimental design and data analysis. The Panel believes this service has been rendered in an effective manner within the constraint of personnel available.
578. It is planned to develop the use of field recorders to collect experimental data in the form of computer readable files. Three new SAS products will be made available for data management and analysis.
579. Courses on the use of microcomputers in agricultural research will be given. Two audiotutorials are considered on "The Role of a Biometrician" and "Principles of Experimental Design."

### 6.2. Computing Section

## Objectives

580. The objectives of the Computing Section are:
1) to provide and maintain appropriate computer hardware to serve the scientific programs;
2) to provide and maintain appropriate computer software for the scientific programs, including systems software, compilers, packages, and applications programs;
3) to provide adequate documentation to investigate aspects of work at CIAT which might benefit from computerization;
4) to keep abreast of current developments in computing;
5) to write suites of programs of general applicability;
6) to provide required training within and outside the Unit;
7) to provide the hardware and software to build and maintain scientific data bases and ensure availability and security.

## Facilities

581. In 1983 CIAT computing facilities included an IBM 4331Group 2 computer and 15 Terminals, with five additional terminals on order.
582. Computer use by programs (IBM 4331, CPU hours) was Pastures $22 \%$, Beans $17 \%$, Cassava $8 \%$, Rice $4 \%$, Genetic Resources $4 \%$, Communication and Library 4\%, Finance 17\%, Data Services 13\%, and others 11\%.

## Future Plans

583. In the future the IBM 4331 will be used exclusively for research functions, and the newly purchased IBM System 36 will be used for administration and finance functions.

## Constraints and Weaknesses

584. There has been an increased demand for service on the Computing Section with little prior discussion or understanding between the Section and the Programs. Hence, to some degree an overload situation may have developed and contributed to what was perceived as an attitude problem. Recent steps to update the hardware and the creation of the new Scientific Programs Computer Users Group (contains one representative from each program) should alleviate any such problems.

### 6.3. Agroecosystems Analysis

## Background

585. Research in the area of agroecological analysis was begun at CIAT in 1978 with specific focus in the zones of interest to the Tropical Pastures Program, and to a lesser extent of the Bean Program. A formal section was not established and limited funding was provided through existing visiting scientists in the core budget.
586. In 1983 the section was finally formed as a core activity with the appointment of an agrometeorologist.

## Objectives

587. Objectives of the Unit are:
1) to develop a system for environmental and economic assessment of the conditions in the production areas of future importance in each CIAT commodity;
2) to develop an agroecological information system which can be integrated with the germplasm development process;
3) to develop a data system which would permit the evaluation of responses of new genetic variability when exposed to a wide range of selected conditions in terms of meteorological, edaphic, and agronomic factors;
4) to develop a data system which provides a firm base for comparative socioeconomic studies on the wide diversity of production zones.

## Staff

588. The Unit is staffed by two system analysts, one of whom is a researcher, two technicians, and one supporting staff.

## Achievements

589. In defining land systems, the American tropical lowlands have been classified in various ecosystems. Studies have provided a valuable lead in defining sites for the germplasm evaluation of the Pasture Network (RIEPT).
590. The location of primary sites for two stages of bean germplasm evaluation were defined. A climatic analysis of 110 microregions allowed an assessment of crop temperature conditions prevailing in each microregion in Latin America. It also verified that growing season temperature conditions at CIAT-Popayan and CIAT-Palmira are clearly representative, and characterize major portions of the production zones with respect to temperature, a key discriminating factor in Latin America.
591. Upland rice areas in South and Central America were identified and mapped. An agroecological inventory of rice production areas was produced.
592. A set of maps has been prepared showing cassava hectareage throughout the subcontinent. The cassava growina regions have been tentatively classified into six edaphoclimatic zones.

Future Plans and Recominendations
593. It is envisaged in the CIAT Long Range Plan that a further senior staff position and appropriate support staff be added. This staff position will take over the land system and soils aspects of the Unit's work. It is obvious, therefore, that the Unit is at present well below its eventual staffing level and cannot hope to fulfill all
demands placed upon it. Current projects emphasize definition of microregions and environmental classifications for cassava and upland rice. It is hoped that within two years these projects should be completed and attention may turn to regions other than Latin America. The Panel recommends that a core-funded Land Systems Specialist position be added to the Agroecosystems Analysis.
594. Continuing and concurrent activities are data base design and implementation under IDMS, continued maintenance and upgrading of the meteorological data base. Further work needs to be done on stochastic rainfall modelling and estimation of data missing from the meteorological data base.

## 7. Recommendations

### 7.1. Administration

595. CIAT should continue to give high priority to cooperation with the national institutions, not only at a high level, but also in areas where there is more interaction among the scientific personnel, such as at the substations CNIA-ICA-CIAT, etc.
596. The Panel recommends that adequate housing facilities be provided at Media Luna for the staff who periodically visit their experimental work on cassava.

### 7.2. Supporting Research Services

597. The Panel recommends that provision for the use of "third country quarantine" be made as soon as possible to enable the receipt by CIAT of collections from those countries considered by ICA as "high risk".
598. The Panel recommends that the position of Head of the Germplasm Resources Unit be filled as soon as possible.
599. The Panel recommends that additional staff, an additional glasshouse, a computer terminal and microcomputer, and improvements in storage and refrigeration facilities be provided to the Germplasm Resources Unit.
600. The Panel recommends creation and filling of a staff position for Coordinator of Research Services.
601. The Panel recommends that a core-funded position be created and filled with the proposed Land System Specialist for the Agro-ecological Studies Unit.

## CHAPTER XI - INTERNATIONAL COOPERATION

## 1. Background

602. International Cooperation in research that supports agricultural development is the very essence of CGIAR philosophy. Each IARC is but one unit of a research matrix embracing its sister institutions, national and regional research organizations, as well as centers of excellence in developing and developed countries. Center activities are largely in applied research and directed to the generation of improved technology in support of national research organizations. Research is in fields where each Center can best make a contribution because of its critical mass of interdisciplinary expertise, germplasm collection, information back-up, and financial resources. The international status and apolitical nature of the Centers enable them to take a lead role in research activities across national boundaries. CIAT is no exception.
603. By its very nature, the whole of CIAT's research and development activities can be described as international cooperation. In the sense of this Review, international cooperation is more narrowly defined as CIAT's relationships with other institutions.
604. In the proposal by the Ford and Rockefeller Foundations for the establishment of CIAT it was envisaged that, from the beginning, the Center would work in close collaboration with national programs in all its research activities. Early links were established with national programs and commended by the 1977 QQR Panel. At the time of the QQR these links were being further strengthened through the creation of the crop field testing networks. Subsequently they have become stronger as CIAT has made germplasm available for potential release by national programs and as the Center's work has gained credibility.
605. Since the 1977 QQR, there has been radical rethinking about CIAT's role, the development of its program and organization. This has come about by an increasing realization that there was a flaw in the assumption by the founding fathers that the Center could develop germplasm adapted to a wide range of environments. Their thinking was influenced by the impact made by the semidwarf wheat and rice cultivars developed by CIMMYT and IRRI. It was forgotten, in the euphoria of the time, that the environments for which these cultivars had been bred existed or could be created over great areas. The same rules were found not to apply for CIAT's crops (forages are also crops), normally rainfed and grown under very diverse ecological, institutional, and socioeconomic conditions. Cassava, alone, is grown throughout the developing world from sea level to above 2000 m.a.s.l., and both for subsistence and a wide variety of end-uses for domestic and export markets.
606. Materials and technologies therefore had to be adapted to a wide range of conditions and against a background of often weak national programs. Even the wide range of environments found in Colombia, while making the country an ideal host for CIAT, was not enough.
607. This new thinking is outlined in "CIAT in the 1980s" and further elaborated in "CIAT's International Cooperation Strategy" (CIAT Internal Working Document, January 1984). The emphasis is on decentralization of CIAT's activities and on networking. However, while the formal expression of the policy is new, to a large extent it represents rationalization of a process that had its origin seven years ago in the start of the Bean Program's involvement in Central America.
608. CIAT's Strategy

### 2.1. Principles

608. The basic principle of the new CIAT strategy is that the Center's main function is to strengthen and complement the activities of national programs. In doing so the Center concentrates on activities in which it has a comparative advantage compared with other institutions or organizations. The work of the Center must be transferable to large areas and relevant to the more important production problems of the commodities on which it works. It has to take full account of the strength of national programs and the potential for development of each commodity. Activities range from strengthening of national commodity programs by support activities, through to catalyzing the establishment of regional and subregional networks with progressive reduction of CIAT input. The Center's way of working will change as its relations with national systems change.

### 2.2. Staffing

609. There are three categories of outposted staff: research, regional cooperation, and bilateral. 1/
610. Research staff are outposted only when the research problems to be solved are significant to a region; the research problems occur under environmental conditions not represented in Colombia, and there is a regional or national organization in the area that gives high priority to solving the research problems and can provide effective research support to the outposted staff. Outposted staff have a training as well as research function and help to further commodity research networks.

1/ Staff provided for bilateral research projects not funded by
CIAT.
611. Regional cooperation staff are assigned to specific regional programs to assist commodity programs, develop training courses, provide liaison between national programs and CIAT, and help in the development of networks. They and outposted research staff will fill core positions though, at least in the short-term, the majority of these posts will have to be supported by special project funds.
612. Bilateral contract staff are appointed on short-term contracts, at the request of individual countries or subregional research programs, to strengthen an institution, while national staff are trained, to fill their position. For management and support reasons, CIAT has decided that no more than 12 such staff should be appointed. The Panel is glad that the implications of appointing too many bilateral contract staff have been considered and would encourage CIAT not to exceed this number which the Panel considers to be a little high.

### 2.3. Networks

613. The aim of the current strategy is to catalyze the development of self-sustaining commodity research networks exchanging information, technology, and breeding materials and, hopefully apportioning effort for greater economy of resources. While outposted CIAT staff would be required in the early development of such networks they would be progressively withdrawn except for the liaison scientist. The Central America bean network is approaching this stage. In the development of other networks the emphasis would continue to be on CIAT's role as catalyst and backstop, but not as leader.
614. Training would be increasingly decentralized, each network having its own training program. Regions would also be assisted to establish their own information networks. The possibility of establishing a regional information network in Africa, in collaboration with another center, is being explored and would go hand-in-hand with modification of publications for the region.

### 2.4. Agricultural Research Management

615. The view was expressed to the Panel by senior scientists of one of the countries in CIAT's region that CIAT should help in strengthening national research management. The Panel agrees with CIAT that the Center does not have a comparative advantage in this field. However, the Center does have a good background of the region's problems and agriculture, and could serve an effective advisory role in support of ISNAR or any other organization serving Latin Americancountries in the improvement of agricultural research management.

## 3. National Programs

616. CIAT provides direct support to national programs through training, germplasm exchange, technical consultation, provision of information and consultancy services, and efforts are made to gear these to the strength of each program. It is the Center's policy to appoint so-called bilateral contract staff as local members of individual countries research programs at the request of, and in consultation with, the country concerned.
617. Currently CIAT has five bilateral contract staff funded by donors or the country concerned. Two are in Peru (beans and rice), two are in Brazil (pastures), and one is in Panama (pastures). There seem to be good reasons why CIAT should support four of these posts, because of the relevance of the work to the needs of the core program or the potential for increased production. The justification for appointing a bean scientist to Peru is less clear as bean production there is not large. The Panel cautions that if CIAT resources are to be used to the best effect bilateral programs must be selected according to the priority of the problem not the availability of funds. Priority should be given to support of national programs that are linked to a CIAT regional program.
618. Members of the Panel were able to assess the feelings of national scientists towards CIAT by visits to national research institutes in Brazil, Colombia, Costa Rica, Cuba, Guatemala, Indonesia, Mexico, and Thailand. In Colombia the whole Panel met with the Director General and senior department heads of ICA. Panel members were impressed by the widespread appreciation and expressions of confidence in CIAT they listened to in all countries. It is clear that the Center's relationships with national programs are very good. The only problem sensed is the danger of a paternalistic relationship between the Center and national programs; when national scientists are young and inexperienced there is a tendency for them to become over-reliant on CIAT. In contrast, when experienced scientists are involved, paternalism provokes hostility. Center staff are mostly aware but need to remind themselves continuously of this risk, which could delay the emergence of strong self-reliant national programs.

## 4. Regional Programs

619. Currently CIAT has few outposted regional cooperation staff. The Cassava Program has a breeder, based in Bangkok, to serve the Asian region. The Tropical Pastures Program has an agronomist/liaison scientist in Brazil and the Bean Program has three regional scientists based in Guatemala and Costa Rica to serve the Central America and Caribbean region, and an agronomist in Brazil. Two additional bean projects are being set up in Rwanda-Burundi (three scientists) and East Africa (four scientists).
620. The Central America and Caribbean bean project, now staffed by a regional liaison scientist/plant pathologist, a cropping systems agronomist, and a breeder, and funded as a special project by the Swiss Government, has been a notable success. It serves a number of small countries with similar ecosystems and initially weak bean research programs. The project has helped to strengthen national programs, foster a team spirit, and establish linkages between the countries concerned so as to draw upon their relative strengths. Thus, work on web blight is concentrated in Costa Rica, bean golden mosaic virus in Guatemala, and Apion in Guatemala and Honduras. New varieties have been developed for the region. While the region had the basis for a successful regional project - research systems at about the same level of development and with common problems - an essential ingredient of success was the choice of project leader. It is envisaged that two of the positions can be phased out over the next five years leaving a liaison scientist. The Panel commends CIAT on the progress made by the Central America and Caribbean Regional Bean Project.

## 5. Other Advanced Institutions

621. CIAT has a wide range of collaborative activities with other advanced institutions. They range from those with centers with which they share responsibilities for a common commodity (IRRI, IITA, ILCA) to those with which they have a common interest (CATIE, ICRAF), centers or institutions which they host (CIMMYT, IBPGR, CIP, IFDC, INTSORMIL, and INTSOY), and developed country institutions with which there are collaborative agreements.

### 5.1. International Agricultural Research Centers Common Commodity

5.1.1. IRRI
622. Under an existing CIAT-IRRI Agreement, an IRRI liaison scientist is stationed at CIAT with responsibility for the International Rice Testing Program in Latin America. The arrangement works satisfactorily but the agreement between the Centers is presently being revised in the wider context of achieving closer collaboration and joint activities.

> 5.1.2. IITA
623. CIAT and IITA have common interest in rice and cassava. Collaborative rice activities go well. The two Centers exchange breeding material to their mutual advantages as the conditions under which rice is grown in Africa and Latin America are similar. In contrast, cassava research is a source of some friction between the Centers.
624. Following on the recommendation of the 1977 QQR Panel that CIAT strengthen the cassava linkage with IITA a new agreement between the two Centers was signed in November 1978 setting out guidelines for their collaboration in cassava research and training. The agreement took account of the large percentage of world cassava production taking place in Africa; the phytosanitary constraints on the movement of vegetative cassava planting material between Africa and Latin America due to the distribution of pests and diseases between continents; and the special environmental, biological, socioeconomic, and cultural factors which make it important that IITA has a regional responsibility for research training and other related activities in Africa.
625. It was agreed that CIAT has the responsibility for cassava improvement and the development of technology to enhance cassava production and utilization in the Americas, Southeast Asia, and Oceania. CIAT also has responsibility for collection of information and establishment of a documentation center, collection and maintenance of the world's main cassava germplasm bank, and coordination and publication of the Cassava Newsletter to which IITA should contribute an African section. IITA has responsibility for cassava improvement and development of technology in Africa. In countries where cassava mosaic disease is a problem, as in the case of India, the two Centers should consult with appropriate officials in these countries to determine the most effective means for cooperation by each institute. The division of responsibilities in terms of supporting disciplines and training took account of the special problems in each Center's region of responsibility.
626. Provision was made for consultation when one Center received requests for germplasm from institutions or individuals in the other's region of responsibility. Where cassava mosaic disease was a problem, IITA, with the knowledge of CIAT, would make available germplasm as requested by the recipient country. Provision was made for a joint review of programs and future plans in cassava research to be held every three years with the venue alternating between the two Centers. To improve communication a member of each Center's cassava program would attend the cassava portion of the other's Annual Program Review.
627. Nevertheless, though collaboration in some fields (e.g., biological control and supply of seed from CIAT to IITA) has been good, in general it is unsatisfactory. The Panel has examined the causes and concluded that it is now more important to look to means for establishing a close working relationship between the two sister Centers than to establish rights and wrongs.
628. Preferably, an attempt should not be made to improve cooperation between CIAT and IITA by an imposed solution. Cooperation can only be achieved through agreement between the two Centers, reached in a spirit of goodwill. To this end, the Panel recommends that the Directors General of CIAT and IITA meet as soon as possible to agree on means of improving cooperation between the two institutions. Senior staff from each Center should meet first for
preparatory staff work and to pave the way for agreement. The existing agreement between the two Centers seems a good basis for collaboration but needs to specify in detail each Center's particular responsibilities. The Panel recommends that TAC pay particular attention to the issue of CIAT/IITA reTationships to ensure a satisfactory solution is reached as quickly as possible.

### 5.1.3. ILCA

629. Cooperation with ILCA has grown in recent years, with particular interest in germplasm exchange. Much of the ILCA programs are on areas drier than covered by CIAT, or are on less acid soils, or are in higher and cooler conditions. Furthermore, the ILCA pasture program is running on a more decentralized basis than the CIAT program and, generally speaking, ILCA operates in an area where community ownership of land is of major importance. This must inevitably have some effect on the procedure used for evaluation and development of pastures. Much of the area to which CIAT germplasm could be suited is affected by tse-tse fly. For these reasons, while the Panel welcomes the close relationship between CIAT and ILCA, and particularly recognizes the value of their collaboration in the collection of germplasm in Africa, it cannot agree with the CIAT plan to place a senior scientist at ILCA in 1986. However, the Panel understands that changes are being planned in the headquarters forage agronomy program of ILCA. When these have been fully effected, it may be opportune to re-examine this question.

### 5.2. International Agricultural Research Institutes Hosted by CIAT

630. CIAT provides a base for regional staff of CIMMYT (maize), IBPGR, the International Fertilizer Development Centre (IFDC), CIP, the International Sorghum and Millet Collaborative Research Support Project (INTSORMIL), and the International Soybean Program (INTSOY). Relationships between CIAT and CIP, INTSORMIL, and INTSOY are those of landlord and tenant; CIAT provides, on payment, accommodation and supporting facilities. There is no active collaboration.
631. 

An IBPGR regional cocrdinator is based at CIAT under a CIAT/IBPGR collaborative agreement. He helps with germplasm collection and collaboration is excellent. The support given by IBPGR to the collection of cassava, bean and forage germplasm is noteworthy.
632.

CIMMYT is also hosted by CIAT. There is no formal agreement for technical collaboration between the Centers nor was there technical collaboration at the time of the 1977 QQR. However, there is active informal collaboration between the CIMMYT team (two scientists) and CIAT's Bean Program. CIMMYT provides advice on suitable maize cultivars for use in on-farm research, as well as material for trials on-station. CIAT and CIMMYT staff exchange ideas on on-farm research activities. The Panel welcomes this evidence of positive informal collaboration between the two Centers.
633. There is also excellent collaboration between the IFDC phosphorus project and CIAT's commodity research programs, and a fertile exchange of ideas on on-farm research. The Centers are currently preparing proposals for joint research.

### 5.3. Other International Agricultural Research Institutions

634. Similar informal collaboration exists between the Bean and Tropical Pastures Programs and their counterparts at the Center for Tropical Agriculture and Training (CATIE), Costa Rica, and it is hoped that these may develop into joint work on Silvopastoralist and Animal Production Systems. Talks are also underway with the International Center for Research in Agro-Forestry (ICRAF) on the possibility for collaboration on Pasture/Farming Systems.

### 5.4. Other Advanced Research Institution

635. CIAT has established significant and increasing collaboration with other Centers of excellence which enables the Center to draw upon the resources of universities and national institutes in developed countries in support of its own research programs. For example, such work includes interspecific hybridization in beans (Gembloux, Belgium); the chemical basis of storage insect resistence in beans (Durham University and TDRI, UK); screening of the collection of Desmodium ovalifolium for resistance to root knot nematodes (North Carolina State University, USA); and the collection and evaluation of mycorrhizal strains and the development of field inoculation techniques (University of Goettingen, Germany). The Center relies upon donor support for such work. Valuable informal relations are also maintained with numerous other institutions, for example, CSIRO, IRAT, TDRI, and universities such as the University of Florida, the University of the Philippines, and San Marcos University, Peru.
636. The Panel supports CIAT's policy of establishing collaborative projects with other scientific institutions for back-up research in furtherance of its work. By this means the more sophisticated resources of developed country institutions can be enlisted, in a very practical way, towards the solution of problems in the developing world. The Panel encourages CIAT to make even greater use of such collaboration.

## 6. Achievements

637. It is evident from visits paid by Panel members within the host country and to other countries in Latin America that CIAT has established excellent relationships with the countries in its region. In all the countries visited the wish was expressed for continued CIAT support. This is a measure of the impact made by CIAT germplasm, described in the earlier commodity chapters.
638. A major achievement has been the effect of CIAT's work on the morale and enthusiasm of national scientists who, for the first time, have access to greatly improved germplasm and, because of the training provided them, know how to handle it. National commodity research organizations have been strengthened and CIAT's staff seem to have well adjusted themselves to working with these organizations. That by now, so many national research workers, at all levels, have been trained at CIAT has ensured easy relationships and mutual respect. In most cases there was no sign of paternalism in CIAT-national scientist relationships. In some countries it was indicated to the team that this had not always been so, but relationships between the Center and the national organizations had matured as the latter gained strength and as its scientists found they could speak to their CIAT counterparts on equal terms.
639. In Asia CIAT has made small impact and that only through the Cassava Program. A regional cassava breeder was not appointed to Bangkok until May 1983. However, the team was impressed by the way in which he is already interacting with national cassava research workers. In this, the fact that many senior cassava breeders in Asia had been taught by him while he was stationed at CIAT-Palmira, was a major contributing factor. No other CIAT program has direct contact with Asia.
640. An interest has been aroused in CIAT's Bean Program in East and Southern Africa but CIAT involvement is still in its infancy. The first program, for Rwanda-Burundi, with three regional scientists, has only recently been initiated but CIAT expects soon to have a bean project in East Africa (a coordinator and three other scientists) and a regional project in Southern Africa is in the pipeline.
641. CIAT has been a late starter among the centers in establishing outreach programs. An exception is the Central America and Caribbean Regional Bean Program described previously. The Program. is evolving into a fully collaborating network, in the true sense of the term, and will provide a model for future international cooperation.

## 7. Constraints

642. It is unfortunate that the time CIAT was ready to begin to extend its outreach program coincided with the beginning of a critical financial situation in CGIAR. However, by the support of national and regional cooperation through special projects, funding should not be the major problem in the future. The major obstacle to the development of CIAT's programs will be the availability of senior research scientists of the right calibre. Staff who are appointed as regional liaison scientists or as leaders of regional research projects, as well as being recognized as good scientists in their own right, should have worked at CIAT for a number of years to establish their knowledge of the Center's programs and its facilities, their
loyalty to CIAT, and to make them already known to national scientists in CIAT's region through training programs and advisory visits. They must possess the right personal qualities. A regional liaison officer should possess great qualities of tact. He must influence by persuasion and not by imposing his views. This implies the use of existing core staff to fill regional positions wherever possible. There is no reason why special project funding, per se, should influence the success of the off-campus program but it will do so if, because of lack of experienced core staff as leaders, the links with the mother center are weak.
643. Future Plans
644. It is planned that CIAT's International Cooperation Program will develop according to the strategy outlined above. It aims at an evolutionary process beginning with the strengthening of national organizations through backstopping by outposted scientists and with the objective of fostering self-sustaining commodity networks with their own information and training services. CIAT's regional scientists would catalyze and support such networks but gradually be withdrawn as the networks acquired strength. This is looking far ahead and CIAT is only beginning to move along that path but the example of the Central America and Caribbean Regional Bean Project, and CIP's similar but more advanced regional programs, provide models and cause for optimism.
645. In the establishment of regional commodity research programs it will be necessary to involve national scientists from the beginning in their planning and the identification of problems. This the Center appreciates. For example, CIAT and the ESCAP Regional Coordination Center for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre) are collaborating in a workshop to be held in Bangkok in June 1984 on cassava marketing potential in tropical Asia and the role of new technology in cassava production. This workshop will involve national research scientists and economists in identifying their own needs. A similar workshop has been held in East Africa to prepare the way for the Bean Program.

## 9. Assessment and Recommendations

### 9.1 Assessment

645. The Panel commends CIAT on the excellent relationships it has established with national programs.
646. The Pane1, in principle, endorses CIAT's strategy for international cooperation and decentralization of activities and the emphasis on catalyzing regional research collaboration. This makes
good sense in relation to the wide range of biological and socioeconomic environments in which the crops for which CIAI has responsibility are grown. However, the Panel urges caution in the Center's pursuance of this policy. There will be a need to adhere to the following basic and largely well understood principles. It is important to:
1) Recognize that donor preference and availability of funds must not be allowed to distort CIAT's planning.
2) Ensure that a satisfactory balance is maintained between off-campus regional and headquarter activities in order not to impair CIAT's long-term scientific capacity and ability to generate new technology. Provision will have to be made for adequate administrative and scientific support of regional staff, for example, in providing germplasm and information, back-stop visits, and routine administrative back-up. It is not possible for the Panel to specify the correct balance. It has to be established by Board and Management for each commodity in relation to the whole of the Center's activities and working outwards from the critical mass of headquarter's programs, and what they can service. Decentralization implies some reduction in headquarters staff. The basic needs of relatively small but effective headquarters scientific teams must determine the number of administrative and scientific staff at CIAT-Palmira.
3) Accept that involvement in regional projects should be long-term and ensure that the principle of long-term support is acknowledged by donors. This implies detailed study of the long-term implications of taking on each new project for the support the Center will need to provide.
4) Ensure that national governments are involved from the beginning in definition of their needs and all stages of project planning. In feasibility studies, account needs to be taken of the full implications of new projects in the wider context of national plans. In regions favored by donors it is often very easy for countries, under pressure from donors and commodity pressure groups, to take on too many projects and overload their capacities.
5) Monitor the progress of regional projects to ensure that they are kept flexible in response to changing circumstances and that timely decisions are taken on the Center's manpower input and how and when it can be phased out.
647. Special project funding will be needed for the implementation of CIAT's strategy. This issue has been discussed in section 7. The Panel concludes that it may lead to weakening of regional links with CIAT unless activities in each region are coordinated by outposted experienced core staff. This will be a key factor in the implementation of CIAT's international cooperation program. The Panel recommends that every effort be made to fill coordinator/liaison positions only by experienced staff.

### 9.2. Recommendations

648. The Panel recommends that the Directors General of CIAT and IITA meet as soon as possible to agree on means of improving cooperation between the two centers.
649. The Panel recommends that TAC pay particular attention to the issue of CIAT/IITA relationships to ensure a satisfactory solution is reached as quickly as possible.
650. The Panel recommends that every effort be made to fill coordinator/liaison positions only by experienced staff.

## CHAPTER XII - LONG RANGE PLAN

## 1. Introduction

651. CIAT's Long Range Plan (LRP) for the 1980s was developed over a two year period from 1979 to 1981, "... by an interactive process involving CIAT's management and staff, its Board of Trustees, and leading representatives of collaborating national agricultural research institutions in the Western Hemisphere." 1/
652. The guiding principles throughout the LRP are the reconfirmed overall objectives of CIAT: "To generate and deliver, in collaboration with national institutions, improved technology that will contribute to increased production, productivity and quality of specific basic food commodities in the tropics - principally countries of Latin America and the Caribbean - thereby enabling producers and consumers, especially those with limited resources, to increase their purchasing power and improve their nutrition."
653. The LRP laid out CIAT's global and regional strategies in relation to food and income, other institutions, its four major commodities (cassava, beans, rice, tropical pastures), international cooperation, new initiatives, and budget projections. As a result of these considerations, CIAT's mandate has evolved to include the following responsibilities:
"1) Principal responsibilities for beans (Phaseolus vulgaris and related species) and cassava (Manihot escuTenta);
2) Principal responsibilities for tropical pastures (specific responsibilities for the acid, infertile soils of the American tropics);
3) Regional responsibilities for rice (specific responsibilities for the American tropics)." 2/
654. CIAT's selection of crops provides a reasonable balance in meeting both production and nutritional goals in Latin America, and the research strategies for each commodity are consistent with the overall socioeconomic goals.

## 2. The Updated LRP

655. For the present EPR, CIAT prepared a number of documents

1/ CIAT in the 1980s. A Long Range Plan for the Centro Internacional de Agricultura Tropical, Series 12E-5, November, 1981.
2/ CIAT Report 1983.
which update the LRP to reflect current priorities and budget projections. 1-7|

### 2.1. Modifications in Overall Center-wide Objectives and

656. In the Background Papers CIAT adds two minor modifications to the LRP. First, CIAT notes: "The first paragraph on page 58 (of the LRP) gives more emphasis to the danger of diversion of resources from the American tropics than we would today, since we consider expansion of efforts in cassava to Asia and beans to Africa of sufficient priority that considerable management time and some core resources are applied to these activities without apology." In the LRP it had been assumed that such expanded efforts could be handled by working through FAO and other international and regional organizations, but attempts to work with FAO and SEARCA failed. Second, CIAT suggests an addition to the section on evaluation and feedback mechanisms on page 63 of the LRP: "In order to encourage and strengthen national program efforts in on-farm research CIAT will conduct methodological research, training, and workshops in an attempt to develop a network of scientists engaged in farm-level characterization and technology evaluation activities."
657. Both of these modifications were discussed by the Panel, which generally endorses them, although there was concern about the difficulties of operating the distant (from CIAT) programs in Asia and Africa (see Chapters on International Cooperation and General Assessment).

### 2.2. Modifications Forced by Reduced Rates of Funding Growth

658. Several program modifications to the LRP were forced by reduced rates of funding growth in the CGIAR system and hence in CIAT's budgets. For example, the LRP projected a senior staff of 72 by the end of 1983, rising to 85 in 1987. However, the funding shortfall in the 1982-1983 period forced CIAT to reduce its senior staff from 62 positions to 54 by the end of 1983. Since the CGIAR has adopted upper and lower brackets for funding, CIAT's current position projections are presented in terms of "minimum" and "optimum" numbers. Center-wide staff positions are presented in Table 1 (from the Summary Modifications to The Long Range Plan, January 1984). In this table, minimum net core requirements are the minimum projections minus the core-type positions which can be funded from extra-core sources, i.e.,

1/ Background Papers,Volume I, item v, 1984.
²/ Cassava Program Report, 30 January, 1984.
3/ Bean Program Report, 30 January, 1984.
4/ Rice Program Report, 30 January, 1984.
5/ Tropical Pastures Program Report, 30 January, 1984
6/ CIAT's International Cooperation Strategy, 30 January, 1984.
7/ Summary Modifications to the Long Range Plan, January, 1984.
projects either presently funded or likely to be negotiated with donors. However, most of discussions on positions focus on minimum core requirements rather than on minimum net core.

Table 1. Projected Center-wide resource requirements (senior staff positions) in the modified plan for CIAT.

| Category | '82 | '83 | '84 | '85 | '86 | '87 | '88 | '89 | '90 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Optimum Core Projections | NA | NA | 63 | 76 | 88 | 89 | 89 | 89 | 89 |
| Minimum Core Projections | 64 | 56 | 60 | 68 | 72 | 73 | 73 | 73 | 73 |
| Minimum Net Core Requirements | 62 | 54 | 56 | 64 | 68 | 70 | 72 | 73 | 73 |
| Long Range Plan (1981) | 67 | 72 | 74 | 79 | 84 | 85 | 85 | 85 | 85 |
| Extra-Core Funded Projections | 7 | 10 | 17 | 29 | 30 | 28 | 26 | 25 | 24 |

659. The current estimates of minimum core requirements through 1990 rise only to 73 positions which is 12 positions below the maximum projected in the LRP.
660. The changes which CIAT has proposed within each of its four commodity programs is a reflection of the overall priorities among the four programs. For 1990, for example, CIAT's current projections are shown in Table 2.

Table 2. Positions projected for 1990

|  | $\begin{array}{c}\text { In current } \\ \text { modification } \\ \text { (minimum core } \\ \text { requirements) }\end{array}$ |  |  |
| :--- | :---: | :---: | :---: | \(\left.$$
\begin{array}{c}\text { LR }\end{array}
$$ \begin{array}{c}Net change <br>

in projections\end{array}\right]\)
661. Decreases are also projected in the Administration and Support Units (Table 2). The Panel commends CIAT for its efforts to reduce administrative and support costs in proportion to cuts in the overall budgets; indeed, because of increases in extra-core positions, administrative and support services must be increasing in efficiency.
662. Extra-core funded projections included in Table 1 show that substantial growth is expected in this category, to which no reference was made in the 1981 LRP. In the 1984 documents it is noted that a maximum of 30 such extra-core positions is projected. Virtually all of these extra-core positions appear to be for off-campus activities. To some degree CIAT is using these extra-core positions to make up the shortfall in the number of positions optimistically projected in the LRP. While it obviously would be better in terms of continuity to have these positions core-funded, realities of funding projections leave little choice.
3. CIAT's Comparative Advantages and Clarifications of its Functions in the 1980s
663. CIAT has prepared a figure (Figure 1 in the LRP and reproduced here as Figure 1) which very nicely depicts its place in the agricultural technology development process for the responsibilities within its mandate. This spiral shows that CIAT's role includes a modest activity in basic research which has high pay-off potentials, assumes its largest activity in the applied research quadrant, and extends into the adaptive research quadrant to a degree inversely proportional to the capabilities of national institutions. CIAT does not get involved in agricultural production. This cleverly conceived spiral can be rotated clockwise to reflect situations where national institutions are weak or have not had time to properly develop, as in tropical pastures. As national institutions gain strength, the spiral can be rotated counter-clockwise to reflect the larger role that CIAT should take in basic research. Rice probably is a commodity for which CIAT should be considering a counter-clockwise twist since it is the oldest program and consequently has had more opportunity to strengthen national programs through training. Within a given commodity situation, the spiral also may be rotated to reflect CIAT's most appropriate role with individual countries, depending on whether a country has weak or strong national programs.
664. A good pictorial example of further clarification of CIAT's role in the technology development process is presented by Figure 2 in the Tropical Pastures Program Report, the right-hand half of which is presented here as Figure 2. This figure shows that CIAT concentrates strongly in identification of potential germplasm, and assumes decreasing roles as material is moved down the inverted pyramid and into the range of the capabilities of the national programs, which release the completed product-new cultivars-to farmers.
search. CIAT's activities are primarily found in this quadrant. CIAT emphasizes applied research and development of basic elements of tech. nology in collaboration with national research institutions.

## BASIC RESEARCH

National institutions, and especially those more developed ones, also engage in basic research.

CIAT assumes responsibilities for selected aspects of basic research having high potentials for pay-off later in the development of new tech or pay bern la search institutions


National institutions involved in commodity research and development are seen as conducting adaptive research based on their own applied research or the tochnology developed by others including interna tional conters.
While predominantly working in production per se, to varying degrees pro ducers also conduct applied and adapt ive research. Their research activities range from the private seed producer who is developing new hybrid varieties to producers associations which raintain thoir own experimental farm maintain their own experimental farm and stations.

## PRODUCTION

National institutions are involved in sc lected production activities including on farm trials, demonstration project and certified seed production.

Figure 1. CIAT's location in the agricultural technology development process.


Figure 2 Organizational structure of the Tropical Pastures Program, germplasm flow and interaction with National Research Programs.

## 4. Research Directions within Commodities

### 4.1. The LRP and Subsequent Modifications

## Beans

665. CIAT also uses figures to depict relative emphases on research directions within commodities. For example, a quick inspection of the figure for beans (Figure 3 in the LRP and reproduced here as Figure 3), shows that breeding for disease resistance is expected to greatly decline in the 1980s, as sources of resistance to the numerous diseases affecting the crop are identified and incorporated into improved germplasm. Scientific effort released from disease resistance studies can then be turned to the needs for increasing yield and quality factors in the crop, things which necessarily had to be assigned lower priority until its was possible to keep the crop alive during the growing season. Such handy figures provide ready benchmarks to measure progress in program shifts. In beans, for example, the 1984 Internal Program Review presentation left the impression that no decline had occurred in the disease resistance effort.

## Rice

666. No doubt it will be necessary to fine-tune the LRP projections from time to time to reflect problem changes which could not be predicted for a decade in advance. For example, the sudden and unexpected resurgence of the hoja blanca virus disease of rice in the last year, as well as increases in Helminthosporium, probably means that breeding for disease resistance in the irrigated areas of this crop will have to be kept at a higher level than anticipated at the the time the LRP was prepared. Nevertheless, Figure 4 on page 102 of the LRP provided an excellent starting point for planning research directions during the 1980s.
667. Although individual figures were presented in the LRP for relative emphases within irrigated rice, and within upland rice, no attempt was made to show the projected balance of efforts between these two types of production ecologies. This is understandable in view of the fact that in 1979-1981 CIAT was still deciding on how much effort should be placed on upland rice, which was not designated as a separate objective until 1981. The current balance between these two ecologies is about two-thirds upland to one-third irrigated, a ratio which seems a little high in view of the opportunities for achieving greatest return on research investment (see Chapter V, Rice).

## Cassava

668. Relative emphases in the 1984 revision of the Cassava Program follows the projections shown in Figure 2 on page 79 of the LRP. The effort on production of finished lines for testing and


Figure 3. Relative emphases the Bean Program will place on various aspects of technology development in the 1980s. Changes in emphases will be reflected in the proportions of crosses in the breeding projects designed for general groups of constraints.
release by national programs has decreased over time as the production of elite germplasm for national breeding programs has increased. Similarly, and as projected in the LRP, emphasis on management practices for cassava in existing production systems is declining as practices related to cropping systems, long-term fertility, etc., increase. However, as the experimental work on establishment of small-scale plants for the production of dry cassava for animal feed proceeds, the work in cassava utilization is increasing a little faster than projected in the LRP. The work with national programs in the development of pilot projects such as this, requires a close association of research and development activities. Overall, however, the changes from the LRP were not large and were only the necessary adjustments required over time.

## Tropical Paștures

669. In the LRP the Tropical Pastures Program predicted that work in the well drained savannas, which took $100 \%$ of the work input in 1980, would decrease to approximately $70 \%$ in 1985 and $60 \%$ in 1990. Initially, the next move was to be into the poorly drained savannas, which were to take $15 \%$ of work input in 1985 and 1990. Work in the humid tropics was planned to commence later, but would be up to $15 \%$ of the effort in 1985 and $25 \%$ in 1990. These changes were reflected in priorities given to germplasm collecting and, with a lag phase, into grazing studies.
670. Following the financial constraints of the early 1980s, staff numbers declined instead of increasing, and there was no movement into new regions. The 1984 modified plan still predicts some outreach. The input into the humid tropics will go ahead and it will be initiated later and represent about $10 \%$ of total input in 1990. The proposal for the work in the poorly drained savannas has been deleted. Instead a program in the moderately acid soils will be initiated in 1988 and take only $5 \%$ of the program input in 1990.

### 4.2. Assessment of the Modifications

671. The modified plans of all commodities seem to be reasonable, and are discussed in detail in the appropriate chapters.
672. Flexibility for Handling New Initiatives.

### 5.1. Initiatives Adopted Since the LRP Appeared

672. With its history of having had to make several shifts in commodities during the 1970 s (i.e., dropping swine, restricting beef program to acid, infertile soils, phase-out of the small farms program, etc.), CIAT has been cognizant of the need to maintain flexibility in its programs. Thus, in its LRP CIAT outlined how two initiatives are to be incorporated into the core program in the 1980s. First, the Seed Technology and Training Project, which began
as a special project, is projected for inclusion in the core unit in 1986. Second, the LRP proposed the addition of an Agroecosystems Analysis section which has been at least partially achieved.

### 5.2. A Proposed New Initiative

673. The EPR proposes a new initiative to add a Scientific and Genetic Resources Unit to CIAT's programs (see Chapter VIII).
674. Overall Assessment of the LRP
675. TAC asked the Panel to determine if, "... the strategies, conclusions, and recommendations of CIAT's LRP are sound, relevant, and useful in the determination of research priorities." The Panel's overall assessment follows.
676. The interactive process by which the LRP was developed meant that it incorporated the best thinking available at the time. Obviously it is not possible to draw up a 10 year plan which accurately projects all technology development and transfer, but CIAT has done a better job on this than most organizations have.
677. The original strategy of the LRP is unaltered - what has changed is the speed with which it has been implemented, and these changes are largely the result of decreased funding growth rates in the CGIAR system.
678. Compared with the other IARCs, CIAT's outreach activities got off to a late start and hence got caught in the funding bind. This caused a delay in the process until additional donors could be identified (see Chapter on International Cooperation). CIAT has shown flexibility in adapting to these funding changes, through modification of priorities both within and between programs, and through the route of securing additional extra-core funding to supplement core funds. The Panel offers a word of caution regarding the extra-core funding, namely that the need for donor support should not be allowed to distort overall priorities of the center. Similarly, the Panel urges that CIAT make maximum use of core staff in the regional coordination programs in order to assure that CIAT is represented by experienced people familiar with CIAT's overall objectives (also see Chapter on International Cooperation). Finally, it should be kept in mind that the increased outreach efforts must eventually lead to a greater administrative load on CIAT headquarters.
679. The Panel's overall impression is that the LRP is very good. The Panel commends CIAT for the considerable thought and effort devoted to not only developing the LRP but also to implementing it.

## CHAPTER XIII - GENERAL ASSESSMENT

## 1. Overall Assessment

679. CIAT is a productive and well managed international center. Its staff, administration, and Board of Trustees are competent and highly dedicated to the programs. The Center operates with an openness which fosters dialogue and critical self-analysis. Continual communication among all levels of research administration and programs is evident. This has resulted in several changes in programs which continue to evolve.
680. CIAT has made major progress in the period since the 1977 QQR. The achievements of the Tropical Pastures Program have justified the concentration of its efforts on the acid, infertile soils of the Llanos and Cerrado. The Center has broadened its Rice Program to include upland rices in favored environments. The Cassava Program has initiated activities in Southeast Asia. The Bean Program has established a very successful network of scientists and activities, and begun to extend these activities to the important bean growing areas of Africa.
681. CIAT's work on on-farm research with a farming systems perspective is still young and with limited resources. The Center needs to obtain more experience. The Panel believes that CIAT has not yet adequately clarified its objectives in this field and commends CIAT's efforts in seeking collaboration with workers in other organizations to share experience on methodologies. The Panel commends also the recent creation of the informal "Agricultural Production System Coordinating Group" within CIAT with scheduled regular meetings aimed to stimulate scientific debate. Some studies in international economics (production, markets) have given valuable preliminary information for directing the commodity programs and evaluating their current or potential impact.
682. CIAT germplasm is present in many new crop varieties being released by national programs in many countries, primarily in Latin America. This impact is most notable with rice, and is increasingly present in new bean varieties. The impact of the tropical pastures technology is less visible at this point because the program did not become focussed until the mid 1970s. However, a relatively large number of grasses and legumes have been collected, characterized and brought into advanced stages of evaluation under grazing conditions, and some exhibit excellent suitability for the acid savannas. Some impact of improved cassava germplasm is beginning to appear, but response by farmers has not been as strong as might be expected.
683. Progress in establishing strong linkages with national programs and with international research institutes has been very
good. The national program staffs in many Latin American countries expressed vigorous support for CIAT and its value to their programs. Many collaborating projects with other institutions are now operating, particularly in thesis and basic science areas appropriate to the programs.
684. The Center has established its presence in appropriate regions of the world by outposting staff strategically in countries and programs. Since CIAT developed its outreach activities later than some IARCs it has attempted to move rapidly on this front in recent years. Budget constraints in the CGIAR have forced the Center to seek extra-core funding for these activities.
685. The need to find extra-core funding creates its own problems. Donors have to be identified and the bureaucratic process of negotiating projects makes it difficult to plan precisely and with certainty. Not many donors can give a firm guarantee of the long-term support needed for the full development of CIAT's outreach programs. The successful implementation of these programs will depend on the ability of the Center to post experienced core staff to fill regional coordinator positions.
686. Training and communication have received strong support from all programs within the Center, and an impressive number and array of individuals have participated in its courses, workshops, and conferences. A high proportion of the trainees have returned to positions in national research programs where the Panel was informed of the relevance of the training from their country's perspective. Many ex-trainees now lead their country's commodity research programs, which they had often been responsible for establishing. Training at CIAT has provided national scientists with the knowledge and confidence to handle the improved germplasm that has become available and enabled them to develop their own national varieties.
687. Many countries now pay the greater part of the costs for the continuing support of their staff who participate in CIAT training courses. The Training Program is appropriately changing its approach by teaching fewer courses at CIAT and assisting more courses presented in-country.
688. The genetic resources and seed programs are extremely effective in meeting their responsibilities to the Center. The numbers of plant accessions have increased rapidly in recent years and now represent a major resource to breeders working with beans, cassava and tropical pasture legumes. In seed production and training, CIAT has become a leader among the IARCs and is appropriately considering ways to evolve this program into a more autonomous unit in the future.
689. The Center is well served by most of its service units, such as facilities and equipment, station and substations, publications, and analytical laboratories. Some improvement in communication between the management and scientific divisions is desirable to assist fiscal management and to attain more prompt delivery of supplies and
of computing services. The Management Review has looked at this problem and the Panel strongly supports their findings.
690. Long range planning has been institutionalized within CIAT. This process led to the development of a Long Range Plan (LRP) which was completed initially in 1981. The Plan has already been updated (1984), and there is good evidence the updated plan will become part of an ongoing process. The Plan is clear, concise and adequately detailed. The updated version is specific as to manpower allocations from core and extra-core funding sources. Even more important than the Plan itself is the Center's acceptance of the need for planning in response to ever-changing circumstances: the development of its programs, the resources at their disposal, national development needs, and the relative strengths of national research programs. Thinking and planning ahead are now part of a continuous process.

## 2. Scientific Staff

691. International staff are drawn from many nationalities and this is considered appropriate by the Panel. Bilingualism is stressed and has been achieved to a very commendable degree. Policies regarding national staff have been carefully formulated in context with Colombia. The "rankless" system for senior staff is well accepted. The Panel endorses the high value accorded merit in the Center.
692. Not as a matter of policy, but in practice, the Center recruits a large number of senior staff initially as post-doctorates, and occasionally as visiting scientists. The Panel supports this approach as one alternative to be utilized in a recruitment strategy, but overuse, particularly by some programs, may lead to a predominance of inexperienced senior staff, professionally brought up to accept the Center's philosophy. The Panel considers it most important that there be continual recruitment of experienced professionals, bringing with them new ideas and challenging accepted concepts and procedures. Only thus can the Center maintain its vitality.
693. The Panel also is concerned by the fact that a number of senior staff positions have gone a long time without being filled. Admittedly some of these positions are in highly specialized fields, but the Center must improve upon this record in the future because these prolonged vacancies in key positions have a serious impact on continuity and productivity of the program.
694. The Panel endorses the sabbatical leave policy of CIAT but urges that administration take a more aggressive posture in encouraging senior staff to plan for such leaves at an appropriate institution. In the absence of an ongoing schedule for such leaves their occurrence becomes random and erratic. It must be accepted that such leaves become the cornerstone of a senior staff development program, along with attendance at professional meetings and in-service seminars and workshops.
695. There is no clearly stated policy on publications by staff at CIAT. The administration supports publication as one element of staff evalution, but many senior staff are confused as to the relative importance they should place on publishing versus other aspects of their responsibilities. The Panel urges CIAT to develop a clear policy statement which gives more encouragement to staff to publish. The preparation of a paper for publication is a valuable self-discipline. Staff are made to look critically at their own efforts. Supporting staff, statistical consultants, and collaborating national scientists should be given co-authorship of papers if they have contributed substantially to the work.

## 3. Organization

696. CIAT is administratively organized along lines similar to most other IARCs. The Director General (DG) carries primary responsibility for operating the Center in accordance with the mandate given by the CGIAR/TAC and the policies established by the Board of Trustees. This Center has modified the typical structure somewhat by dividing the responsibility for research administration between two directors, although one of these carries primary responsibility for international cooperation as well. In fact, the Directors and the DG operate in a collaborative style which shares day-to-day responsibilities broadly. This appears to operate effectively within the administrative group but creates some confusion among staff and external organizations which collaborate with CIAT. The Panel feels the Center should re-evaluate this element of administration.
697. The commodity programs are structured as interdisciplinary teams each of which is administered by a coordinator. The Center has been successful in implementing the interdisciplinary approach in a very effective manner. The Panel is satisfied the present arrangement is correct for CIAT, with two caveats. First, the coordinator positions of the four commodity programs should be made full time, so that the individual is not expected to carry primary scientific responsibility for any element of the program. However, they should be provided with some support to maintain a moderate research program while in the coordinator position. Second, the Panel feels it is time for CIAT to create a scientific unit of highly specialized biological scientists to support all of the commodity programs. The GRU should be an integral part of such a unit.

## 4. Achievements and Impacts

698. The achievements of the Center and the impact made on client countries have been attained primarily through the activities of the four commodity programs and those units which support them. In all cases these programs have had a major impact in catalyzing and
promoting stronger and more effective national commodity research programs.

### 4.1. Rice Program

699. The first and still the greatest success story to emerge from CIAT's work was the development of high-yielding rice varieties (HYVs) for production under irrigation. The first impact was made in Colombia by the release of IRRI varieties but CIAT's own breeding program, based on imported material, mostly from IRRI, soon took off. About 40-50 lines of HYVs derived from CIAT germplasm and/or IRTP nurseries have now been released to rice farmers in most Latin American countries.
700. The impact of CIAT's achievements on the production and utilization of its mandate crops has been quantified in some instances. Semidwarf HYVs of rice from the CIAT germplasm were grown on 2,286,000 hectares in Latin America in 1981. That is $26 \%$ of the rice area in the region and $70 \%$ of the area if Brazil, where the large upland area is not favorable for adoption of CIAT technology, is excluded. An average yield increase of 1.2 tons/hectare over previously grown varieties resulted in an increased value of US\$ 850 million in the region in 1981 alone. Although, the HYVs were developed for irrigated conditions, the figure of $2,286,000$ hectares includes the unexpected adoption of HYVs on 661,000 hectares of upland rice, which is $10 \%$ of the upland area in Latin America and $60 \%$ of that outside of Brazil.

### 4.2. Bean Program

701. Improved bean lines have been developed, many incorporating multiple resistance to the major diseases and tolerance to specific stress conditions. In recent years about 40 varieties (based on CIAT germplasm or transferred from one country to another after identification in IBYAN trials) have been named by national programs in 16 countries in the Americas and in two African countries. Bean yields in the region have not risen in recent years, but it is too early yet to know the impact of the new varieties. National programs are optimistic at this point. The creation of the Central America and Caribbean network of collaborating bean scientists is a notable achievement.

### 4.3. Tropical Pastures Program

702. Good progress has been made in a number of areas and notably in the definition of different management practices on recently released and promising species and on the collection of resource data. However, the most significant impact is being made through the release of tropical pastures plants.
703. Four cultivars from the Tropical Pastures Program, one grass and three legumes, have now been released by national institutions.

Andropogon gayanus has now been released in five countries and its use is increasing rapidly.

### 4.4. Cassava Program

705. The Cassava Program has added substantially to knowledge of the crop, previously at a low base. A complete package of low cost practices has been developed for cassava stake production including agronomic and phytosanitary management and storage. Simple technologies have been developed for storing cassava roots destined for fresh consumption and for the small-scale production of dry cassava for animal feed. CIAT has played a notable part in the identification and collection of parasites and predators of mealybugs and mites for introduction into Africa where these pests cause massive damage.
706. Cassava cultivars which contain CIAT germplasm have been released in 10 countries. The impact is not yet discernible in cassava yields, but they may have contributed to the reasons why cassava hectarage has increased in several countries in Latin America.

### 4.5. GRU

707. The GRU provides the stock of germplasm on which the success of the commodity programs depend. Major world collections of beans, cassava, and forage species have been developed and are being increased. The Unit's active role in describing accessions is of value to breeders worldwide.

### 4.6. Seed Unit

708. The establishment of a Seed Unit to promote and strengthen seed production activities in the tropics is an imaginative initiative. The Unit also provides a service function for CIAT and has provided seed for three of the mandate crops.
709. The seed of 49 varieties or lines of beans, rice, and tropical pasture species has been produced and supplied to 16 developing countries.

### 4.7. Training

710. CIAT's impact through training is very substantial. A total of 2400 individuals have received training at the Center, with 1772 of those trained since 1977. Students from Latin America have conducted thesis research at the Center for 79 M.S. and 29 Ph.D. degrees. A recent survey of former trainees indicates that $54 \%$ remained active in the field of research for which they were trained, with many of these returning to national programs which sent them. Meetings held by Panel members with administrative and research staff in Brazil (EMBRAPA), Colombia (ICA), Cuba, Guatemala (ICTA), Mexico (INIA), Indonesia (NRCP), and Thailand (FCRI) indicated an overwhelming support for the positive impact CIAT training courses and programs
have made upon their national research programs. Training in the Seed Program has resulted in the development of four seed networks and 15 seed trade associations within the region.

## 5. Constraints

711. The major constraints to the wider and more rapid diffusion of CIAT's new technologies are external to the Center and beyond its control. Diffusion depends on such factors as the strengths of national research and extension systems, the existence of regional organizations which may make it easier to establish networks, the scale of farming enterprises and the state of the rural infrastructure. It is linked to communications and the accessibility of farms, and to the ease with which farmers can obtain credit, pure seed, chemicals, and equipment. It depends on rural marketing facilities, crop prices, and government policies.
712. Increased cassava production in Latin America is constrained by a stagnant market for the crop. This may be related to such factors as the availability of international credit and the livestock feed industry's preference for an assured supply of imported grain, as well as government policies relating to subsidies on home-produced and imported grain.
713. Beans and cassava are grown by large numbers of small-scale farmers, each his own decision maker. Their crops are often grown on poor soils and under unpredictable rainfall so that there is a major disincentive to rapid change. Farmers cannot afford to take risks and need to be fully assured of the advantage to them of adopting a new variety or cultivation technique. Often they do not have ready access to informed advice and, if they do, find it difficult to secure the inputs they need and to pay for them. Under such circumstances acceptance of new technology is slow.
714. The Panel endorses the reminder of the 1977 QQR that it takes about 10 years to develop a new technology and, in the developing countries, another 10 years before it can be seen to make an impact. CIAT must be judged against this scale.

## 6. International Cooperation

715. Through its international cooperation activities the Center has created scientist and commodity networks for beans, rice, and tropical pastures. These have facilitated horïzontal transfers of technology in many cases, for example, in enabling varieties released in one country to enter production in another country. The networks will facilitate sharing of scientists among the Latin American countries for purposes of teaching training courses and preparing publications.
716. CIAT has intensified its efforts to outpost staff in the appropriate areas of the region and world in recent years. This has come at a time when budget constraints in the CGIAR system became severe and the support base has been built primarily through extra-core funding which is frequently short-term. The strategy for these positions is sound, but the Panel feels CIAT should now plan to place an appropriate portion of these positions within the core program. Generally the Center has been careful not to allow availability of extra-core funding to involve them in projects for which they do not have a competitive advantage, but the Panel notes there is one project which comes close to violating that principle.
717. The Center has developed collaborative relationships with a number of institutions of scientific excellence around the globe. Overall it appears to be doing this quite well, but efforts should be increased in some areas such as the emerging biotechnology field. This type of collaboration will increase the scientific credibility of CIAT's programs in future years.
718. In most instances CIAT collaborates very effectively with its sister institutions in the CGIAR system. Good examples are its cooperation with IRRI in rice, with CIMMYT in maize, with ICRISAT in sorghum, with IBPGR and ILCA in genetic resources, and with several IARC's in seed technology. Unfortunately the collaboration with IITA in cassava has been less than satisfactory, a fact which was noted by the 1977 QQR. The Panel cannot judge the causes of this lack of collaboration but feels strongly that the two Centers must resolve this problem in the very near future. If not, a third party must be engaged to bring about such an agreement. Hopefully that will not be necessary.

## 7. Future Plans and Related Staff Requirements

719. CIAT's strategy for the future is logical. It takes account of the wide range of biological and socioeconomic environments for which it works and the need to decentralize its activities.
720. The LRP has already been modified once, and it will need to be modified further at intervals, not to change the main strategy but to take account of changing circumstances. The rate of its implementation will depend on the extent to which donors make extra-core funds available for off-campus activities. The use of extra-core funds to supplement core activities and positions is legitimate, even if unsatisfactory. It makes planning and continuity of activities difficult. However, CIAT has little option but to follow this course if it is to implement its proposals. In doing so, the Center should not allow donor aid preferences, and the availability of funds for some areas/activities and not others, to distort its priorities and the planned extension of its activities.
721. Under these circumstances the numbers of extra-core (but
core type) positions to be filled can only be speculative. The Panel thinks that the $25-30$ positions projected to be funded in this way in the late 1980s is the maximum the Center can reasonably expect to be able to service and it may be difficult to find appropriately experienced staff to fill senior regional positions. The build-up will thus need to be gradual.

## EXTERNAL PROGRAM REVIEWS OF

THE INTERNATIONAL AGRICULTURAL RESEARCH CENTERS

## 1. CHARGE

The Consultative Group on International Agricultural Research (CGIAR) has charged its Technical Advisory Committee (TAC) with the conduct of External Program Reviews of the value and effectiveness of its International Centers.

## 2. PURPOSE AND SCOPE

The major objective of such Reviews has been defined by TAC (in agreement with the Directors of the International Centers) and adopted by the CGIAR as follows:
"on behalf of the Consultative Group, to assess the content, quality, impact and value of the overall program of the Centers and to examine whether the operations being funded are being carried out in line with declared policies and to acceptable standards of excellence".

It is hoped that the Review will inter alia assist the International Centers themselves in planning their programs and ensuring the validity of the research priorities recognized by the Boards of the Centers.

1/ This version, which was approved at the 31st TAC Meeting, replaces that approved by the 24 th TAC Meeting.

2/ "Center" for the purpose of this document comprises the board, the director and staff of all CGIAR institutions, including Boards, Centers, Institutes, Programs and Services. The consultative process for External Program Reviews involves appropriate officials from Center management and/or Board as relevant to the issue in question. It is in such understanding that the term "Center" is used herein.
3. DETAILED ITEMS OF ENQUIRY

In pursuance of the main objectives, defined above, the Review Panel is requested to give particular attention to the following aspects:
(i) The mandate of the Center, its appropriateness, internal consistency and interpretation with respect to:
(a) the immediate and long-term needs for improved food supply and human welfare in developing countries;
(b) present and possible future areas of work.
(ii) The relevance, scope and objectives of the present program and budget of the Center and its forward and long-term plans in relation to:
(a) its mandate, and criteria for the allocation of resources as defined by TAC;
(b) the ongoing activities of other international institutes and organizations, and of the relevant national institutes in cooperating countries and in others where the work of the institutes has bearing;
(c) the policy, strategy and procedures adopted by the Center in carrying out its mandate, and the mechanisms for their formulation;
(d) the Center's rationale for its present allocation of resources, its present and future overall size, and the composition and balance of the program in the fields of research, training, documentation, information exchange and related cooperative activities.
(iii)The content and quality of the scientific and related work of the Center with particular reference to:
(a) The results of the Center's research, particularly that done since the last Review;
(b) the current and planned research and the role of the scientific disciplines therein;
(c) the information exchange and training programs, their methodologies, their specialization and decentralization, and the participation of the research staff therein;
(d) the adequacy of the research support and other facilities;

## Annex I Page 3

(e) the management of the scientific and financial resources of the Center and the coordination of its activities. -
(iv) The impact and usefulness of the Center's activities in relation
(a) agricultural production and the equity of distribution of benefits from increased production;
(b) its information exchange and training programs;
(c) cooperation with national research and development programs;
(d) cooperation with other international institutes and organizations.
(v) Constraints on the Center's activities which may be hindering the achievement of its objectives and the implementation of its programs, and possible means of reducing or eliminating such constraints.
(vi) Specific questions which concerned members of the CGIAR, cooperating institutions, the Center's, Director or its Board of Trustees, may request TAC to examine. -

## 4. GENERAL CONSIDERATIONS

In the early stages of a Center's development, the External Program Reviews must be devoted to assessing the scientific excellence of the-Center, but with the passage of time, the scientific reputation of the Centers becomes widely known and Panels are expected to give more attention to the outcome and impact of the Centers' work and less to detailed comments on the research itself, which is reported elsewhere. Other aspects of paramount importance are the priorities within and between research programs, the balance among programs, the balance between headquarters and off-campus activities, and relationships with national programs.

[^9]
## 5. REPORTING

On the basis of its review, the Panel will report to TAC its views on:
(a) the Center's effectiveness and impact;
(b) the relative importance of the various activities of the Center;
(c) means of improving the efficiency of operations;
(d) the need for any changes in the basic objectives or orientation of the Center's program elements; and,
(e) proposals for overcoming any constraints.

The Review team should feel free to make any observations or recommendations it wishes, because the report is its alone. Equally, it should be clearly understood that the Panel cannot commit the CGIAR or TAC to any consequent action, and Centers should bear this in mind when considering implementation of the Panel's recommendations before the report has been discussed by TAC and the CGIAR.
[REF. 3 (vi) Terms of Reference]

## Results of the First Quinquennial Review

1. What was the impact of the recommendations of the first Quinquennial Review?

## Mandate of CIAT and Research Priorities

2. Is the relative importance given by CIAT to the different crops of its mandate in accordance with changing global needs for these crops? Is there scope for a better identification of research needs and concentration of research means on particular mandate crops and their ecology? Are the strategies, conclusions and recommendations of CIAT's Long-Term Plan sound, relevant and useful in the determination of research priorities? How does CIAT coordinate its global mandate for cassava, tropical pastures and field beans with its regional one for rice in view of its primary regional orientation to Latin America?
3. How does CIAT interpret its mandate and role with respect to cassava, tropical pastures and rice? How does CIAT cooperate with other Centers concerned with these crops (IITA, ILCA, IRRI)? What formal or informal mechanisms are in place and how do they work? Improvement of tropical pastures and cassava may both have significance in Asia. How does CIAT operate in this area?
4. Cassava is not only a staple subsistence food crop, but is also in some parts of the world, a commercial crop of rapidly increasing importance. Given that different regions of the world have differing needs and expectations from improved cassava technologies (e.g., germplasm, agronomy, post-harvest/processing technology, etc.), how does CIAT allocate its resources to respond to these differing needs? What order of priority is given to cassava among the CIAT responsibilities? How are these priorities translated into action in Asia, Africa and Latin America?

## Cooperation with National Programs

5. CIAT initiated an off-campus program somewhat later in its development than most other IARCs of similar age and as a result, much of the costs are covered by special project instead of core funds. In view of this, how effective is the dialogue and influence of associated national agricultural research systems on the program development of CIAT? Are the national programs satisfied with CIAT's response to their identified requirements not only in research, but in training and information flow? What are the current specific
relationships with the national research systems, including universities?
6. How much direct contact does CIAT have with national programs outside Latin America? How are relations fostered?

## Balance of Core and Special Project Activities

7. What is the proportion of special project to core program? How is the core program influenced by special program activities?

## Pasture Program

8. What were the driving motives for phasing out the beef program and introducing the pasture program in view of the recommendations of the first Quinquennial Review? What is the impact of the socio-economic studies on tropical pastures? What is the likely outcome and who is likely to gain from these studies in the long run?

## Soil Fertility and Soil Conservation

9. To what extent does CIAT's current work focus on fertilizer efficiency and/or attempts to improve availability of soil nutrients? Are efforts put into work on fertilizers and those on biological nitrogen fixation adequately balanced? To what extent does CIAT take into consideration soil conservation techniques in its farming activities? With what success?

## Seed Production Unit

10. What is CIAT's plan for the Seed Production Unit? To what extent is this activity an important aspect of CIAT's work? Does the unit have any impact on countries outside Latin America? What are CIAT's plans for phasing it out by transferring this activity to national programs or ungrading it to a core activity?

## Germplasm

11. What are CIAT's overall priorities and strategies with respect to germplasm collection and conservation? How have they been implemented? What interim measures have been instituted by CIAT since the loss of the staff member in charge of the germplasm unit? What are CIAT's plans for reinstitution of the position?

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## DOCUMENTATION FOR REVIEW PANEL

## A. Documentation provided by TAC Secretariat

1. Terms of Reference and Guidelines for External Program Reviews;
2. List of Specific Questions Related to CIAT;
3. Brochure on the CGIAR System;
4. Report of the Second Review of the CGIAR;
5. Procedures for Management Reviews of the Centers;
6. Report of the Quinquennial Review of CIAT;
7. Extracts from 16 th, 17 th, 23 rd, 26 th, 28 th, 29 th, 30 th, and 31st TAC Meeting Reports;
8. Report of the Second Quinquennial Review of CIMMYT;
9. Extract from Compendium of Off-Campus Activities of IARCs 1980;
10. Extract from Draft Report of the Second External Program Review of IITA: Chapter 2 - The Mandate and Strategies of IITA, and Chapter 4 - Root and Tuber Improvement Program (TRIP);
11. Extract from the Report of the Second TAC Quinquennial Review of IRRI: Chapter IV - IRRI and Upland Rice Research, and from Chapter V - International Cooperation, Training and Conferences, paras. 381-388.
12. CIAT Special Projects 1983;
13. Farming Systems Research at the International Agricultural Research Centers, 1978;
14. Extracts from Main Conclusions Reached and Decisions Taken, (paras. 9 \& 36) CGIAR Meeting, 31 October - 4 November 1983, Washington, D.C.

## B. Documentation provided by CIAT

(i) BASIC DOCUMENTS ESTABLISHING CIAT

1. Act of the foundation of CIAT;
2. By-laws of CIAT;
3. Agreement between the Government of Colombia and the Rockefeller Foundation
4. Decree No. 301 of 7 March 1968.
(ii) MANDATE OF CIAT
5. Draft of mandate statement endorsed by the CIAT Board of Trustees at its meeting in 1983.
(iii) ACTIONS ON RECOMMENDATIONS OF FIRST QUINQUENNIAL REVIEW
6. Document entitled: "Review of actions taken by the Center on the recommendations of preceding quinquennial review."
(iv) (v) LONG-RANGE PLAN, UP-DATES TO LONG-RANGE PLAN, AND
(vi)(vii) PRINCIPAL ACHIEVEMENTS
7. CIAT in the 1980s: A Long-Range Plan;
8. Commentary on developments in center-wide aspects since publication of the Long-Range Plan;
9. Program reports:
3.1 Up-date on objectives and strategies (i.e., up-date of Long-Range Plan);
3.2 An analysis of the main achievements and the impact of the programs during the last seven years;
3.3 An up-date of future plans (i.e., up-date of Long-Range Plan);
10. Modification of Chapter 6 in Long-Range Plan: Draft position paper on international cooperation strategies and projections.
(viii) RECENT PROGRAM \& BUDGET DOCUMENTS
11. Program and Budget Proposal 1982-83;
12. Midterm Report, Program and Budget 1982-83;
13. Program and Budget Proposal 1984-85.
(ix) PROGRAM REVIEWS AND POSITION PAPERS
14. Proceedings of Workshop on Upland Rice;
15. Upland Rice Research for Latin America: A Report to the TAC Sub-Committee on Upland Rice (December 1979):
16. Upland rice in the Latin American Region: Overall description of environment, constraints, and potential. CIAT paper presented at Upland Rice Workshop, Bouaké, Ivory Coast, October 1982;
17. An evaluation of distribution of social benefits of rice and cassava research at CIAT and of foregone benefits of possible program reductions;
18. Potential for Field Beans in Eastern Africa: Proceedings of a Regional Workshop held in Lilongwe, Malawi, March 1980;
19. Cassava in Asia (1983);
20. Type and Level of Proposed CIAT Involvement in the Humid Tropics of Latin America (Document considered at the 1980 meeting of the CIAT Board of Trustees);
21. Training Position Paper (1983);
22. Seed Unit Position Paper (1983);
23. Target Area Evaluation Unit (Document considered at the 1980 meeting of the CIAT Board of Trustees);
24. Relevant sections from "Analysis of Cooperation and Coordination between the International Research Centers (CIMMYT, CIAT, CIP) and the National Center of Latin America," a report of a project conducted by Iowa State University for the InterAmerican Development Bank (1982);
25. Background Documents for Internal Program Review 1983:
(a) Bean Program, Annual Report, 1983;
(b) Cassava Program, Annual Report, 1983;
(c) Rice Program, Annual Report, 1983;
(d) Tropical Pastures Program, Annual Report, 1983;
(e) Seed Unit, Annual Report, 1983;
(f) Training and Conferences, Annual Report, 1983;
(g) Seed Unit: A Five-Year Report;
(h) Strategies for Communication and Information Transfer in an Epoch of Increasing Collaboration and Decentralization;
(i) VA Mycorrhiza Management: A new, low-cost, biological technology for crop and pasture production on infertile soils?
(x) AGREEMENTS WITH OTHER INSTITUTIONS CONCERNING MAJOR COOPERATIVE ACTIVITIES WITH CIAT
A. List of Collaborative Projects with Advanced Research Institutions;
B. Specific Agreements with Sister Institutions:
26. IITA (cassava);
27. IRRI (rice);
28. Bean/Cowpea CRSP;
29. INTSORMIL (sorghum);
30. INTSOY (soybeans);
31. IICA.
(xi) MAJOR NON-CORE PROJECTS
32. "Regional project to increase bean production and consumption, and to strengthen national bean research in the CDA countries of Eastern Africa," special project submitted for funding to CIDA, Canada, and AID, USA, in November 1983;
33. "International tropical pastures evaluation network: a mechanism for technology feedback, validation and transfer with and among national programs in tropical America, Phase II," special project submitted for funding to IDRC in October 1983;
34. "Improvement of bean production in the Central American and Caribbean region," extension of a special project funded by the Swiss Development Cooperation. Project duration: 1 January 1984 - 31 December 1986;
35. "Seed training, outreach and research unit, continuation of a special project financed by the Swiss Development Cooperation." Duration of project continuation: 1 January 1984 - 31 December 1986;
36. "Regional bean research project in the Francophone region of Eastern Africa," special project financed by the Swiss Development Cooperation for the period July 1984 - December 1985;
37. "Improved agricultural information exchange for the tropics," a proposal presented to IDRC in 1983, and likely to be funded for a 4 -year period starting on 1 January 1984;
38. "Project on technology transfer on root and tuber crops," work plan and budget for Phase II of project (1982-1987);
39. Agreement CIAT-INIPA-World Bank regarding the stationing in Peru of national co-coordinators in beans and rice.
(xii) OTHER DOCUMENTATION
40. CIAT Report 1983;
41. Principal staff list;
42. Publications catalog;
43. Training materials catalog.

8 - 10 October 1983
On the occasion of CIAT's Tenth Anniversary Dr. F.E. Hutchinson (Chairman) visited the Center and discussed the EPR with members of the Board of Trustees (BoT) and Management of CIAT.

## 28 October 1983

Dr. Hutchinson discussed the final Panel composition and Review Program in Washington, D.C. with the TAC Chairman, CIAT Management and TAC Secretariat.

28-29 November 1983
Drs. Hutchinson and H.M.L. Gallegos (Panel member), accompanied by Dr. G. Gālvez, CIAT Regional Bean Coordinator, visited the collaborative bean program in Guatemala.
28 Nov. Discussions with ICTA $1 /$ staff:
Ing. C. Pinto - General Manager
Ing. A. Fumagalli - Assistant to General Manager
Ing. H. Juarez - Technical Officer
Dr. P. Masaya - Bean Coordinator
Ing. S.H. Orozco - Farming Systems
Dr. S. Beebe - Bean Breeding
Ing. J. M. Diaz - Bean Research (field)
Ing. J. Salguero - Bean Research (field)
Ing. G.A. Figueroa - Bean Research (field)
Ing. M. Castillo - Communications
29 Nov. Discussions at Nutrition Institute. Discussions with farmers in Chimaltenango, Xeatzan and Tecpan (in highlands and lowlands).

30 November 1983
Drs. Gallegos and Gálvez (CIAT) visited bean experiments in Costa Rica; discussion with Ing. Bernardo Mora (Min. of Agriculture).

1/ ICTA = Instituto de Ciencia y Tecnologia Agricolas, Guatemala City, Guatemala.

Dr. K.R.M. Anthony (Panel member), accompanied by Dr. K. Kawano, CIAT Regional Rice Coordinator for Asia, visited the collaborative cassava program in Thailand.

11 Jan. Discussion with Mr. Sophon Sinthuprama, Head of Root Crop Section, Field Crop Research Institute (FCRI), Bangkok. Visit CIAT's Regional Cassava Program office.

12 Jan. Discussions with Dr. Amphol Senanarong, Deputy Director FRCI, and Mr. Panya Ekmahachai, Agronomist at Khon Kaen Field Crop Research Center.
Visit Mahasarakharm Field Crop Experiment Station, onfarm trials and cassava farms in northeast Thailand.

13 Jan. Discussions with Mr. Charn Tiraporn, Director and Cassava Breeder, and staff at Huai Pong Field Crop Research Station, Rayong, eastern Thailand. Visit on-farm trials, cassava farms, and starch factory.

## 14 January 1984

Drs. Anthony and Kawano (CIAT) travel Bangkok-Jakarta.

15-18 January 1984
Drs. Anthony and Kawano visited the collaborative cassava program in Indonesia.

15 Jan. Travel Jakarta - Bandar Lampung (South Sumatra). Visit Bandar Lampung with Dr. R. Soenarjo, Coordinator and Breeder, Root Crop Program. Visit cassava trials at Tamanbogo Experiment Station; discussion with Mr. Martin Sumanta, Head of Station. Visit cassava farms and Cassava Plantation and Starch Processing Factory, Humas Jaya Farm; discussion with Mr. Setlowan Achmed, Director, and Ir. Hardono Nugroho, cassava plantation manager.

16 Jan. Visit cassava trials, including CIAT material, at Humas Jaya Farm. Travel to Bogor, West Java.

17 Jan. Discussion with Dr. B.H. Siwi, Director, Central Research Institute for Food Crops (CRIFC). Visit Muara Experiment Station.

Visit cassava crossing plots at Pacet Substation (alt. 1100 m ).
18 Jan. Discussion with Dr. Shiro Okabe, Director General, Regional Coordination Center for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Center), and senior staff.
Visit Cickeumeuh Experiment Station. Departure from Jakarta.

## 23-27 January 1984

Dr. J. Casas visited specialists in INRA, GERDAT, IEMVT, and IRAT in Montpellier and Guadeloupe to discuss CIAT related research programs.

23 Jan. Discussion with Dr. M. Leger in Montpellier on IRAT's research on beans, cassava, and rice.

24 Jan. Discussions with Drs. Devron, Plant Physiologist (INRA, Montpellier), and Fouilloux (Head, INRA Bean Program, Versailles) on rhizobium and bean research relations with CIAT and on their recent mission concerning the bean programs in Cuba, Nicaragua, and CIAT. Discussion with Dr. P. Lhoste, Pasture Agronomist, GERDAT-IEMVT.

25 Jan. Travel Montpellier-Guadeloupe.
26 Jan. Discussion with Dr. C. Messiaen, Director of INRA Regional Center in Guadeloupe and Plant Pathologist Breeder, on the regional French bean research program and its relationship with CIAT.
Discussions with Dr. Degras, Plant Breeder and present Vice-President of the International Society for Tropical Root Crops, on cassava research and production in the Caribbean.

1/ | INRA $=$ | Institut National de la Recherche Agronomique |
| ---: | :--- |
| GERDAT $=$ | Groupement d'Etudes et de Recherches pour le |
|  | Développement de 1'Agronomie Tropicale |
| $=$ | Institut de Recherches Agronomiques Tropicales et des |
|  | Cultures Vivrieres |
| IRAT $=$ | Institut d'Elevage et de Médicine Vétérinaire des |
| Pays Tropicaux |  |



28 January - 3 February 1984
Review Panel attended Annual Internal Program Review at CIAT, Palmira, Colombia.

28 Jan. Review Panel assembled at CIAT.
29 Jan. Discussion Panel Chairman and Secretary.
Panel sessions in morning and afternoon.
30 Jan. Opening session CIAT Internal Program Review by Dr. J.L. Nickel, Director General, and Dr. M. Piñeiro, Chairman Program Committee, Board of Trustees.

Presentations on Tropical Pastures Program by:
Dr. J.M. Toledo - Program Coordinator and Pasture Agronomist
Dr. R. Schultze-Kraft

- Agronomist, Germplasm

Dr. J. Lenné

- Plant Pathologist

Dr. R. Bradley

- Soil Microbiologist

Dr. C. Lascano - Animal Scientist, Pasture Quality and Animal Nutrition
Dr. R. R. Vera - Animal Scientist, Cattle Production Systems
Dr. J.E. Ferguson

- Agronomist, Seed Production

Panel session in evening.
31 Jan. Presentations on Bean Program by:

Dr. A. van Schoonhoven
Dr. 0. Voysest
Dr. J. Woolley
Dr. G.E. Gálvez

Dr. M. Dessert

- Program Coordinator and Entomologist
- Agronomist
- Agronomist, Cropping Systems
- Plant Pathologist and Regional Coordinator, Central American Bean Project
- Plant Breeder, Francophone East Africa

Annex IV Page 5
Panel session with Program Committee (BOT) in evening.
1 Feb. Presentations on Rice Program by:

Dr. P.R. Jennings
Dr. C. Martínez
Dr. S. Sarkarung

- Program Coordinator and Plant Breeder
- Plant Breeder
- Plant Breeder

Presentation on Seed Unit by:
Dr. J.E. Douglas - Head of Seed Unit
Panel session in evening and dinner at Dr. Nickel's residence.

2 Feb. Presentations on Cassava Program by:

Dr. J.H. Cock
Dr. C. Hershey

- Program Coordinator and Plant Physiologist

Dr. A.C. Bellotti

- Plant Breeder

Dr. R. Howeler
Dr. R. Best

- Entomologist
- Soil Scientist, Soil and Plant Nutrition

Dr. J.K. Lynam

- Utilization

Dr. K. Kawano

- Agricultural Economist

Dr. J.C. Lozano

- Plant Breeder for Southeast Asia

Dr. B. Ospina

- Plant Pathologist
- Betulia pilot project

Panel session in evening.
3 Feb. Presentation on Priorities and Strategies in International Cooperation by:

Dr. G.A. Nores
Dr. F. Fernāndez
Dr. S.C. Harris

- Director, Resources Research and

International Cooperation

- Coordinator, Training and

Conferences, Soil Scientist

- Head, Communication and

Information Support Unit

Presentation on Mycorrhiza Research by:
Dr. E. Sieverding - Soil and Plant Nutrition
Dr. S.R. Saif

- Soil Microbiologist

Presentation on Applied Biotechnology by:
Dr. W.M. Roca

- Acting Head, Genetic Resources, Plant Physiologist

Closing remarks by Drs. F.E. Hutchinson, Review Panel Chairman, M. Piñeiro, Program Committee Chairman, and J.L. Nicke1, Director General of CIAT.

During the following week the Review Panel split up as follows:

1) Drs. Hutchinson (Chairman), Jones, Ramalho, and Rutger, accompanied by Dr. G.A. Nores, visited collaborative bean, cassava, rice, and tropical pastures programs in Brazil from 5 - 11 February 1984.
2) Drs. von der Pahlen, Casas, Gallegos, Niblett, and Ochtman (Secretary), accompanied by Dr. G.E. Gálvez in Costa Rica and Cuba, and by J.H. Cock in Mexico, visited collaborative bean, cassava, rice, and tropical pastures programs in these three countries from 4 - 10 February 1984.
3) Dr. Anthony visited IITA in Ibadan, Nigeria, for discussion of CIAT-IITA collaboration in cassava research for Africa on 7-8 February 1984.

The program of the above mentioned Panel team visit to Brazil was as follows:

4-5 Feb. Travel Cali-Bogotá-Rio de Janeiro-Brasilia.
6 Feb. Drs. Hutchinson, Jones, and Ramalho, accompanied by Dr. G.A. Nores, visited Centro de Pesquisa Agropecuảria dos Cerrados (CPAC), and had discussions with following:

Mr. Elmar Wagner
Mr. Edson Lobato
Mr. Guedes
Dr. Derrick Thomas
Dr. Darci Tercio Gomes
Dr. Jose Zoby
Mr. Carlos Magno Campos da Rocha
Mr. Ronaldo Pereire de Andrade
Mr. Ben de Sousa
Dr. Walter Couto
Dr. Mark Hutton

- Director, CPAC
- Technical Director, CPAC
- Administrative Director, CPAC
- CIAT Forage Agronomist stationed in CPAC
- Program Coordinator, Animal Production
- Animal Nutritionist
- Regional Trials (grazing)
- Coordinator, Pastures-Seed Research
- Breeding
- Former CIAT Soil Scientist stationed in CPAC
- Plant Breeder

Dr. Rutger visited Centro Nacional de Pesquisa em Arroz e Feijao (CNPAF) personnel, met with the same as those met by the larger group on 7 February (below).

7 Feb. Drs. Hutchinson, Ramalho, and Rutger, accompanied by Dr. G.A. Nores, visited CNPAF and met the following:

Dr. Almiro Blumenschein - Director, CNPAF
Mr. Arnaldo Josē de Conto

- Technical Director

Ms. Iracema Costa Magalhaes

- Library, Training and Publications
Dr. Ricardo Silva Araujo
- Microbiology

Dr. Robert Hansen - USAID Microbiologist and Visiting
Dr. Francisco P. Zimmerman Scientist
Ms. Marlene Silva Freire - Germplasm Bank and Rice Program
Dr. Nand Kumar Fageria

- Soil Fertility

Dr. Joao Kluthcouski - Soil Fertility
Dr. Thomas de Aquina Portes - Intercropping e Castro
Dr. Ricardo José Guazzelli - Cowpea Research
Dr. María José de Oliveira - Bean Program Zimmerman
Dr. Ann Prabhu

- Rice Pathology

Mr. Evaldo Pacheco Sant'Ana - Rice Program
Mr. José Francisco Valente - Rice Program Moraes
Dr. Adelson de Barros Freire - Rice Program
Dr. Y. Tanaka - IICA Rice Pathologist located in CNPAF
Mr. Paulo Hideo Nakano Rangel - Rice Program
Mr. Emilio Maria Castro - Rice Program
Ms. Marli de Fatima Fiore - Rice and Azolla Program
Mr. Silvio Steinmentz - Agrometeorology
Mr. Francisco Reyniers - IRAT Agrophysiologist stationed
Dr. Michael D. Thung in CNPAF

- CIAT Bean Agronomist stationed in CNPAF

Dr. Jones continued visits to CPAC.
8 Feb. Discussions (entire group) with Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA) officials in Brasilia:

Dr. Raimundo Fonseca

- Executive Director

Dr. Agide Gorgatti Neto - Executive Director
Dr. José María Pompeu Memoria - Head, International Cooperation
Travel Brasilia-Porto Alegre (entire group), for discussions with Rio Grande do Sul officials and with officials and scientists at Instituto Rio-Grandense do Arroz (IRGA):

Hon. Joao Salvador Jardin
Mr. Theodoro Saibro

- Secretary of Agriculture
- Asistant Secretary of Agriculture

Mr. Karl H. Moerdick - Director of Research
Mr. Paulo Belchior da Costa - President, IRGA
Mr. Marco Antonio B. Oliveira - Technical Director, IRGA
Mr. Clovis H. Scherer - Assistant to the Technical Director, IRGA

9 Feb. Continued visits at IRGA station (entire group).

Mr. Mauricio Pilzen
Ms. María Suely Soares da Costa

Mr. José Alcen Infield
Mr. Arlei Laerte Terres
Mr. José Galli
Ing. Sidnei Bicca da Rocha
Ing. Pedro Roberto de Souza
Ing. Paulo Sergio Carmona
Ing. Brasil Aquino Pedroso
Ing. Bernardo Iochpe
Ing. Jose Carlos da Silva
Ing. Jaime Vargas de Oliveira
Ing. Dieter Kempf
Ing. Jorge Kalil Abud
Ing. Luiz Alberto Pinto Gondim
Ing. Marlene Souza Lopes
Ms. Marisa de Azevedo e Souza de Jesús
Ing. María da Graca Burgo Valerio
Ing. César Mariot
Ing. Valfredo García Basler
Ing. José Gallego Tronchoni
Ing. Mauricio Miguel Fischer

- Assistant representative, EMBRAPA-RS
- Technical Coordinator for Integrated Programs S.A., IRGA, EMBRAPA
- Rice Bioclimatology, EMBRAPA, Pelotas
- Rice Breeding, EMBRAPA, Pelotas
- Rice Breeding, UFPEL, Pelotas
- General Coordinator, IRGA
- Coordinator of Research
- Plant Technology, IRGA
- Plant Technology, IRGA
- Plant Technology, IRGA
- Plant Technology, IRGA
- Plant Technology, IRGA
- Plant Technology, IRGA
- Plant Technology, IRGA
- Soils and Water
- Soils and Water
- Soils and Water
- Seeds
- Machinery
- Machinery
- Training
- Training

10 Feb. Dr. Rutger travelled to Campinas, for discussions with rice and bean scientists at Instituto Agronómico de Campinas (IAC):

Mr. Luiz E. Azzim

- Rice Breeding, IAC

Mr. Antonio Pompeu

- Bean Breeding, IAC

10 Feb. Drs. Hutchinson, Jones, and Rama1ho, accompanied by Dr. G.A. Nores, visited Centro Nacional de Pesquisa de Mandioca e Fruticultura (CNPMF) at Cruz das Almas, near Salvador, for discussions on cassava with:

| Dr. M.A.P. da Cunha | - Director, CNPMF |
| :--- | :--- |
| Dr. M.C.M. Porto | - National Cassava Program |
| Dr. N. Alvarez | Coordinator |
| - Cassava Breeder |  |

11 Feb. Dr. Rutger continued visits at IAC, then returned home. Drs. Hutchinson, Jones, Ramalho, and Nores continued visits at CNPMF, then all returned home except Dr. Jones.

12-13 Feb. Dr. Jones visited EMBRAPA National Dairy Cattle Research Center, Juis da Fora, for discussion with:

Dr. Margarida de Carvalho

- Plant Nutritionist

Dr. Andrew Gardner

- Pasture Agronomist

The program of the abovementioned Panel team visit to Costa Rica, Cuba, and Mexico was as follows:

3 Feb. Travel Cali-Bogotā.
4 Feb. Travel Bogotá-San José, Costa Rica.
Accompanied by Mr. C. Rodriguez S., Agronomist, Bean Program, National Council for Production (CNP), visit to Foundation Seed (beans) fields in Cartago-Paraiso area.

Panel team session in evening.
5 Feb. Discussions in San José with national program officials from the Ministry of Agriculture and Livestock (MAG), the National Council for Production (CNP), and the. National Seed Office (ONS), for discussions with:

Ing. R. Alfaro M.

Ing. O. Ramírez B.

- Deputy Director Agricultural Research (MAG) and National Coordinator of the Bean Program

Ing.

- Director, National Seed Office (ONS)
Ing. B. Mora
- Plant Pathologist, Bean Program (MAG)
Mr. C. Rodriguez S.
- Agronomist, Bean Program (CNP)

Mr. E. Abarca C.

- Agronomist, Bean Program (CNP)

Mr. Zamora M.

- Agronomist, Bean Program (CNP)

Panel team session in evening.
6 Feb. Discussions with:

Ing. J. Torres - Vice-Minister, MAG
Ing. R. Alfaro M.

- Deputy Director Agricultural Research, MAG
Dr. L.C. Gonzålez
- Dean, Faculty of Agriculture, Univ. of Costa Rica
Ing. E. Quiroz
- President, CNP

Travel San José-Havana, Cuba
Dinner with Dr. P. Morales, Director of the Comite Estatal de Colaboración Externa (CECE), Havana.

7 Feb. Presentations by national program officials from the Ministry of Agriculture (MINAG):

Lic. G. Cayado
Dr. E. Ruiz

Ing. 0. Gómez
Dr. J. Trémocs

Dr. F. Funes
Ing. A. Martinez
Ing. J.E. Deus-Rentería
Ing. M. Portieles

- Director, International Relations
- Director of Science and Technology, and representative for Latin America and the Caribbean Region in the CGIAR
- Director, Research Institute for Horticulture, Grains and Fibers
- Director, Research Institute for Agrochemistry and Soil Improvement
- Director, Pasture and Forage Research Institute
- Director, Seed Inspection and Certification Service
- Plant Breeder, Rice Research Institute
- Cassava Development

Visit to the Grain Experiment Station "Tomeguin", Havana, and discussions with:

Ing. L. Barreiro - Station Director
Ing. M. Torres - Maize Researcher
Ing. M. Irañeta - Bean Researcher
Ing. T. Hernandez

- Bean Researcher

Dr. A. Jiménez

- Delegate of the Vice-Minister

Mr. M. Nieto

- International Relations, MINAG

Visit to the Pasture and Forage Research Station "Niña Bonita", Havana, and discussions with:

Dr. F. Funes

- Station Director

Dr. J.S. Paretas

- Deputy Director

Ing. R. Rabago

- Seed Production

Ing. E. Berra

- Head, Agronomy Department

Dr. E. Ruiz

- Director of Science and Technology, MINAG

Panel team session in evening.
8 Feb. Accompanied by Drs. E. Ruiz and G. Cayado, visit to:
i) Matanzas Provincial Office of MINAG for discussions with:

Mr. H. Hernández Cuesta - Deputy Delegate of MINAG in the Province
Ing. R. Rodriguez C.

- Grain Specialist

Ing. L. Barreiro

- Director, "Tomeguin" Station, Havana
ii) "Lenin" State Farm, Jovellanos, Matanzas Province, for discussions with:

Ing. F. Jorrin

- Head, Agricultural Production and Delegate of MINAG in the Province
Ing. J.I. Rodriguez
- Deputy Director of Production, "Lenin" State Farm
Ing. A. Cañada
- Grain Technologist
iii) "Victoria de Giron" State Farm, Matanzas Province, for discussions with:

Ing. J. Sureda

- State Farm Director

Ing. J. Estupiñan

- Deputy Director

Final discussion with Drs. Ruiz, Cayado, and Nieto at the International Relations Office, MINAG, Havana.

Travel Havana-Mexico City in evening.
9 Feb. Dr. von der Pahlen, accompanied by Dr. Cock (CIAT), travelled Mexico City-Villahermosa, Tabasco (Mexico) and visited:
i) CAEHUI 1 / Experiment Station in Huimanguillo and discussions with:

Ing. M.C. Francisco Melendez - Regional Coordinator
Ing. J.I. Lopez Naranjo - Pasture Program
Ing. V.W. GonzaTez Lauck

- Cassava Program

[^10]ii) Ranch "El Destierro" of Mr. H. Navarro; trials on grasses and legumes, including Brachiaria decumbens.
iii) Ranch "Palo Borracho"; fertilization trials, including $\underline{B}$. decumbens.

Meeting in the evening with:

Ing. S. Contreras Ing. Gonzalez Lauck Ing. F. Segoretta Padilla
Ing. D. Sánchez Esparga
Ing. J. Zuinga Gonzålez
Ing. T. Gaytais Muñiz
Ing. S. Sānchez Gōmez
Ing. J.I. López Naraujos
Ing. J.P. Flores Márquez
Ing. Antelmo Contreras

- Cassava Coordinator
- Cassava
- Cassava
- Cassava
- Cassava
- Cassava
- Cassava
- Pastures
- Rice
- Rice

9 Feb. Drs. Casas, Gallegos, and Ochtman, travel México CityCuliacán, Sinaloa (Mexico) and visited:
i) CIAPAN $1 /$ Agricultural Research Center at Culiacán for discussions with:

Dr. J.M. Ramírez

- Director, CIAPAN

Dr. R. Lepiz

- Bean Coordinator, Central Zone, INIA
Dr. J. Armenta S.
Ing. R. Salinas
- Rice Coordinator, Northern Zone, INIA
- Bean Program, Ahome Experiment Station
ii) Members of Rio Culiacán Farmers' Association, i.e.:

Ing. H. Saldoria
Mr. R.L. Ramos
Mr. F. Elias A.
10 Feb. Dr. von der Pahlen visited:
i) Experimental sites at Pato Escondido and El Quinez.
ii) Cassava drying plant "El Guacamoto".

1/ CIAPAN $=$ Centro de Investigaciones Agricolas del Pacífico Norte.

Travel Villahermosa-Mexico City.
Discussions at INIA ${ }^{1 /}$ headquarters with:
Ing. A. Ramos Sánchez - Dep. Director of Research, Southern Zone
Dr. K. Yoshii Okuda

- Bean Program, Veracruz, Cotaxtla

Ing. N. Carrezales Mejía

- Bean Program, Chiapas

Ing. L. Hernảndez Aragón - Rice Program, Experimental Station "Zacatepec", Morelos

Dr. Casas and Mr. Ochtman travel Culiacán-Mexico City.
Panel team session in evening.
11 Feb. Panel members' departure from Mexico.
7-8 February 1984
Dr. Anthony during his visit to IITA, Ibadan, Nigeria, had discussions on the CIAT-IITA relationship regarding cassava research, with the following IITA staff:

Dr. E.H. Hartmans

- Director General, IITA

Dr. B.N. Okigbo

- Deputy Director General

Dr. E.R. Terry

- Director, International Program and Training
Dr. S.K. Hahn
- Director, Root and Tuber Program

Dr. Y. Efron

- Director, Cereal Improvement Program
Dr. K. Zan
- IRRI Liaison Scientist


## 2 March 1984

Dr. J. Casas visited Institut d'Elevage et de Médģine Vētérinaire des Pays Tropicaux (IEMVT) and ORSTOM² in Paris for discussions with:

Dr. Provost - Director General, IEMVT, Maisons Alfort
Dr. Andru

- Head, Pasture Program, IEMVT

Dr. Spire

- Head, International Cooperation with Latin America, ORSTOM, Paris

1/ INIA = Instituto Nacional de Investigaciones Agrīcolas
2/ $\quad$ ORSTOM $=\begin{aligned} & \text { Office de la Recherche Scientifique et Technique } \\ & \text { d'Outre-Mer. }\end{aligned}$

3 March 1984
Review Panel reassembled at CIAT, Palmira, Colombia.

4 March 1984
Panel session.
Tour of CIAT Experiment Farm.
The Review Panel split up as follows:

1) Drs. Hutchinson (Chairman), Casas, Jones, Niblett, and Rutger visited Carimagua, Villavicencio, and Quilichao from 4-9 March 1984.
2) Drs. von der Pahlen, Anthony, Gallegos, Ramalho, and Ochtman (Secretary) visited Corozal, Santa Marta, Popayān, and Ipiales from 5-9 March 1984.

Drs. Hutchinson, Casas, Jones, Niblett, and Rutger, accompanied by Dr. J.M. Toledo, CIAT Tropical Pastures Program Coordinator, visited the following institutions and officials in Carimagua, Villavicencio, and Quilichao:

4 March Travel by air Cali-Carimagua (Meta). General overview of Carimagua Station.

5 March Discussions at Carimagua Station with:

Dr. B. Grof
Dr. R. Howeler
Dr. A.C. Bellotti
Dr. R.R. Vera
Dr. C. Seré
Dr. C. Lascano
Dr. J. M. Lenné
Dr. R. S. Bradley
Dr. J.M. Toledo

- Agrostologist and representing Director of ICA/Carimagua
- Soil Scientist, CIAT Cassava Program
- Entomologist, CIAT Cassava Program
- Animal Scientist, CIAT Pastures Program
- Agr. Economist, CIAT Pastures Program
- Animal Scientist, CIAT Pastures Program
- Plant Pathologist, CIAT Pastures Program
- Soil Microbiologist, CIAT Pastures Program
- Pasture Agronomist and Coordinator, CIAT Pastures Program

6 March Discussions at Carimagua Station with:

| Dr. R.R. Vera | - Animal Scientist, CIAT Pastures |
| :--- | :--- |
| Program |  |
| Dr. C. Seré | - Agr. Economist, CIAT Pastures |
| Dr. C. Lascano | - Animal Scientist, CIAT Pastures |
| Program |  |
| Dr. J.M. Toledo | -Pasture Agronomist and <br> Coordinator, CIAT Pastures <br> Program |

Visit to "Altagracia" ranch; discussions with Dr. A. Jiménez (owner).

7 March Travel by car Carimagua-Villavicencio (Meta); on the way visits to:
" Guayabal " ranch
" Las Margaritas " ranch
" Las Leonas " ranch
" El Viento " ranch
8 March Visit Santa Rosa CIAT Substation; discussions with:
Dr. J. Gonzălez - Agronomist, CIAT Rice Program
Ing. A. Dỉaz-Durān - Superintendent, CIAT Stations Operations
Dr. S. Sarkarung - Breeder, CIAT Rice Program
Visit La Libertad ICA Research Station; discussions with:

Ing. I. Torrez - Station Director, ICA
Mr. E. Jiménez

- Regional Manager

Dr. E. B. Owen - Director of Regional Agricultural Research
Dr. Perez

- Pasture Research

Ing. E. Andrade

- Rice Breeder

Dr. D. Leal

- Rice Agronomist

Travel by air Villavicencio-Palmira.
9 March Travel by car CIAT (Palmira)-CIAT Quilichao Station (Cauca); discussions with:

Ing. A. Díaz-Durān

- Superintendent, CIAT Stations Operations
Dr. J.H. Cock
- Coordinator, CIAT Cassava Program

Dr. R. Howeler

- Soil Scientist, CIAT Cassava Program

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Dr. J.W. Miles
Dr. R. Schultze-Kraft
Dr. C. Lascano
Dr. J.M. Toledo
Dr. J.E. Ferguson
Dr. S.P. Singh

- Breeder, CIAT Pastures Program
- Agronomist Germplasm, CIAT Pastures Program
- Animal Scientist, CIAT Pastures Program
- Coordinator, CIAT Pastures Program
- Agronomist, Seed Production, CIAT Pastures Program
- Breeder, CIAT Bean Program

Travel by car CIAT Quilichao-Mondomo region, accompanied by Drs. J.H. Cock, R. Howler, and J. Lynam, to visit and discuss:

- evaluation of mycorrhiza
- regional trials
- evaluation of fallow and fertilizers on long-term fertility
- erosion control

Return by car to CIAT-Palmira.
Drs. von der Pablen, Anthony, Gallegos, Ramalho, and Ochtman visited the following institutions and officials in Corozal, Santa Marta, Popayān, and Ipiales:

5 March Travel by air Cali-Corozal (Sucre).
Accompanied by Drs. J.H. Cock and R. Best, Coordinator and Utilization Scientist of CIAT's Cassava Program, respectively, visited:

- Cassava natural drying plant, Montañitas Farm, of the Betulia Farmers Association (APROBE) = and the pilot drying plant with circulation bin dryer and solar collector.
- Regional cassava variety trial, Montañitas.
- Cassava sowing date and harvest time trial at Montañitas.
- Commercial cassava lots, Montañitas, with improved technology, traditional technology, and traditional method of stake storage.

[^11]- Stake storage trial, Albania.
- Regional cassava variety trial, Albania.
- Cassava natural drying plant, Albania.

At above sites discussions with:

| Ing. C. Acosta | - Regional Director, ICA1// |
| :--- | :--- |
| Ing. R. Pērez | - Regional Director, DRI// |
| Ing. E. García | - District Director, ICA |
| Ing. O. Medina | - District Director, CECORA/ |
| Ing. B. Donado | - Coordinator, Interinstitucional |
| Mr. J. Ortega | Cassava Project Team, CECORA |
| Mr. S.M. Erazo | - Manager, APROBE |

Travel by air Corozal-Santa Marta (Magdalena).
Panel team session in evening.
6 March Travel by car Santa Marta-Media Luna, accompanied by Drs. J.H. Cock (Program Coordinator), C. Hershey (Cassava Breeder), J.K. Lynam (Economist), J.C. Lozano (Plant Pathologist), Ing. R. Laberry (Associate Pathologist), and Ing. J.A. Puente (Cassava Program Operations on the Atlantic Coast), visit to:

- Breeding plots for cassava ecosystem ECZ-1.
- Regional trial.
- Long-term fertility trials.
- Production of virus-free materials.
- Ecological zones systems trial.
- Varietal distribution in the Media Luna area.
- Natural drying plant.

Return to Santa Marta.
Panel team session in evening.
7 March Travel by air Santa Marta-Popayăn (Cauca), accompanied by Ing. A. Díaz-Durān (Superintendent Stations Operations), Drs. A. van Schoonhoven (Bean Program Coordinator), S.P. Singh (Bean Breeder), M.

[^12]Pastor-Corrales (Bean Pathologist), C. Hershey (Cassava Breeder), and Ing. R. Realpe, visit of CIAT Substation in Popayăn.

Travel by air Popayăn-Pasto (Nariño).
Panel team session in evening.
8 March Accompanied by Drs. A. van Schoonhoven (Bean Program Coordinator), J. Davis (Bean Breeder), J. Woolley (Bean Agronomist), Ing. Omar Guerrero (Acting Director of Station), Ing. N. Angulo (ICA Bean Breeder), Ing. L. Obando (ICA Bean Program), visit of bean trials at Obonuco Station.

Accompanied by Drs. A. van Schoonhoven, J. Woolley, D. Pachico (Economist), and Ing. N. Angulo (ICA), visit of on-farm trials (bush bean monoculture) in Funes.

Travel by car Funes-Ipiales.
9 March Continuation of visit to on-farm trial sites.
Travel by air Ipiales-Cali.
10 March Review Panel visit ICA headquarters at Tibaitatá (Bogotā); discussions with:

Dr. F. Gómez - General Manager, ICA
Dr. E. Alarcōn - Director of Planning
Dr. J. Navas - Deputy Director of Research
Dr. M. Torregrossa - Director of Agronomy
Dr. G. Manrique - Director of Animal Production
Dr. J. Isaza - Director of Rural Development
Ing. M. Brochero - Director of Agricultural
Production
Ing. R. Artunduaga
Ing. A. Ariza - Director, Tibaitatā Station
Return to CIAT in the afternoon.

11 March 1984
Panel session in morning.
Presentation by Mr. J. A. Cuéllar, Executive Officer of Administration, CIAT.
Panel session in afternoon.
Meeting External Management Review (EMR) and EPR Panels in evening.

12 March 1984
In-depth discussions and consultations with CIAT staff. Report preparation in evening.

13 March 1984
Report preparation and consultations with staff. Panel session in evening.

14 March 1984
Panel sessions morning, afternoon, and evening. Report preparation.

15 March 1984
Report preparation and consultations with staff. Panel attended presentation of External Management Review to CIAT.
Panel session in evening and report preparation.

16 March 1984
Panel sessions in morning, afternoon, and evening.
Report preparation and consultations with staff.

17 March 1984
Panel session in morning with Director of Crops Research, Director of Resources Research and International Cooperation, and four Commodity Program Coordinators.
Report preparation.
Panel session in afternoon with Director of Crops Research, Director of Resources Research and International Cooperation, and Cassava Program Coordinator.
Panel sessions in afternoon and evening.

18 March 1984
Panel sessions in morning, afternoon, and evening. Dr. and Mrs. J.L. Nickel invite Panel for luncheon. Report preparation.

Report preparation and consultations.
Panel sessions in afternoon and evening.

## 20 March 1984

Report preparation and consultations.
Panel sessions in afternoon and evening.

## 21 March 1984

Report preparation and consultations.
Finalizing draft report.

## 22 March 1984

Draft report to Executive Committee, BoT.
Final checking draft report.
Panel sessions with Executive Committee in afternoon and evening.
Finalizing report.

## 23 March 1984

Finalizing report.
Presentation of EPR report by Panel Chairman to CIAT Executive Committee, Management and Staff in early afternoon.
Final Panel session in afternoon.
Dinner at Dr. J.L. Nickel's residence in evening.

24 March 1984
Departure EPR Panel.

# REVIEW OF ACTIONS TAKEN BY CIAT ON THE RECOMMENDATIONS OF THE 1977 QUINQUENNIAL REVIEW 

PART A: ACTIONS RE: PRINCIPAL RECOMMENDATIONS AS PRESENTED ON PAGES 80-82 OF QQR REPORT

1. Stabilization of Policy

Recommendation:
That the Center be given a period of stability and the opportunity to make uninterrupted progress.

## Action Taken:

This recommendation was followed by the various elements in the Center and CGIAR System so that no major program changes (except the elimination of the already small Swine Nutrition Unit) were made until 1982, when the financial crisis in the CGIAR interrupted stability.
2. Forward Planning

Recommendation:
That the Center should not be asked to detail long-term prescriptions for the separate programs.

## Action Taken:

This recommendation was overtaken by the strongly expressed views of donors in 1978 that all Centers should develop long-range plans. Thus, during the two-year period from mid-1979 to mid-1981 a long range plan, entitled "CIAT in the 1980s" was developed. This included, in Chapter 5, long-term strategies and projections for each program.
3. Coordination of Regional Survey Activities

Recommendation:
That there be a positive effort to integrate and classify regional ecological, land-use and farming systems information.

Action Taken:
An Agro-ecosystem Unit has been established, which is compiling data bases of such information for each program and assists them in defining priority agroecological regions.

## 4. Assessment of Contribution

## Recommendation:

That CIAT develop a method for monitoring its contribution to tropical agriculture.

## Action Taken:

This activity has been recognized as one of the principal functions of the economist in each commodity team. Together, each year the program economists prepare a status report (copies of the reports for the past two years included with briefing information) to the Board of Trustees.

The summary of achievements which make up part of information compiled for the EPR constitute the most recent contribution in this respect. However, this is a continuing and large task which will become greater as CIAT technology reaches farmers in more countries. Therefore, it will be essential to enlist local assistance in various countries. The studies on bean technology adoption in Costa Rica and Guatemala, conducted by local university students under the supervision of the Bean Program economist, is a method which will probably be used more in the future.
5. Training of Trainees

## Recommendation:

That a substantial part of the course program be devoted to methods for teaching the technologies which the students are learning.

## Action Taken:

No formal element on this subject has been added to the courses, but the goal has been effectively achieved. An integral component of each course is an element on visual aids preparation and use and other communication skills. In addition large amounts of training materials have been developed. Also, individuals responsible for conducting training courses in their home countries have been given special training in course planning and organization. The result is that many (and those we consider clearly the best) of the growing number of in-country courses on beans, cassava, rice and tropical pastures are conducted by CIAT alumni, with heavy use of CIAT teaching materials. Communication specialists from several countries have also been given special training in the development and use of audiotutorial materials.
6. Training for Seed Production

Recommendation:
That training in the technology of multiplication and distribution of clean seed should have a high priority in CIAT programs.

Action Taken:
This is the principal function of the Seed Unit.
7. Avoidance of Soil Exhaustion from Low Input Cropping

Recommendation:
That nutrient balance studies for minerals be conducted to monitor CIAT recommendations for low-input cropping systems in infertile soils.

## Action Taken:

Shortly after the last QQR two Soil Scientists were added to the Tropical Pastures Program (one in Colombia and one in Brazil) with the task of determining the nutrient requirements of the new pastures on Llanos and Cerrado soils and establishment of appropriate fertilizer levels for initial establishment and maintenance. One of these was subsequently lost--in the 1983 fallback cuts--but the work continues and very useful information on this subject has been developed.

In the case of Cassava macro and micro nutrient requirements have been established and deficiency symptoms identified. Also, long-term experiments were initiated in 1977 to monitor the fertility status of soils with various fertilizer practices. These continue. This will also be one of the chief responsibilities of the agronomist we hope to place in the Asia Cassava Program.

In the case of beans, screening methodology has been developed to identify genotypes which intrinsically require less phosphorus--as opposed to those which are merely more efficient in extracting it from the soil.
8. Improvement of Soil Conservation Procedures

## Recommendation:

That higher priority be given by CIAT to the incorporation of well known soil conservation techniques into all its farming activities.

## Action Taken:

The specific recommendation related to CIAT's own farming practices has been amply followed, especially on the more hilly substations of Quilichao and Popayan. Well known soil conservation practices were put in place when these farms were developed and have been substantially improved with experience.

While soil conservation research did not form part of the panel's recommendations, it is appropriate to point out that modest efforts have also been made in this field. Over the past several years the on-farm soils research at Mondomo has tested various living mulches and other agronomic practices to reduce erosion in cassava plantings in that hilly area.

A major effort has also been made in the Tropical Pastures Program to develop new pasture establishment technology which will minimize soil disturbance.
9. Increased Germplasm Collection in Beans

Recommendation:
The early engagement of an experienced plant collector as a temporary member of the bean team and that a third breeder be appointed to this team before 1980 in order to work on related species.

## Action Taken:

The recommendation on bean collecting has been amply followed. Using temporarily hired collectors, and with support from the IBPGR to cover much of the costs of the expeditions--especially those incurred by the cooperating national programs--the following collecting trips have been carried out with direct CIAT involvement: Spain and Portugal, Mexico, Guatemala, Peru, Brazil. In addition CIAT has received material from IBPGR missions in Zambia, Malawi, Cameroon and other countries.

The Phaseolus species collection increased to 32532 accessions by December 1982 from 12896 in December 1976. In the existing collection $89 \%$ of the accessions are P. vugaris, $7.2 \%$ $\underline{P}$. lunatus (lima beans), $3.3 \%$ P. coccineus (runner beans), and $0.5 \%$ P. acutifolius (tepary beans). In addition about 100 accession $\bar{s}$ of wild Phaseolus species have been added to the collection.

A third Senior Staff bean breeder was added in 1978. However, only a small portion of his time is dedicated to related species. Good progress with related species has been made with interspecific crosses through a collaborative project
with the University of Gembloux, combining basic research at the University with field work at CIAT carried out by Belgian, FAO Associate Experts.

## 10. Provision of Greenhouses

## Recommendation:

That forward provisions for additional greenhouses be reviewed to insure the provision of:
a. A greenhouse with full containment facilities for insects and diseases.
b. A greenhouse for pasture legume breeding work.
C. A greenhouse for nitrogen fixation work in beans and forage legumes.

## Action Taken:

The plans were revised and a special post-quarantine phytosanitary glasshouse and headhouse were added to the Genetic Resources Unit. In addition 3 new glasshouses and eight growth rooms were added to the glasshouse/headhouse complex to cater for the needs described above, along with others.
11. Animal Health Studies in the Beef Program

## Recommendation:

The retention of sufficient scientists in animal health within the Beef Production Program in order that research work of immediate relevance to the health of herds on improved savannas be undertaken.

## Action Taken:

This is one recommendation which has not been followed. With growing evidence that poor nutrition rather than animal diseases represented the key constraint to improved livestock production in acid, infertile frontier lands of Latin America, the CIAT management and Program Committee of the Board recommended an increased concentration on the development of improved pastures for this region. This was thoroughly debated and agreed upon by the Board of Trustees. As a result the program was renamed the Tropical Pastures Program and senior staff positions reallocated to best cover the most important fields of research related to this new focus. One of the results of this action was the reduction of senior staff animal health position from 2 to 1 in 1978.

Later, when it was necessary to reduce the number of senior staff in the Center to adjust to a reduced level of funding anticipated for 1983, the remaining animal health position was one of the casualties. This was because--for the reasons given above--it was considered to be a lower priority area of activity. While the Senior staff position was eliminated, the section was not closed down. Four professional veterinarians remain within the program, along with adequate laboratory facilities. Two of these professionals look after the health of the test herds and monitor the animal disease situation.

PART B: ACTIONS RE: RECOMMENDATIONS INTERSPERSED IN TEXT OF QQR REPORT (In May 1978, one year after the QQR, in response to a request by the Program Committee of the CIAT Board, CIAT managenent put together a list of all the recommendations in the QQR Report and commented briefly on what action had been taken by that time. A copy of that list, with additional current comments provided by CIAT, follows below.)

| Page | Paragraph | RECOMMENDATION | ACTION TAKEN <br> (as described in May, 1978) |
| :---: | :---: | :---: | :---: |
| $\begin{array}{r} 14 \\ (24 \end{array}$ | $\begin{aligned} & 43 \\ & 87) \end{aligned}$ | Strengthen cassava linkage with IITA. | The Directors General of both Centers are arranging meetings for discussion. |
| 18 | 58 F | Further collection of cassava and wild species. | Not yet implemented, but some collaboration is developing with Dr. Nassar in Brazil. |

A new agreement with IITA was signed in November 1978; however, this now needs updating. in spite of a number of meetings with the two successive Directors General of IITA, the nature and level of cooperation needs improvement.

Cultivated and related wild materials have been collected in coordination with IBPGR in Mexico and Paraguay, and national collections in Brazil and Peru have been added to the CIAT collection through meristem transfers. Further collection missions are now being planned to priority areas of diversity with IBPGR funding.

These experiments continue. See also \#7 in Part A of this Appendix.

## Much progress has been made in developing under preparation. improved storage technology for fresh cassava roots and village level chipping

 and drying methods.83 Storage of cāssava foliage (silage, etc.) and large-scale cattle feeding trials to be continued and exparded.

Pre?iminary investigations started; detaile studies wil? await recruitment of PDF or Visitir. S Scientists in 1979-80.

Some work on cassava silage--including silage with foliage--was conducted by the Utilization section of the Cassava Program before that section was eliminated in the budget cuts. Cattle feeding trials with cassava foliage were completed in 1978. Cattle feeding stalls dismantled and building converted for use by Sted Unit.

96 Expand information on the location and extent of different ecological areas in which beans are grown to aid in establishing priorities.

107 Acquisition of new greenho:use to expedite the136) safe introduction and despatch of germplasm.

112 The third Fhaseolus breeder ( $P$. lunatus) appointment should not be delaje $\bar{d}$ unti? 1980.

Competence in Base Data Analysis to be added. PDF to study ecologies, climate ctc. on bean prociuction with bean physiologist.

Special Plant Introduction greenhouse to be constructed adjacent to GRU. Plans drawn and bids have been let.
P. lunatus germplasm beirg actively assembled, collected and studied; 3 staff have peripheral interest.

115 Design course in production and multiplication of 29) clean seeds.

31117 Solving problem "x" in Beans: assign full-time staff member.
his capability to be included in future bean training courses, and will also be incluaded into new Seed Unit courses if and when funded.

Exhaustive studies in plant nutrition and pathology drew blanks; work by Biochemist strorigly indicates herbicidal residues and drift, esp. 2,4-D and atrazine.

35 -36 Experienced plant collector to be attached to Bean Agreement worked out with INIA and beans.
contractual arrangement made with C.L.A. Leakey to systematically collect in Mexico. Collection of collections is continuing.

Possibility currently under study-Management feels CIMMYT should be involved.

A total of 118 bean production microregions have been identified in Latin America. These serve as the basic units for the growing data base of edapho-climatic, agronomic and socio-economic information. This information is being utilized to define program objectives.

See \#10 in Part A of this Appendix.

The third breeder was hired, but work on $\underline{P}$. lunatus was limited to building up and evaluation (by a predoctoral student) of a modest germplasm collection. CIAT considers work on $P$. lunatus of low priority, but cooperation with other agencies could stimulate more work in future at CIAT.

Seed production and processing element are included in commodity training courses. See also \#6 in Part A of this Appendix.

A full-time staff member has not been assigned to this, as it has become much less of a problemprobably because we are chiefly using genetic material resistant to this syndrome-which remains a mystery. The problem now appears largely eliminated.

See \#9 in Part A of this Appendix.

Cooperation with CIMMYT has improved on this, but still needs iniprovement. This was discussed between CIAT's Bean Program Coordinator and the new Director of CIMMYT's maize program when he visited CIAT in early 1984.

ACTION TAKEN
(as described in May, 1978)

Suggests early emphasis on upland rice esp. disease resistance

41 160-2 Problems in Maize for beans and downy mildew nead to be addressed.

170 Suggest growing some collections in neutral environment (like Kew) for safety.

171 Conduct physiological and biochemical investigations outside the GRU on account of fire hazards.

175 Mentions soil and water management of hillsides (and fragile ecologies) for SSU.

48187 Comments on concern to concentrate too much effort at CIAT-Quilichao at expense of Llanos/ Cerrado.

49
188 Beef Program needs assured adequate back-up service in Biometrics, biocnemical analysis and greenhcuses.

Workshop held 1st week of Nov. 1977; constraints identified; specific proposals made to Program Committee.

Discussions underway with CIMMYT
(Sprague in Cali in Feb. '78).
Under consideration, especially in exchange of cassava germplasm with Africa/India.

All chemistry work will be undertaken in main laboratories (West wing).

Preliminary studies underway, but other priorities being considered.

Senior staff now living and working full time in Llanos (1) and Cerrado (3). Recruitment underway for ?egume àgronomist to be
assigned to Llanos, land at Quilichao now limited.

Except for greenhouses (being developed), coristraints not yet obvious in chemistry nor biometrics.

This has been implemented.

See commerts on 35-137, above. The downy mildew question is dealt with by CIMMYT.

Still under discussion. Beans are the most important problem area in this regard and we have been looking for third country quarantine for some years. It now appears that USDA Pullman, Washington will grow out African bean collections prior to entry of the seed into Colombia. Other opportunities may need to be found in other species from time to time.

Recommendation fully implemented.

Work currently limited to cassava (See \#7 in Part A of this Appendix. We are considering seeking special project funding for major research effort on hillside agriculture.

After initial surge of pasture research at Quilichao, level of activity levelled off as it was found that this location was not sufficiently representative of Llanos/Cerrado conditions for most work. Present balance seems appropriate.

Greenhouses built (see \#10 in Part A of this Appendix. Biometrics support services are adequate. Program Data basis being built using new Data Base Software (IDMS/Cullinane). Appropriate equipment for soil and tissue analysis have been purchased and methodologies adjusted for very acid soils and periodically controlled with other labs.

## ACTION TAKEN

(as described in May, 1978)

50189 Strengthening of forage agronomy and breeding is strongly supported; also work on other legumes, including Leucaena, is highly recommended; breeding objectives need to be clearly defined.

Active recruitnient underway for tropical forage agronomists; Visiting Scientist recently assumed responsibility for legume breeding, and has initiated work with Leucaena.

51190 Support major effort in Beef to study plant nutrient status in oxisols and ultisols, primary emphasis on $\underline{P}$ and $\underline{S}$; also Mo and $\underline{Z n}$.

Extensive studies currently underway; one third (9) of present staff were trained in soils science.

51191 Seed Production technology needs incorporation in training course.

Currently 5 (of 16) senior staff in Tropical Pastures Program (TPP) are forage agronomists One forage breeder is on board and a second is projected in the Long-Range Plan. Active breeding efforts carried out with Leucaena from Jan. $19 \% 8$ to Nov. 1982. This work continues at CPA.C/EMBRAPA for the Cerrados ecosystem in which areas of bettor soils in ecosystem in which areas of better soils which Leucaena can play a role are found. Best lines from CPAC will be tried in lesser acid soils/more fertile areas. Meanwhile, the progran is planning to obtain existing collections (Hawaii, CSIRO, and Mexicol to subject accessions to systematic screening for adaptation under low and moderate input conditions in the two major ecosystems (savannas and humid tropics).

Two current TPP staff are soil scientists conducting research on soil-plant nutrition, pasture establishment and nutrient requirements recycling with regard to major, minor and micro nutrients of individual species and mixtures under grazing. While most of their research is for the Llanos ecosystem, they monitor soil fertility and plant performance in regional trials with a network of soil labs using the same lab methods for oil and tissue analysis. In the Cerrados cosystem the Program had a full tine soil scientist until 1983 conducting similar type of research. Due to budget cuts CIAT phased of research. Due to budget cuts CIAT phased out this position and the scientist was hired by EMBRAPA but keeps very close linkages with the Progràm.

See comrnent on 3i-115. In addition, special pasture seed training courses are pianned or 1984 and 1986, complemented by workshops on pasture seed technology.
Page
Para-
graph $\quad$ RECOMMENDATION

ACTION TAKEN
(as described in May, 1978)
Recommendations have already been adopted; animal numbers are increased.
Bos indicus; advanced cattle management needs
study, including health.

54196 - Higher throughput of biochemical arialysis

- Mineral nutrition of cattle should be studied in context of soil-pasture-animal system flux
- Evaluate greater range of legumes over wider environments.
- Healthy, well-managed, high-quality cattle essential to research.
- Beef Program now requires time for uninterrupted progress.

206 Maintain the Swine unit within core budget.

208 Veterinary component of Beef remains strong
300) and direct towards relevant problems: (i) ? flux in cattle: (ii) Gl parasites and lungworms.

209 Strong recommendation on CIAT collaboration in broader studies of cattie diseases in LA to be supported by donors on a bilateral or internationa? basis, and to include the ecuromic analysis of iripaci of diseases and

Modern, batch-type lab equipment procured; consultant from NCSU contracted to present course on procedures.

Aspects are being considered and actively studied by Dr. Paladines.

Legume investigations expanding rapidly to Carimagua, Brasilia, Venezuela and elsewhere, with much longer numbers of entries.

Test herd is carefully chosen; subjected to advanced management; and health is continuously monitored.

Ojalá and Amen !!

Will be reviewed by CIAT's management, Program Comittee and full Board on 12 May, 1978

One veterinary scientist assigned full-time to monitoring of test heads; three ICA
veterinarians assigned to Carimagua (includes
Station Director), also a substantial animal health input by EMBRAPA at Brasilia.

The Title XII Conso:tium of U.S.Universities interested in animal health is developing a major program in which CIAT may have an active role. The $D G$ has also made contact wich relevant Eurupean institutions.

ADDITIONAL COMMENTS
(Feb. 1984)
nimals in test herd are representative of those found in the region, and breed of bulls are rotated between Cebu (Bos indicus) and riollo (Bos taurus) to maintain appropriate level of blood mix, and at the same time provide for animal standarization for experiments.

Current throughput adequate. In 1983, senior staff members were reduced by $20 \%$ due to buiget cuts.

Being studied by Nutrition Section of TPP.

Recommendation implemented.

4000 animals in herd from which test animals are selected.

Program objectives have remained stable and good progress has been made.

After thorough study and extensive discussions Board decided to discontinue Swine Unit.

See \#11 in Part A of this Appendix.

DG attended two planning meetings of consortium developing animal health CRSP to insure collaboration with CIAT. Project given lower priority than those which could be funded by BIFAD, to date.

ACTION TAKEN
(as described in May, 1978)

ADDITIONAL COMMENTS
(Feb. 1984)

61213 CIAT should exercise care in allowing too high
a proportion of research staff time be allocated to training activities.

63221 CIAT develops the means of monitorirg its con-
30 289) tribution to tropical agriculture.

72267 Cioser involvement, of Bionietrics in planning stage of investigations the data of which they wiil be involved with processing.
270 Encourages CIAT to assist national programs in experimental design-often a weak area.

272 Three additional greenhouses are required at CIAT-Palmira.

277 Designating senior, respected scientist as "spokesman" for their discipline to ensure their less-experienced colleagues have the benefit of their help and advice; and to foster inter-program cooperation. Each laboratory should have a scientist in charse.

75278 Management ard maintenance standards of greenhouses and potting sheds are "below standard".

Needs for training and staff time devoted to Staff time dedicated to training varies dependit will be monitored by Manaçement.

Staff time dedicated to training varies depen
ing on yearíprogram but it is being closely ing on year/program but it is being closely monitored by International Cooperation/Tra available and range between $8 \%$ and $12 \%$ depending on programs and year. Developinent of audio-tutorials have reduced staff time dedicated to routine lectures so that more could be spent on interpersonal contacts.

This is a primary responsibility of commodity This is being done by the program economists economists; also of the "Base Data finalysis" as an integral part of their work.
capability proposed to be added.

All scientific staff are urged to consult Biometrics when planning experiments.

Biometrics is included in appropriate training programs specific design guidelines for bean research has been prepared (Feb. 1978).

Plans drawn up for 3 additional greenhouses, improved hei thouse service complex and 3 fold increase in meshnouses.

Under consideration by Management; but extensive intra-disciplinary across-program consultation already occurs, particularly in economics, physiology, and eritomology.
Also the same disciplines share laboratories to foster this interaction. Laboratory needs are administered by a special conmittee headed by an "executive" chairman.

Well recognized! Total plans have been prepared to redevelop this entire area, expand construction, rationalize services, nechanize soil handling and provide ir:dependent assistance for this facility.

They are still being urged--and do utilize this service.

In addition, the TPP is doing research on grazing trial methodology. Network workshops contribute greatly to exchange of views in this area.

Done - See \#10 in Fart A of this Appendix.

No such formal step taken--but current informal procedures seem to be working well.

This has been fully implemented. The change in the quality of management and appearance of these facilities has been revolutionary.

ACTION TAKEN
(as described in May, 1978)

ADDITIONAL COMMENTS
(Feb. 1984)

76279 Improving throlighout of the Soils Laboratory; and more studies on water relationships for Beef, Cassava and Rice - requires soil physics expertise.

80287 The Centers should not be required to produce long-term "prescriptions" for separate programs.

80288 There should be a positive effort to integrate and classify regional information on ecology and economic activity.

81 290 CIAT must mainiy aim to train instructors.

More efficient systems and equipment already in use, water relationships of prime interest to each program and being activated in various ways, eg. through visiting scientists.

Two-year budget for 1978-79 has been prepared some revision appears necessary. our-year projections required by CGIAR appers about right.

New unit will be proposed to be responsible for Base Data Analysis Unit.

This is recognized, but is not that simple, and in-country training is already being planned by some programs.

Soils laboratory has been improved and services provided seem adequate. We see no reason to use scarce resources on a soil physicist.

Long-Range Plan completed in 1981. Suggested modifications have been prepared by each program and will be presented to Board after receiving EPR report.

Two staff positions were planned for the Agrcecological Study Unit in agrometeorology and in land systems. These positions were temporarily filled with visiting scientists from 1978 to 982. The first of these was finally included as a permanent core position in 1982. The second position is planned to be filled in 1985. The unit assists commodity programs in stratifying and defining macro and microecological regions using climatological and land systems common data and production systems and economic data collected by the respecive programs.

Forty-three in-country courses were organized by the respective countries since 1978 to 1983 with the assistance of CIAT. Current plans emphasize training of trainers for in-country and regional research courses; and for in-ccuntry production courses for participants from extension/ development programs. The training materials unit will have produced by April 1984 a total of 99 audiotutorial units and aims at developing other training materials for use in such ccurses as well as in Universities.

81 292-3 Avoidance of overdepletion of plant nutrients in soils with minimal input systems.

Major studies underway in Beef and Cassava; later in Rice and Beans. Two IFDC scientists are specirically foclissing their effort on phosphorus.

A11 programs are aware of this danger; and Station Managers are introducing special measures to reduce erosion and improve moisture retention through mulch cropping, bunding, contouring and ridging.

Soil-plant nutrition research is carried out on a continuous basis by the cassava and pastures programs aiming at low input systems. $P$ and mycorrhizal research aims at understanding interactions under low input conditions and to avoid overdepletion of critical nutrients such as $P$. Nutrient recycling studies under different input levels and soil management are currently studied for major ecosystems and are part of training courses.

Rosearch and training on agronomy Emphasize cultural practices for soil conservation and improvement in all commodity programs. Station operations Superintendent working with programs to continually improve scil conservation practices on CIAT Station and sub-stations.
Full time animal health scientist is monitor- In major screening sites animal health research ing test herds; ICA and EMBRAPA providing considerable more competence at the senior staff levels at Carimagua and Brasilia; metabolic profiles studies in conjunction with soils invastigations have been undertaken in the Llanos; other studies being done by Pasture Nutritionist at Quilichao and Carimagua.
is conducted by host institution scientists. addition, at Carimagua the program maintains two three junior veterinarians conducting animal management/pasture utilization research and monitoring animal health of test herds, since $P$ available from pasture intake varies with the composition of intake in terms of pastures and this varies with regions/systems, emphasis this varies with regions/systems, emphasis
is placed on training in minerai supplementation requirements and research.

## GLOSSARY OF ACRONYMS

| AVRDC | Asian Vegetable Research Development Center |
| :---: | :---: |
| CATIE | Centro Agronómico Tropical de Investigación y Enseñanza |
| CDA | Corporation for Development in Africa |
| CGIAR | Consultative Group on International Agricultural Research |
| CIAT | Centro Internacional de Agricultura Tropical |
| CIDA | Canadian International Development Agency |
| CIMMYT | Centro Internacional de Mejoramiento de Maiz y Trigo |
| CIP | Centro Internacional de la Papa |
| CNP | Consejo Nacional de Producción |
| CNPAF | Centro Nacional de Pesquisa em Arroz e Feijao |
| CNPMF | Centro Nacional de Pesquisa em Mandioca e Fruticultura |
| CPAC | Centro de Pesquisa Agropecuaria dos Cerrados |
| B/C-CRSP | Bean and Cowpea Collaborative Research Support Program |
| CSIRO | Commonwealth Scientific and Industrial Research Organization |
| EMBRAPA | Empresa Brasileira de Pesquisa Agropecuaria |
| EPR | External Program Review |
| FAO | Food and Agriculture Organization of the United Nations |
| FES | Fundación para la Educación Superior |
| GERDAT | Groupement d'Etudes et Recherches pour le Development de l'Agronomie Tropicale |
| IAC | Instituto Agronomico de Campinas |
| IARC | International Agricultural Research Center |


| IBPGR | International Board for Plant Genetic Resources |
| :--- | :--- |
| ICA | Instituto Colombiano Agropecuario |
| ICRAF | International Council for Research in Agroforestry |
| ICTA | Instituto de Ciencia y Tecnología Agricolas |
| IDB | Interamerican Development Bank |
| IEMVT | Institut d'Elevage et de Médecine Vétérinaire Tropicale |
| IFDC | International Fertilizer Development Center |
| IFPRI | International Food Policy Research Institute |
| IITA. | International Institute of Tropical Agriculture |
| ILCA | International Livestock Centre for Africa |
| INCAP | Instituto de Nutrición de Centroamérica y Panamá |
| INIA | Instituto Nacional de Investigaciones Agricolas |
| INIPA | Instituto Nacional de Investigaciones y Promoción |
| INRA | Institut National de la Recherche Agronomique |
| INTSORMIL | International Sorghum and Millet Program |
| INTSOY | International Soybean Program |
| IRAT | Institut de Recherches Agronomiques Tropicales et des |
| Cultures Vivriēres | Instituto Rio-Grandense do Arroz |
| IRTP | International Rice Testing Program |
| IVT | Instituut voor Veredeling van Tuinbouwgewassen |
| ODA | Overseas Development Administration |
| OFR | On-Farm Research |
| SADCC | Southern African Development Coordination Conference |
| In |  |

SEARCA Southeast Asian Regional Center for Graduate Study and Research in Agriculture

SDC Swiss Development Cooperation
TAC Technical Advisory Committee
TDRI Tropical Development Research Institute
TPI Tropical Products Institute
UNDP United Nations Development Program
USDA U.S. Department of Agriculture
WARDA West Africa Rice Development Association
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# CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH 

REPORT<br>OF THE<br>EXTERNAL MANAGEMENT REVIEW<br>OF

THE INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

Panel Members:
Michael Arnold (Chairman)
John Dearden

# CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH 

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September 12, 1984

Mr. S. Shahid Husain
Chairman
Consultative Group on International
Agricultural Research
1818 H Street, N.W.
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Dear Mr. Husain:
It is my pleasure to submit to you for consideration of the Group the report on the first external management review (EMR) on the International Food Policy Research Institute (IFPRI). This is the fifth management review conducted within the CGIAR and was held concurrently with the external program review of IFPRI.

The Group owes a debt to the board of trustees, the director and the staff of IFPRI for their cooperation and assistance in conducting the two reviews. Particular debt is also owed to Dr. Michael Arnold and Professor John Dearden who constituted the EMR panel.

The EMR panel has conducted a comprehensive and detailed assessment of management at IFPRI. In carrying out its review the EMR panel has worked closely with the EPR panel, and the conclusions and recommenations of the two panels by and large reinforce each other.

The overall impression of the panel about management at IFPRI is very positive. A number of factors have contributed to IFPRI's management effectiveness: a positive relationship between the board and the director; strong leadership; high caliber and well-motivated staff; an informal management style appropriate for the institute's size, purpose and stage of development; and excellent systems for accounting, reporting, financial analysis and internal control. IFPRI should be commended for these and the many other achievements noted in the report.

The panel's recommendations focus mainly on strengthening three aspects of IFPRI's management:
(1) organizational structure;
(2) management of human resources; and
(3) management of financial resources.

On organizational structure, the panel concludes that there is a growing need for greater delegation of authority and responsibility from the director, who has a heavy research, managerial and administrative burden, towards other managers in the institute. To accomplish this, the panel proposes the reestablishment of the post of deputy director, establishment of a management group and a research, appointments and promotions committee, and gradual delegation of responsibility for budgetary control to program directors who wish to accept such responsibility. Under the scenario proposed by the panel, the deputy director would be responsible for coordinating matters relating to the administration of research and for overseeing all support services for research.

On management of human resources the panel recommends the introduction of more systematic performance appraisal reviews and establishing policies that address the concerns of research assistants. It also encourages senior IFPRI staff to participate in management training programs and suggests that more consultation and greater visibility are needed in the processes leading to the selection and appointment of senior research staff.

In the financial management area the panel strongly emphasizes the need to improve core funding and cash flow--by increasing the number of donors contributing to its core program, by increasing its working capital, and by adopting a more conservative financial strategy in the future. The panel also illustrates the extent of IFPRI's dependence on special project funds, which in one research program have reached sixty percent of total direct costs in 1983.

The board and the management of IFPRI have been extremely receptive to the suggestions of the review panel. The board's response to the program and management reviews, which are attached, show that IFPRI has already set in motion the actions necessary for implementing most of the EMR panel's recommendations. For this, the institute's board and management should be commended.

In the consideration of both the program and management reviews, and of the budget for IFPRI in 1985, the TAC came to the conclusion that it would recommend increases in IFPRI's budget sufficient to overcome the funding crunch to which both reviews call attention. That program, if funded, includes provision for increasing working capital. In these discussions, the CG secretariat undertook, provided that IFPRI showed a real commitment to the building up of working capital, to use the financing facility of the World Bank to make up for short run liquidity problems in the meantime. We have since met with IFPRI management on this topic and have reached an agreement on an overall approach, under which the Bank will lend funds to IFPRI on a more flexible basis than is usual, and IFPRI will in turn share with the secretariat its financial plans and particularly the actions it intends to take to build up working capital.

In conclusion, we recommend that the Group take the following action in connection with the EMR of IFPRI:
(1) commend the board and management of IFPRI for their past achievements in building a well-managed institute and for their prompt actions in response to the recommendations of the EMR panel; and
(2) recommends to the Group to take account of IFPRI's need to build up working capital, as well as to increase its core program, in decisions concerning funding over the coming years.

The IFPRI management review report clearly shows that as a research organization grows, it needs to continuously adjust its management philosophy and system to the changing circumstances. IFPRI has done this successfully in the past, and, in part prompted by this review, plans to do so in the future. With such a positive attitude IFPRI should continue to be a well-managed institute.


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Attachments

# INTERNATIONAL <br> FOOD <br> POLICY <br> RESEARCH <br> INSITUTE 

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Response of the Board of the Trustees<br>of the<br>International Food Policy Research Institute<br>to the External Program and Management Reviews

The Board of Trustees was most gratified by the extraordinarily high quality of the External Program Review and Management Review Teams, their dedication to the complex task they faced, and the thoroughness of the review they conducted. In particular we are thankful for their willingness to participate in the long and arduous visits to a wide range of field sites in Asia and Africa. We also note the timing of the Reviews is propitious in terms of the stage of development and receptivity of the Institute.

The Board of Trustees is now responding briefly and broadly to the reviews as the first round in a continuing dialogue on these issues with the Technical Advisory Committee and the donor communities. This response deals not only with the substance of the reports but purposefully underlines IFPRI's current extremely difficult financial condition, the relation of this condition to the findings of the review teams, and the additional financial requirements necessary to preserve the achievements lauded by the review teams and to make the additional progress called for in the reviews.

Succinctly, the current financial problem is to support an uneconomically small core senior research staff with an excessively large proportion of special project funding. The basic need is to enlarge the core senior research staff by four persons and to provide support for them. It is clear from the Management Review that the Institute is in danger of severe retrogression without a substantial increase in core support in 1985. We emphasize that this situation has arisen from the need for IFPRI, as for any new institution, to grow until it reaches its minimum viable size. IFPRI has managed to do so through a level of special project funding, which is now recognized to be unsustainable.

The Board is gratified that the External Program Review clearly states the sharp focus of IFPRI's research and its substantial emphasis on both production and equity aspects. It also points to the process of interactions of the members of the Board of Trustees, the management staff, the research staff, and the user community in setting specific research priorities. The Board also welcomes the team's analysis of the geographic composition of IFPRI's research program and the recommendation that IFPRI's current efforts on Africa of less than 10 percent of IFPRI's total effort be increased to nearly 30 percent, while cautioning that there be no further reduction in the work on South Asia, given the low cost of research and the immensity of the food and poverty problems in that region. Further, the Board welcomes the team's understanding of the complexities and subtleties of IFPRI's outreach to and impact on policy processes, and it welcomes the team's proposal that the Institute prepare a biennial institute report for the CGIAR reflecting the state of food and agriculture as it pertains to the system's mandate.

The Program Review Team has made a set of recommendations that in effect call for a broadening of IFPRI's focus and approach. The Board fully recognizes the importance of the interaction of the set of issues to be accompanied by the broadening of approach. In response it expresses the following concerns and cautions:

1. IFPRI's current clear focus has been developed slowly and carefully to fit not only the exigencies of the food and poverty problems of developing nations but the special implications of IFPRI's presence in the CGIAR and the tightness of funding to the system as a whole. The Board therefore:
a) is concerned that a sense of urgency be preserved concerning the critical role of accelerating growth in food production in developing countries in meeting the income, consumption, and nutritional needs of the poorest people in those countries. In view of the special emphasis on poor people in IFPRI's mandate, the Board reiterates the need for research on the relation between agricultural growth and the growth in employment and incomes of poor people. The core of that work, in which IFPRI has been particularly innovative, needs further strengthening and broadening;
b) wishes to emphasize the vital role of IFPRI's credibility in maintaining the rigorous analytical approach for which it was complimented by the External Program Review Team. It is important that IFPRI not be interventionist, but rather that it play its role by adding to knowledge and bringing its findings to the attention of policymakers and analysts in an unbiased manner.
2. The Board welcomes the suggestions for broadening the focus of the six questions around which the research projects are organized but, again, is concerned that the present tight focus not be lost.
3. The Board welcomes the suggestions for broadening IFPRI's approach through staff additions assuming that IFPRI's strategic focus is retained and the financial implications are considered. The Board wishes to draw attention to the urgency of additions to the CG core budget in order to maintain the existing integrated program. Thus, the broadening of its disciplinary bases, the further outposting of staff, the strengthening of work in Africa and on fertilizer, and the development of the strategy work are all presented as broadening and strengthening efforts to be built on existing operations that themselves cannot be maintained without added funds. Both the External Program Review and the Management Review clearly state how extremely fragile and unstable IFPRI's core research program is at the present level of core financing.

The Program Review Team made specific recommendations concerning IFPRI's research program. The Board concurs with these recommendations as follows:

1. The broad concept of a program concerned with development strategy issues as they arise from and relate to food policy will add emphasis to an area we recognize to be important and will be advantageous from a management standpoint. The role this effort will have in defining the rest of IFPRI's research program is increasingly vital. How this area is to be defined is a complex and important issue, and the Board looks forward to tackling this issue itself and through its interactions with the TAC, the donors, the developing countries, and IFPRI staff. The Board recognizes that any further expansion and articulation of this work must be from its present well-defined focus and that the relation of this work to each of the other programs must also be taken into account. The Board wishes to take under advisement a title for this program, recognizing that too broad a title may lead to diffusion of the focus.
2. The Board concurs with the suggestion of a change in name and focus for IFPRI's Food Trends Analysis Program. It has requested the Director begin to explore such a shift with the various other interested parties.
3. The Board fuily concurs in the team's urging that the work of the International Food Trade and Food Security Program be more visible including its explicit inclusion in the six questions.
4. It is urgent that the work on fertilizer policy be strengthened.
5. The Board shares the concern of the team about the high proportion of core research conducted in the Food Consumption and Nutrition Policy Program that is financed from special project funds, but views this as part of the larger problem of the need to reduce special project financing of core research from one third of the budget to a maximum of 25 percent. It notes that to address the recommendation and concern of the Review, this requires increased core financing.

The bulk of the recommendations of the Management Review are so clearly in order that the Board has fully concurred that the Director proceed as quickly as possible in implementing them. In particular the Board has requested the designation of a more explicit management committee and its attention to personnel, staffing, and performance appraisal. The Director will report regularly to the Board on the implementation of these various recommendations.

Many of the Management Review Team's recommendations documented the weak financial base of the Institute, which has been a continuing concern of the Board. Earlier the Board had expressed its reservation about leaving the position of Deputy Director vacant, but felt it necessary to do so because of the even greater urgency of maintaining the research program. The team's articulation of the role of a Deputy Director is very helpful and reinforces the Board's view of the need for such a person.

Even more serious is the problem of working capital. The team's documentation of the problem is welcomed. The stated need for more capital equipment in the Information Services and Computer Services and administrative areas as well as the observation of the cramped space for the staff and its activities are valuable to the Board, which will take action as soon as finances permit.

Finally, the Board feels reinforced in its concern for the high level of special project funding, especially for key core programs. This, however, cannot be dealt with except through a substantial increase in core funding.

We look forward to a continuation of the high level of immensely valuable and constructive dialogue, and IFPRI's evolution to a stabilized position as a productive member of the CG system.

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## ACKNOWLEDGMENTS

The Panel was greatly helped in its work by the friendly reception and unstinting assistance accorded to it by the Director of IFPRI and its staff at all levels. The thorough preparation for the Review, undertaken by the Institute, was clearly reflected in the high quality of the briefing documents and the excellence of the field trips organized prior to the main review.

The Panel was assisted by Selcuk Ozgediz of the CGIAR Secretariat whose thoughtful guidance was always at hand. We are especially grateful to Marian Cole of IFPRI who so ably coped with the word processing for all drafts of the report.

## SUMMARY

The Management Review Panel has concerned itself with the working relationships, procedures and resources that enable IFPRI to function as an effective research institute. We have looked at the mechanisms used to determine its aims and strategies; the control over its affairs exercised by the Board of Trustees; the Institute's organizational structure and its methods for defining responsibilities; and the efficiency of its management of human and financial resources.

In general, we have concluded that the IFPRI staff at all levels are highly motivated, that they benefit from working as a closelyintegrated international team, that they are well led and that the style of management is appropriate for the Institute's size, purpose and stage of development.

Our suggestions and recommendations are made with a view to strengthening the mechanisms for internal review and communication that we consider essential to ensure that the productive working environment is not gradually eroded as the Institute matures.

## Mandate and Strategies

We have looked at the ways in which the mandate and strategies were determined and are kept under review. We were able to observe some of the processes involved at the level of the Board and at the level of the Institute. We conclude that the Institute is doing all that can reasonably be expected of it in order to take into account the wide range of ideas and circumstances that affect its research strategies; to communicate its conclusions to the developing countries; and to obtain feedback from them.

We have noted the steps that IFPRI is taking to foster good relations with other institutions both within the CGIAR system and outside it. There is obviously more to be done in these areas but the main requirement is for the time that it takes for the necessary process of evolution. Consequently, we see no need for mechanisms that are additional to those already in place or projected for the future, such as joint meetings, seminars, conferences and all the informal interaction that develop from them.

## Board of Trustees

As far as the Board of Trustees is concerned, we consider that the Board has served the Institute very well. In general, we detected a strong and positive relationship between the Board and the Director,
and adequate interaction between the members of the Board and the senior research staff. The way in which the Board functions, as well as the minutes of meetings, show that the Board gives clear guidance to the Institute on strategies for both research and finance; and that it maintains an appropriate distance from the Institute, in that its members do not become involved in the day-to-day affairs of the Institute. The length of service of individual trustees is kept under review by the Board.

## Organizational Structure

The present organizational structure of IFPRI has been arrived at through a process of evolution and is not a particularly unusual structure for small research institutes. It involves a complex matrix of informal working relationships that are highly dependent on personal initiative and goodwill. The basic organizational structure of four programs and six support services is supplemented by numerous loosely-defined groupings running across the main structure. The horizontal groupings do not relate directly to IFPRI's six research questions, but are influenced by them in that the questions determine the types of research project that are undertaken.

In our opinion, the close working relationships within the Institute largely obviate the need for many of the more formal procedures that are normal in larger institutions. Nonetheless, we detect areas where we consider that responsibilities are inadequately defined and areas where workloads are likely to become too great. Consequently, we see a need to move gradually towards a somewhat more systematic approach to communication, coordination and the definition of responsibilities.

## Management of Human Resources

In the management of human resources, for example, we detected areas where there are gaps in the procedures which, if not corrected, might lead to discontent or frustration in the future. Our main recommendation is that performance appraisal reviews be introduced into the management procedures of IFPRI and that they should cover all staff up to and including the senior research staff. It is clear that many of the staff are not familiar with the concept of performance appraisal and confuse it with the process of annual evaluation for purposes of promotion.

The more systematic and analytical approach to job satisfaction and efficiency that is introduced by performance appraisal is not very demanding in time, but represents a safety net for catching minor deficiencies in management before they develop into major ones. Before performance appraisal can be introduced, however, it would be necessary to familiarize the staff with the concepts and to arrange training for all appraisers. We have made suggestions along these lines, in the general context of involving some of the senior staff more gen-
erally in management training such as in the seminars on management issues planned by the CGIAR Secretariat. The fact that not many deficiencies have arisen in the present informal system of management is reflected in the generally high motivation and job satisfaction of the staff, although there were a few exceptions, notably among the research assistants.

We detected a need for more consultation and greater visibility in the processes leading to the selection and appointment of senior research staff, although we consider that the final responsibility for their appointment should remain with the director. Concerning the terms of appointment for senior staff, we have cautioned against moving too rapidly into offering indefinite terms of appointment to senior research staff. We recognize the need for continuity, but this has to be balanced against the need for change, and we consider that the present arrangements are appropriate having regard to the stage of the Institute's development.

We consider that the concerns of research assistants should be kept under review and we recommend that the Deputy Director be assigned responsibility for dealing with problems related to research assistants and for establishing policies for guiding and administering them.

## Management of Financial Resources

Regarding financial management, the routine procedures for accounting, reporting, analysis and internal control are excellent. Nonetheless we have drawn attention to cash management in relation to excess of expenditure over income; we have commented on the budgetary process and on the costing of special projects.

Regarding cash management, steps have to be taken to improve cash flow and to prevent the large shortfalls that occur at certain times of the year. The position of IFPRI is different from that at most other CGIAR institutions in that it does not have capital reserves on which to draw in times of difficulty. This disadvantage should be recognized by the CGIAR. We accept that some risk-taking, with regard to core funding, has been necessary during the development of the Institute to its present stage, but we consider that a somewhat more conservative policy should be adopted in future.

The Institute needs the greater stability and security of funding that would arise from having more donors willing to contribute to its core funding, and by having reasonable reserves of working capital. It should therefore augment its efforts to attract new donors and give higher priority to increasing its working capital.

Regarding the budgetary process and control of expenditure we consider that the Institute must move gradually towards decentralizing the research budgets, at least to the Program level. Because heavy involvement of the Program Directors in administrative matters would
detract from the productive working environment, we recommend that responsibility for administering the core budget for research be assigned to the Deputy Director and that, at his discretion, he further delegate responsibility for budgetary control to those program directors who wish to accept such responsibility. As far as special projects are concerned, the problems are different and our comments relate to the assignment of overhead costs and the effect that this can have on core funding.

## Support Services

We looked at the support services for research and administration. These are all working efficiently and are highly praised by the research staff. As far as the research support is concerned, there are some problems of priority of work that are not at all unusual on research stations. They are particularly important in relation to services such as computing. We consider that the coordination of work of the support services for research, and the resolution of competing demands from research staff, should be primarily the responsibility of the Deputy Director. For this reason we consider that the Heads of the support services for research should report to the Deputy Director, not to the Director as at present. Otherwise we have generally endorsed the suggestions made by the staff themselves. Thus we recommend that IFPRI employ a consultant to review the Institute's requirements for computing facilities and information technology and that meeting these needs should be accorded high priority in the internal allocation of resources. We also recommend that IFPRI formulate a procedure for approving and reviewing its operating manuals and ensuring that they are made available as soon as possible.

## Future Management of the Institute

Finally, we consider the overall management of the Institute and the implications of our proposals for the Institute as a whole. Although, in general, we endorse the informal style of management and we certainly do not want to disrupt the healthy and productive working environment, we have detected two trends that should be averted. One is that the Director is progressively being overloaded by involvement in the day-to-day management of the Institute. The other is that the Associate Director for Finance and Administration is progressively being drawn into research matters that should not be her primary concern.

We see two clear alternative ways of arresting these undesirable trends: one is to delegate far more authority and responsibility to the Program Directors; the other is to strengthen central management by re-installing a Deputy Director.

Because the Program Directors see themselves as research workers, not as administrators, and because everyone is anxious to preserve the basic style of management, we favour the second of these alternatives
rather than the first and recommend that the organizational structure be amended so that the heads of the support services for research report to the Deputy Director and that his or her responsibilities be re-defined to include a strong coordinating role in all matters relating to the administration of research and related activities.

We see the Deputy Director as being a professional researcher in his own right, with an involvement in the research of the Institute, but whose primary responsibility would be to assist in the central administration of the Institute as part of a central management group, comprising the Director, the Deputy Director and the Director for Finance and Administration.

We also consider that a modest degree of formality should be introduced into the administration and recommend that the Director's Advisory Committee be renamed the Research, Appointments and Promotion Committee and that it should operate on a more formal basis to resolve issues relating to research and the management of human resources.

## INTRODUCTION

This report summarizes the findings and the recommendations of the CGIAR External Management Review Panel of the International Food Policy Research Institute (IFPRI) in Washington, D.C. The External Management Review (EMR) was carried out during March 26 - April 6, 1984, concurrently with the External Program Review (EPR) of IFPRI. As the two Panels have worked closely throughout the review, the two reports are complementary. Both should be read for gaining an understanding of the effectiveness of IFPRI's research program and of its management.

Management reviews of CGIAR centers are still at an experimental stage. Following the reviews of CIP, IITA, WARDA and CIAT, this is the fifth management review conducted in a period of little over a year. Consequently, an important outcome of the review has been knowledge gained on ways of improving the methods of conducting mana gement reviews of the institutions within the CGIAR system. This knowledge is being communicated to the CGIAR Secretariat separately.

As in previous reviews, the management review of IFPRI attempted to achieve the following board aims:*
(a) to provide IFPRI's Board and management with insights into the management effectiveness of the Institute and ways of improving the effectiveness and the efficiency of the Institute's operations;
(b) to provide the Group with information on the management effectiveness of IFPRI and on problem areas that need to be addressed;
(c) to ascertain whether IFPRI's management is receptive to change and whether the administrative, financial and other management systems are designed and operating efficiently and in ways that enable the Institute's management to monitor progress, discover weaknesses and introduce corrective action;
(d) to identify management practices at IFPRI that may have broader application in the system; and

[^13](e) to identify elements or circumstances that have important positive or negative influences on IFPRI's efficiency and, where appropriate, to suggest constructive change.

In meeting these requirements, the Panel has limited its review mainly to the examination of the specific questions compiled by the CGIAR Secretariat in "List of Issues -- IFPRI External Management Review" (see Annex 1). The structure of the report is broadly related to the topics outlined in the List of Issues.

For the reader unfamiliar with IFPRI and its operations a descriptive summary is provided at the beginning of Chapter 1. The annexes contain biographical information on the panel members (Annex 2), the itineraries of the panel members (Annex 3), and a list of individuals interviewed (Annex 4).

## CHAPTER 1.

IFPRI'S MANDATE AND STRATEGIES: THEIR FORMULATION AND REVIEW

## Background

IFPRI was established in 1975 following discussions within the CGIAR. Funded initially by three non-governmental donors (the IDRC, the Ford Foundation and the Rockefeller Foundation), its primary purpose was to do work in those areas of socio-economic research that were beyond the scope of other CGIAR institutions. Two important areas of work were identified:
(i) the analysis of world data on food and
(ii) research on governmental policies affecting the availability of food in developing countries, particularly its availability to the poorest people.

In identifying these gaps in existing work, the founders of IFPRI stressed the need for objective reporting, unaffected by those political considerations that influenced the conclusions of other organizations doing similar work. The output of IFPRI was seen as a potentially valuable source of knowledge for those who formulate policies in developing countries.

By 1978 the Institute had assembled a professional staff of 21 and, on the basis of the "undiminished need for independent review and analysis of critical issues related to world food policy," it was accorded full sponsorship by the CGIAR. Its current mandate, which was approved by the Board in 1980, emphasizes its role in analyzing the effects of different policies on the availability of food, especially in relation to the needs of the poor and the alleviation of malnutrition. It describes the types of research required to fulfil this mandate, the strategies necessary to disseminate the research findings, and the contribution the Institute can make to training. The evolution of the mandate and strategies of IFPRI are described fully in the Report of the External Program Review (Chapter 2).

Research at IFPRI is administered through four "programs" or departments each related to food policy and concerned respectively with:
(i) trends,
(ii) production and development,
(iii) consumption and nutrition, and
(iv) trade and security.

Each of these "disciplines" requires specialist expertise, but most of the questions that arise in food policy require inputs from more than one of them. Accordingly, the research strategy has been guided by six questions that relate to:
(i) the rapid growth in imports of food in the developing countries,
(ii) the policies needed to encourage technological change,
(iii) the incentives needed to achieve growth and equity simultaneously,
(iv) the relative weights that should be given to different agricultural commodities,
$(v)$ the policies needed to alleviate rural poverty, and
(vi) the strategies required for greater security of food supply to the world's poorest people.

Selective intensification of research related to some of these six questions forms the basis of IFPRI's development plan for the 1980s, "Looking Ahead." It projects an increase in professional staff from 21 to 25 by 1986, with corresponding increases in funding for salaries, but minimal increases in the cost of overheads.

The plan predicts that IFPRI's research will assist policy-makers by providing:
(i) a basis for predicting rapid increases in imports of food and for estimating their composition;
(ii) guidelines for allocating resources to agricultural research among competing commodities;
(iii) policies for stocks of fertilizer and its supply, taking into account the needs of new technology in relation to faster rates of growth;
(iv) policies for improving the nutrition of rural people when the application of new technology leads to greater commerce in agriculture and consequent increase in exports;
(v) a basis for comparing the effects of high-yielding varieties on the alleviation of poverty, under irrigated and dry land conditions; and
(vi) policies for ensuring access to food, by both the urban and rural poor, that include rules for subsidizing food and for initiating schemes of rural employment, in circumstances that foster the application of new technology to food production.

These major aims, and the strategies designed to fulfill them, are formulated and kept under constant review through collective discussion, involving the research staff, the Director and the Board.

## Observations

IFPRI's mandate and research strategies are clearly understood by its staff and enthusiastically supported by those policy-makers whom the Panel met in the developing countries. IFPRI has reached the stage where it is beginning to receive wide recognition for research of high quality that is relevant to the immediate needs of developing countries.

Its strengths are perceived primarily as:
(i) its independence, in that it is not directly influenced by governmental pressures,
(ii) the relevance of its work, in that its research projects are sharply focussed on the needs of developing countries, and
(iii) the strength and motivation of its staff that arise from combining, in a single international group, individuals with a wide range of expertise and experience.

IFPRI also has opportunities for working in close association with researchers at other CGIAR institutions. No other research institution currently working on problems of food policy can muster a comparable combination of desirable attributes.

The process of collective discussion through which IFPRI's strategies are formulated is vigorous and dynamic. The strong consensus that is developed is seen as a self-regulating mechanism on staff who might otherwise allow their personal interests to deflect their research from IFPRI's central purpose.

The mechanisms used for defining strategies are also used to provide feed-back from developing countries. Careful thought is given to selecting members of the Board as well as individuals who are invited to attend conferences and workshops, so that a wide range of opinions from developing countries is continuously sampled. Moreover, the Institute makes good use of its location in Washington and the opportunities this provides for interacting with international personalities in relevant fields of work, both those resident in the various institutions in Washington and those on short-term assignments or visits.

Research proposals and findings are exposed to debate and criticism before initiation or publication, through internal seminars to which external specialists are invited. These seminars, the external seminars organized by IFPRI in the developing countries and the numerous other conferences, seminars and workshops in which the research
staff participate, all provide mechanisms whereby IFPRI remains sensitive to changing perceptions and research requirements. In addition, preparation for the External Program Review and participation in discussion with its panel members has enabled the staff to check and modify their insights into the problems they are tackling. Consequently, IFPRI's long-range plan is seen as a forward projection of current thinking, rather than as a project plan that must be rigidly adhered to.

## Evaluation and Conclusions

The Panel noted the complexity of the problems that IFPRI is tackling and their wide-ranging implications for policies affecting the availability of food to poor people in the developing countries. Having regard to the Institute's size and available resources, there is a limit to the extent to which it can reinforce its efforts to maintain the relevance and focus of its strategies. Against this background, the Panel commends IFPRI for the ways in which it remains alert to the problems it seeks to elucidate. As IFPRI gains in stature, however, it must guard against the danger of becoming authoritarian in its approach and must continue to ensure that it is a good listener as well as a good counsellor. One way of widening its contacts might be to exchange information on its programs for internal seminars with other institutions which are involved in similar and related fields of research, both outside and within the CGIAR system.

The Panel considered the question of the possible conflict of interest between IFPRI and other institutions working in similar fields of research. The management aspects of these relationships are concerned with the mechanisms used to encourage desirable interaction and those that might be necessary to identify and clarify possible areas of conflict, and hence to avoid their undesirable consequences.

From the limited ways in which the Panel could study the relationships between IFPRI and other institutions, we conclude that additional mechanisms are not required. The development of a new institute, such as IFPRI, is inevitably viewed by the staff of other institutions with some concern, in that they fear that the new institute may encroach on their perceived territory. Some misunderstanding is likely to arise until the benefits of co-operation override the fears of conflict. The Panel was told of some problems of this nature that had arisen in the past, but relationships are steadily improving and several areas of strong co-operation were described to the team.

Regarding relationships with other institutions within the CGIAR system, active co-operation is clearly strongest with IRRI, where an IFPRI member of staff is posted to the region. This mechanism is successful and economical partly because food policy in the ASEAN countries is dominated by rice. Posting of IFPRI staff to other regions, partly as a means of fostering closer co-operation with CGIAR institutes, is likely to be less cost-effective because of the greater
diversity of issues relating to food policy. It could not be contemplated without a substantial increase in IFPRI staff.

Although the Board and the Director are fully receptive to the need for greater cooperation with other CGIAR institutions, the reality is that the level of cooperation, as perceived by the staff themselves, has not yet developed very far. This comment applies, to a greater or lesser extent, not just to the IFPRI staff but to all staff in the CGIAR system. It arises both from the different roles of IFPRI and the other institutes, as well as from the different staff in the government services of the developing countries with whom the various CGIAR institutions wish to cooperate.

The Panel considers that relationships will continue to develop through an evolutionary process that is fostered by bringing together CGIAR staff to discuss issues of mutual concern. Some good examples of this process are provided by recent and proposed meetings. In March, 1984, IFPRI organized a workshop at ILCA on International Agricultural Research and Human Nutrition to which representatives from all the CGIAR institutions were invited. Delegates consisted of an approximately equal mix of social scientists and biologists. This workshop is to be followed by an IFPRI paper to be discussed with the Centre Directors at their meeting in June, 1984, with a view to transmitting a document for discussion by TAC. Other meetings are planned, such as an informal meeting at IFPRI of the CGIAR economists who will be visiting Washington in April, 1984, in connection with the CGIAR Impact Study. These types of meeting should assist IFPRI to clarify where greater cooperation is needed and to plan its work and the distribution of its staff accordingly. The Panel commends IFPRI for the action it is taking to strengthen cooperation with other CGIAR institutions.

## CHAPTER 2.

## THE BOARD OF TRUSTEES

## Background

The IFPRI Board of Trustees comprises 16 members, including the Director of the Institute who is appointed ex officio. One member is nominated by the host country and eight are appointed by the CGIAR. The remainder are elected by a majority of the Board. The unusual feature of the appointment of Board members, compared with other CGIAR institutions, is the large number appointed by the CGIAR itself. This proportion of 50 percent is necessary to fulfil the requirements under legislation in the USA for recognition of the Institute as a "Public International Organization Entitled to Enjoy Privileges, Exemptions and Immunities."

Members of the Board are chosen from a wide range of disciplines and countries. In addition to the social sciences, the biological sciences are also strongly represented. Half the members traditionally come from the developing countries and are chosen primarily for the contribution they can make to the discussion of issues relating to food policy. Typically, they hold high office in their home countries and are consequently limited in the amount of extra time they can devote to IFPRI business, over and above their attendance at meetings. Partly for that reason, the Board has concerned itself more with matters relating to programs than to administration. Indeed, IFPRI is the only CGIAR institute in which the whole Board functions as the Program Committee.

The Board meets twice a year. The February meeting, devoted mainly to program matters, is held in a developing country and is preceded by visits and meetings aimed at facilitating interaction between members of the Board and policy-makers in the host country. The annual general meeting of the Board is usually held in Washington in September.

The administration of IFPRI is monitored by the Board's Executive, Finance and Audit Committee which usually meets twice a year in association with the Board meetings. There is also a Nominating Committee and, since 1983, a Development Committee. These committees meet once a year in conjunction with the September meeting of the Board.

The Development Committee was established to "review IFPRI's relationship to its constituency and funding sources, and to foster interaction with the donor community. Particular emphasis would be placed on interaction with its European constituency." The committee
is to function for two years initially, after which its continuation will be reviewed.

The Bylaws of the Institute prescribe that trustees shall hold office for three years. This statement is not amplified or qualified, however, so that trustees may be re-elected and hold office indefinitely.

## Observations and Conclusions

From observation of one program meeting and study of the minutes of previous meetings, the Panel considers that discussion of program matters by the Board, though wide ranging, is sufficiently focussed to give strong guidance to the determination of strategies. For example, the Board had a substantial input into the formulation of the longrange plan. Moreover, its interaction with Program Directors and research fellows is vigorous and constructive. The meetings convened in developing countries enable members to gain a wider perspective of food policy issues and are regarded as extremely valuable. The practice of holding Board meetings in different developing countries is one that other Boards in the CGIAR system might consider, even though the costs of traveling would prevent large numbers of research staff from attending.

Discussion with members of the Board, and inspection of the minutes, suggest that financial and administrative matters are discussed fully by the Executive, Finance and Audit Committee before being presented to the full Board for further discussion. The Chairman of the Committee visits the Institute when meetings are held in Washington and communicates by telephone at other times. His appointment as Treasurer of the Institute was adopted by the Board in order to emphasize his availability to the Institute.

The current financial position is reported regularly to the Board and quarterly to the Executive, Finance and Audit Committee by the Director, with full supporting documents. The Board adopts contingency plans for possible short-falls in funding and determines dead-lines for implementing fall-back positions, should these become necessary.

Deficiencies in core-funding have forced the Board to accept a relatively high proportion of funding by special projects. Members are aware of the imbalance that funding through special projects has caused to its perception of the optimum balance of programs. The imbalance is particularly noticeable in the high proportion of extracore funding allocated to the Consumption Program. (These issues are discussed fully in the Report of the Program Review.) The Board considers that the position can be satisfactorily resolved only through the allocation of greater core-funding.

Although from a somewhat limited study of the minutes the Panel did not detect any gaps in communication between the Institute and the Board on financial matters, we consider that the Board should review whether it would be reasonable to expect the Chairman of the Execu-
tive, Finance and Audit Committee to visit the Institute more frequently in his capacity as Treasurer. In this connection the Board might wish to review the honoraria payable to its key officers in relation to the tasks expected of them, following the guidelines outlined in the draft paper prepared for the CGIAR Secretariat entitled: "Rules, Relationships and Responsibilities of Trustees of International Agricultural Research Centres." It might also wish to formulate guidelines for those who hold responsibilities, such as those of Treasurer, in future years.

The Board attaches great importance to the work of its Nominating Committee in identifying and attracting new Board members of high calibre. In considering the CGIAR guidelines for the term of office of Board members, the IFPRI Board has concluded that the advantages of continuity of membership may sometimes outweigh those of restricting members strictly to two, three-year terms of office. Consequently, the Board prefers to retain flexibility on this issue.

Table 2.1 lists the members since 1975, shows their country of origin, length of service and the composition of the various committees. It is clear that the Board has achieved a very reasonable balance between the need for continuity and the need for change in its composition. Nonetheless, in the light of the Report of the Second Review of the CGIAR, it would be prudent for the Board to keep this issue under review.

Minutes of meetings of the Board and its committees were made available to the Panel. They are comprehensive, clearly written and, with respect at least to the meeting in February, 1984, produced promptly.

The Board is very conscious of the need to widen its constituency of support. In this connection, the invitation extended to members of the CGIAR to attend a "visitors' day" preceding the Board meeting held in Washington in September, 1983, was valuable. Staff from African embassies in Washington were also invited and the main purpose was to discuss the outcome of a seminar held in Zimbabwe and co-sponsored by IFPRI and the University of Zimbabwe. The seminar formed part of a special project funded by the UNDP and the Government of the Netherlands and was entitled: "Accelerating Agricultural Growth in SubSaharan Africa." The idea of a visitors day represents one way of involving donors in IFPRI activities.

The Development Committee of the Board has been established specifically to strengthen IFPRI's relationships with the donor community. From discussions with members of the donor community, the Panel became aware of some misunderstanding that exists among them about IFPRI's role in the CGIAR system. The establishment of the Development Committee is therefore appropriate and timely.

The Panel sensed a strong and productive relationship between the Board and the Director and adequate interaction between the Board and senior research staff. It is clear that all enjoy mutual respect and

Table 2.1. Board of Trustees -- Historical Information

| Board Member | Country of Origin | $\underline{1975}$ | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | Total <br> Years | AssignmentsCurrent Members |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Ruth Zagorin | U.S.A. | $x$ | $\times$ | $x$ | x |  |  |  |  |  |  | 4 |  |
| Ralph Kirby Davidson | U.S.A. | x | x | x | x | x | x | x | x | x | x | 10 | Vice Chairman of the Board Chairman, E/F Comm. <br> Chairman, Nominating Comm. |
| Sir John Crawford | Australia | x | x | $x$ | $x$ | x | x | x |  |  |  | 7 |  |
| David Bell | U.S.A. | x | $x$ | $x$ | $\times$ | x |  |  |  |  |  | 5 |  |
| Morman Borlaug | U.S.A. | x | x | x | x | x | x | x | x | x |  | 9 |  |
| Ojetunji Aboyade | Nigeria |  | $x$ | x | x | x | x |  |  |  |  | 5 |  |
| Mohamed El-Khash | Syria |  | $x$ | $x$ | * | $x$ | $x$ | * | $\times$ | ${ }^{*}$ |  | 8 |  |
| Nurul Islam | Bangladesh |  | $\times$ | x | x | x | x | x | x | $x$ | x | 9 | Mominating Committee |
| Affonso Pastore | Brazil |  | x | $x$ | x |  |  |  |  |  |  | 3 |  |
| Andrew Shonfield | United Kingdom |  | $x$ | $x$ | $x$ | x |  |  |  |  |  | 4 |  |
| Puey Ungphakarn | Thailand |  |  | $\times$ | x |  |  |  |  |  |  | 2 |  |
| Lucio Reca | Argentina |  |  | x | x | x | x | x | x |  |  | 6 |  |
| Roger Savary | France |  |  | x | x | x | x | x | x |  |  | 6 |  |
| V.S. Vyas | India |  |  | x | x | x | x | x |  |  |  | 5 |  |
| Nocolas Ardito-Barletta | Panama |  |  |  |  | x | $\times$ | $\times$ | $\times$ | $\times$ | $\times$ | 6 | E/F Committee |
| Ivan Head | Canada |  |  |  |  | $\times$ | x | x | $\times$ | ${ }^{*}$ | ${ }^{*}$ | 6 | E/F Committee |
| Snoh Unakul | Thailand |  |  |  |  | x | x | $x$ | x | ${ }^{*}$ | ${ }^{*}$ | 6 | Mominating Committee |
| Lowell Hardin | U.S.A. |  |  |  |  |  | x | $x$ | x | *** | ${ }^{* *}$ | 5 | E/F Committee |
| S. R. Sen | India |  |  |  |  |  | $\times$ | $x$ | x | x | x | 5 | Thatriman of the Board E/F Committee |
| Dick de Zeeum | Netherlands |  |  |  |  |  | x | $\times$ | x | ${ }^{*}$ | ** | 5 | E/F Committee <br> Chairman, Development Comm. <br> Nominating Committee |
| T. Ajibola Taylor | Wigeria |  |  |  |  |  |  | $\times$ | $x$ | ${ }^{*}$ | ** | 4 | Nominating Committee |
| Philip Ndegwa | Kenya |  |  |  |  |  |  |  | $\times$ | ${ }^{*}$ | ** | 3 | Development Committee |
| Saburo Okita | Japan |  |  |  |  |  |  |  | x | ${ }^{*}$ | ** | 3 | Development Committee |
| Anne de Lattre | France |  |  |  |  |  |  |  |  | ${ }^{*}$ | ${ }^{*}$ | 2 | Development Committee |
| Eliseu Alves | Brazil |  |  |  |  |  |  |  |  |  | x | 1 | E/F Committee <br> Nominating Committee |
| Yahia Bakour | Syria |  |  |  |  |  |  |  |  |  | ** | 1 |  |
| James MCWilliam | Australia |  |  |  |  |  |  |  |  |  | x | 1 |  |

[^14]confidence in the Institute's potential for success. The Board gives clear guidance to the Director on research strategies and, under advice from the Executive, Finance and Audit Committee, monitors the financial affairs of the Institute. It does not become involved in the detail of the administration of the Institute, however, and maintains an appropriate distance from day-to-day management.

CHAPTER 3.

## ORGANIZATIONAL STRUCTURE AND DEFINITION OF RESPONSIBILITIES

## Background

IFPRI is a relatively small institute. Practically all of its staff, numbering about 80 individuals, are housed in somewhat restricted space on two floors of a single building in Washington. Its organizational structure and mechanisms for control and communication have evolved in an informal manner, reflecting the strong research interests and relaxed management style of the senior research staff.

The current organizational chart, prepared by the Institute, is shown on page 19. It illustrates the line management structure for the research programs and support activities. It does not indicate the staff responsibilities that run across the line management structure, giving a complex matrix of organizational relationships that are highly dependent on personal initiatives and goodwill. This matrix of working relationships, together with the collective input into the research strategies described in Chapter 1, is frequently referred to at IFPRI as a "collegial" approach.

Under the present structure the program directors report to the Director. The heads of the support services report, for administrative matters, to the Associate Director for Administration and Finance, but to the Director for matters pertaining to research. The Deputy Director was seconded to ISNAR in 1982 and the position has, in effect, been vacant since that time.

The Director's Advisory Committee meets informally once a week and forms an important part of the mechanism for communication among the most senior staff. Minutes are not recorded, however, and the Panel was not able to review the work of the committee in detail.

The individual research projects are determined in relation to the six questions that relate the four programs to food policy (see Chapter 1). The questions do not in themselves constitute the research projects. Rather, they are used to define smaller projects, each of which is relevant to, but does not totally embrace, one of the questions. Consequently the six questions do not have any direct relevance to the organizational structure.

## Observations

The Panel considers that the strong team approach at IFPRI contributes greatly to the motivation of staff at all levels. The close

IFPRI ORGANIZATIONAL CHART

working relationships it engenders largely obviate the need for bureaucratic procedures that would inhibit prompt action and lead to frustration. Nonetheless, as IFPRI has expanded, a number of undefined areas of responsibility have arisen that may or may not be entirely filled through personal initiative and goodwill. As IFPRI continues to mature as an Institute, it will need to review its organizational structure and procedures to ensure that any gaps in the definition of responsibility are detected before they lead to inefficiency and discontent.

The senior research staff are strongly opposed to the introduction of procedures that imply greater bureaucracy. The majority do not wish to spend time on the paperwork of administration nor, in general, do they wish to become more deeply involved in management, even at the level of Program Director. With few exceptions, they see the absence of delegated responsibility for the management of budgets and expenditure as desirable and to constitute a valuable mechanism for freeing them from concerns that might otherwise divert them from their role of stimulating and doing research.

## Conclusions

In the context of a small institution, the Panel sees the merit of these arguments and would not suggest changing the present style of management in any substantive way. Nevertheless, to prevent gaps in responsibilities from arising, the Panel considers that action should be taken to ensure a more systematic approach to mechanisms for internal communication and the definition of responsibilities. We develop this analysis and make recommendations in subsequent chapters of this report.

## CHAPTER 4.

THE MANAGEMENT OF HUMAN RESOURCES

## Background

The management of human resources at IFPRI can best be analyzed by examining the component parts of the organization, which are: the senior research staff, the scientific support staff, the senior administrative staff, and the administrative support staff.

Senior Research Staff. The senior research staff include research fellows and post doctoral fellows. Most decisions concerning the senior research staff are made by the Director. The Director makes the final decision on all senior research staff appointments, sometimes in consultation with the program director concerned. The Director evaluates all senior personnel and he alone determines their compensation and merit increases. No feedback is provided on the reasons for a merit increase. There is no direct performance appraisal, in that the Director and the researchers do not meet to discuss specifically the performance of the researcher. The senior research staff are all appointed for specific terms, ranging from one to five years.

Communication between the research staff and the Director and among senior research staff is informal with two exceptions: the Director's Advisory Committee (DAC) and regularly scheduled Friday meetings in the Consumption Program.

Scientific Support Staff. The scientific support staff include research assistants and computer programmers. Each senior research fellow is entitled to one-half of a research assistant's time. Research assistants are assigned to a program and, within the program, they are assigned to individual research fellows. Research assistants may be hired, evaluated, assigned, and terminated by the program director, in consultation with the research fellow, where appropriate. Research assistants are typically appointed for short periods, one or two years. There is a formal system of annual evaluation for research assistants, which is adequately documented.

Senior Administrative Staff. The senior administrative staff consist of the Associate Director and the heads of the six support services. The head of accounting services and the personnel and office manager report directly to the Associate Director, the other four heads of services report to her only for administrative matters and to the Director for matters pertaining to research.

The Director makes the final decisions on appointments of the senior administrative staff, in consultation with the Associate Director for Finance and Administration. He evaluates them and determines their merit increases in consultation with the Associate Director where appropriate. As with the senior research staff, there is no formal system of performance appraisal.

Administrative Support Staff. Administrative support staff include editors, assistants, typesetters, word processors, accounting assistants, secretaries, receptionists, and messengers. The administrative support staff are formally evaluated each year and this evaluation is documented. They are eligible for merit increases on their anniversary and a cost of living adjustment on January 1. Their compensation package is at least competitive and may be slightly above average because of favourable fringe benefits at IFPRI.

## Observations

Senior Research Staff. Everyone in the research area with whom the Panel talked was enthusiastic about the collegial atmosphere that exists at IFPRI. Most expressed the belief that it is conducive to maximum output and job satisfaction. Most believe that the quality of their fellow researchers is high, that there is free communication and that there is little, if any, friction. All believed that the research atmosphere at IFPRI is a major factor in IFPRI's ability to recruit and retain top research staff. All expressed a very positive degree of job satisfaction. All indicated the highest regard for the Director both as a researcher and as a colleague, and found him reasonably available. In short, the picture presented to the Panel was one of a highly productive and very satisfied group of researchers.

The Panel considers that responsibility for search and recruitment of senior research personnel should be broadened to include, on a formal basis, more members of the staff. Although the final decision on employment must rest with the Director, there is a need for greater consultation with Program Directors before the appointments are made. Moreover, in view of the fact that vacancies are not advertised, it is desirable that the search for new staff is seen to be wide and objective.

At present, all senior research staff are appointed for a specific term, usually between one and five years. The Director has asked the Panel to consider the appropriateness of having some appointments for an indefinite period of time because it is desirable to have continuity in the research staff. This policy also has an advantage in recruiting staff because some people are reluctant to give up a permanent position to accept a temporary one. The disadvantage is that it is a simple matter to terminate a person at the expiration of a term appointment, while there can be considerable legal problems in terminating a person hired for an indefinite term.

On balance, the Panel considers that the disadvantages of indefinite appointments outweigh the advantages at this time and that IFPRI should maintain the present practice of offering only term appointments. Where appropriate, the Director can always assure a candidate that he intends to keep him or her on indefinitely. The Panel is also concerned that, if an indefinite appointment were an option, many people on term appointments would be unhappy and there would be pressure for indefinite appointments for all staff.

Scientific Support Staff. The only group of people at IFPRI that the Panel found to be discontented were the research assistants, a fact that is well-known to the administration. The disatisfaction arises from several causes. First, the scientific support staff have an ambiguous position in the organization. They are more highly paid than clerical staff, yet most can never hope to be promoted to research fellow. There is, in effect, no clearly-defined career path. Second, some research fellows are more satisfactory to work for than others. Since the relationship between the researcher and the assistant is the most important single factor in job satisfaction, it is inevitable that some of the research assistants will be unhappy. Their condition is made worse in some instances because most research assistants work for more than one researcher. Third, many of the research assistants are overqualified for the particular jobs they are asked to do. Fourth, the final resort for dealing with most of their problems is the Director. Since it is inappropriate for the Director to have to deal with their concerns except on a policy level, there is a visible gap in the communication process and this creates a leadership vacuum. Research assistants for the most part are not part of the collegial atmosphere and, thus, they require a more structured administration.

The Panel understands that methods to alleviate the problems of the research assistants have been under consideration for over two years. It is the opinion of the Panel that the problems have become acute because no one in the organization, except the Director, has the authority to address the job-related concerns of the research assistants as a group. Someone on the research side of the Institute is needed, not only to address the specific needs of the research assistants, but to review policies for recruitment, promotion, compensation, assignment and so forth.

Senior Administrative Staff. All the senior administrative staff are highly motivated and enjoy good relations with the research staff. Direct interaction with the Director and Program Directors is variable and some gaps in communication were detected. Job satisfaction was generally high but might be improved in some instances by greater interaction with the senior research staff.

Administrative Support Staff. There are two problems that the Panel observed in the management of the secretarial staff. First, each research fellow is entitled to one-quarter of a secretary's time. This inevitably leads to problems of uneven workloads both because researchers vary in the amount of secretarial time that they require
and, also, because the timing of research effort may be uneven. This results in periodic work overloads for some secretaries at certain times and underloads for others. On the basis of interviews with the staff, the Panel estimates that, on average, $75 \%$ of the secretaries' time is spent in typing. The second difficulty occurs because the secretaries, as a group, have no individual to address their common problems. The circumstances are similar to those encountered by the research assistants.

## Conclusions and Recommendations

Performance Appraisal. While not wishing to disrupt the collegial atmosphere (see also Chapter 7), the Panel considers that job satisfaction at all levels of staff could be raised even higher through the introduction of a modest degree of formality into the entirely informal atmosphere that currently exists at IFPRI. Structured discussions between staff and more senior members of management, such as those that form the basis of "performance appraisal review," can have benefits that are not always achieved through entirely informal communication. Concerns may be expressed during formal interviews that might not be expressed during normal working relationships. There are also opportunities for more penetrating analyses of ways of achieving desired goals. In our view, the process of performance appraisal is a necessary and positive part of management procedures.

Accordingly, we recommend that performance appraisal reviews be introduced into the management procedures of IFPRI and that they should cover all staff up to and including senior research staff.

In order to implement this recommendation the Panel suggests that the Institute obtain professional assistance in setting up a system for performance appraisal. It will also be necessary to ensure that staff assigned the responsibility for appraisal are adequately trained in the accepted techniques.

Management Training. The Panel noted that the Institute has no structured program for management training. In addition to the need for training in methods of performance appraisal, the Panel considers that senior staff would benefit from wider exposure to management issues. Senior staff should be encouraged to participate in management seminars such as those proposed by the CGIAR Secretariat, and to attend courses to improve their management skills, where appropriate.

Support Staff. The problems of job satisfaction and career development, that were expressed to a greater or lesser extent by various categories of support staff at IFPRI, are common to most research institutes. There is no easy solution to them. The process of performance appraisal would help to identify particular problems on a regular basis. It is possible that some re-organization might also help.

With the secretarial staff, for example, it might be worth assessing whether the problem could be alleviated by assigning one secretary to each research program and organizing the remainder on the basis of a secretarial pool. With the more general use of word processors, a scheme of this kind might have advantages in smoothing out the demand for work and improving job satisfaction. The Panel considers that the maintenance of an overview of the concerns of all secretarial staff is desirable and that this responsibility should be assigned to the Personnel and Office Manager.

As far as research assistants are concerned, it may be necessary to review the standards of recruitment in relation to job prospects. We consider that the concerns of research assistants should be kept under review and we recommend that the Deputy Director be assigned responsibility for dealing with problems related to research assistants and for establishing policies for guiding and administering them.

CHAPTER 5.

## MANAGEMENT OF FINANCIAL RESOURCES

## Background

The Director has final authority for the management of IFPRI's financial resources. The administration of financial affairs is the overall responsibility of the Associate Director for Finance and Administration, supported by the section for accounting services, which is staffed by a controller, an accountant and a bookkeeper. The Chairman of the Executive, Finance, and Audit Committee of the Board serves as Treasurer.

Financial management at IFPRI includes the budgetary process, cash management, contract management, and accounting services. The Associate Director and the Controller prepare the budgets and financial reports that are sent to the Director and to the Board of Trustees. The Controller is responsible for the accounting services and for the supervision of the accounting staff.

The financial plan for the ensuing year is submitted for approval to the Board in September, following the receipt of the approved core budget from the Technical Advisory Committee of the CGIAR. Subsequent to approval of the budget, the accounting services provide monthly statements showing the actual expenditure compared with the budgeted amounts assignable to the period being reported. Financial reports analyzing the financial status in depth are reviewed by the Director on a quarterly basis. These reports compare actual expenditure for the period with the forecast. Each quarter the Director is provided with an updated forecast of the balance for the year.

The controller prepares subcontracts and other agreements initiated by IFPRI and is also responsible for meeting the contractual requirements of special projects and for providing those responsible for special projects with current levels of expenditure.

In addition to financial planning and contract control, the controller is responsible for the usual accounting functions, such as the maintenance of the general ledger, the preparation of financial statements, cash management, and liaison with the external auditors.

## Observations and Conclusions

The Panel reviewed the financial reports and procedures and discussed the system for accounting and internal control with the
external auditors. In former years, IFPRI has experienced problems with both the accounting records and the system of internal control. Beginning in 1982, corrective action was started. It is our opinion that the problems experienced in former years have now been entirely corrected. The Panel considers that the accounting, reporting, financial analysis, and internal control are excellent. The manning of these functions (a controller, an accountant and a bookkeeper) is minimal but adequate. Nevertheless, we identified the following areas in which financial management could be strengthened: cash management, particularly with respect to the excess of expenditure over income, the budgetary process, and the costing of special projects.

Cash Management. In the Panel's opinion, cash management should be improved and expenditure should not continue to exceed income. Because these two areas are interrelated and are the result of the same circumstances, we discuss them together.

The problem of cash management occurs because at certain times the required disbursements of cash exceed the amount of cash on hand. This is particularly true in the early part of the year. For example, in 1982 and 1983, the proportion of the core income received during the first quarter was $17 \%$ and $16 \%$ respectively, compared with a need of $25 \%$. The cash shortfall amounted to $\$ 240,000$ in 1982 and $\$ 300,000$ in 1983. As a result, it was necessary to defer some disbursements and to borrow money from commercial sources as well as from the World Bank, in order to buffer the differences in timing between receipts and payments.

Expenditure has exceeded income for the past two years by $\$ 35,943$ in 1983 and $\$ 22,302$ in 1982. Although these amounts are not large, the potential for a much greater shortfall exists. Furthermore, a shortfall can necessitate emergency measures at the end of the year to minimize its effects.

There appear to be three reasons why expenditure has exceeded income in the past two years. First, there is considerable uncertainty with respect to the potential income in any particular year, resulting from two causes: the relatively small number of major donors and the heavy reliance on special project income. With a small number of donors, a difference between the amount expected and the amount actually received could have an important impact on the funds available. Also, as described above, the timing of the receipt of contributions can affect the cash balance.

Second, the management at IFPRI has chosen to adopt a "risky" financial strategy in that forecasts of income have tended to be optimistic, whereas forecasts of expenditure have included little allowance for unplanned commitments. This strategy has proved successful in the past because a more conservative policy would have resulted in less research. Further, the financial situation at IFPRI has been carefully monitored by the Board to ensure that any shortfall would not exceed clearly-defined limits.

Third, compared with other CGIAR institutions, IFPRI has only a very small capital budget. Consequently, it has negligible internal resources that can be used to buffer the effects of variable cash flow. Members of the CGIAR should take this into account when reviewing IFPRI's budget.

Although the financial strategy of IFPRI has proved successful in the past two years, it is the opinion of the Panel that it should gradually become more conservative. First, IFPRI should specifically plan for income to exceed expenditure each year until it has a sufficient cash reserve to buffer adequately the timing differences between income and expenditure. Second, planned expenditure should include greater allowances for contingencies.

In addition, IFPRI should make a concerted effort to increase the number of donors. The Panel realizes that this is easier said than done and we recognize that considerable effort along these lines has already been made. Now that IFPRI has developed to the point where increased donor participation is feasible, however, the Panel considers that the importance of increased donor support justifies a structured plan of action with broad participation by appropriate staff and Board members. Accordingly we support the inauguration by the Board of a Development Committee (Chapter 2).

The Budgetary Process. The Panel considers that the budgetary process and subsequent reports of actual receipts and payments compared with budget forecasts are very good. There is, however, a somewhat unusual feature in financial management. That is the high degree of centralization in financial planning and control.

Within the support area, Heads of sections participate in the budget preparation and are held responsible for, staying within their budgets. For the research work, however, budgets are not even prepared by program. Consequently, the Program Directors have no responsibility (in fact little input) into the budgetary process for core funding in their programs and no reports on their expenditure relative to budgetary allocations. Most Program Directors are satisfied with this arrangement because it minimizes the time spent on administrative matters.

This lack of delegation is seen as part of the Director's strategy to minimize the bureaucracy at IFPRI. It is the Panel's opinion, however, that decentralization should gradually be incorporated into the budgetary process. Consequently, we recommend that responsibility for administering the core budget for research be assigned to the Deputy Director and that, at his discretion, he further delegate responsibility for budgetary control to those Program Directors who wish to accept such responsibility. Although budgetary control of core projects may be premature at present, it is our opinion that, as budgetary control is decentralized, IFPRI should gradually move towards analysis and control over core funding at the level of individual research projects.

Control of Special Projects. In addition to the uncertainty of the income from special projects, described in a previous section, there is also a problem with the allocation of overhead costs. Cost accountants typically classify costs into three categories:
(i) "direct" costs, which include all costs that would not have been incurred had the special project not been undertaken, such as salaries, computer time and travel expenses;
(ii) "common" costs, which include all costs that would not have been incurred had no special projects been undertaken, such as occupancy costs and support costs, that are related to the level of activity; and
(iii) "joint" costs, which include costs that are not affected by the level of activity, such as the cost of the Director's office.

The distinction between direct costs and common costs is in timing. The former vary immediately with the level of activity; the latter with the level of activity over a longer period of time.

The funding of a special project should always include direct costs, usually include common costs, and sometimes include joint costs. Clearly, there is a net out-of-pocket cost if all direct costs are not funded and this amount will have to come out of core funds. To the extent that common costs are not funded, there will be a longrun shortfall that will have to be covered by core funding. To the extent that the overhead allocation includes joint costs, the special project will contribute to core funds.

The Panel has examined the overhead allocation rates used by IFPRI and concludes that they are reasonable approximations of common costs. (Direct costs are charged directly.) These rates are charged where indirect costs are accepted by the contracting organization. One difficulty with special projects at IFPRI is that some contracting organizations accept no overhead allocations. Superficially it might appear that such special projects should never be undertaken. There are, however, mitigating circumstances that make undertaking such projects desirable. For example, in a joint project the other participant may pay the entire amount of some direct costs such as computer time or consulting. In other instances, a special project may directly support a core project. The merits of each project must be decided individually and, therefore, an across-the-board policy proscribing the acceptance of special projects that do not fund overhead costs is inappropriate. Table 5.1. shows an analysis of direct research costs by program. Overall, the proportion of these costs funded through special projects in 1983 was $35 \%$, with the highest proportion ( $60 \%$ ) in the consumption program. We conclude that IFPRI is justified in undertaking special projects that may not fully fund common costs but that such projects should be carefully screened to insure that core funds are not being used to supplement them without at least a corresponding benefit.

## Direct Research Costs by Program

|  | 1983 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Consumption |  |  | Production |  |  | Trade |  |  | Trends |  |  | Total |  |  |
|  | Core | Spectal Project | Iotal | Core | Special Project | Total | Core | spectal Project | Total | Core | spectal Project | Total | Core | Spectar Project | Total |
| Salaries | \$255,271 | \$166,672 | \$421.943 | \$478,561 | \$105,181 | \$583,742 | \$281,963 | \$ 51,827 | \$333,790 | \$221,855 | \$54.415 | \$276,270 | \$1,237,650 | \$ 378,095 | \$1,615,745 |
| Benefits | 71,312 | 46,239 | 117,551 | 133,690 | 29,180 | 162,870 | 18.769 | 14,378 | 93,147 | 61,976 | 15,096 | 71,072 | 345,747 | 104,893 | 450,640 |
| Field/Collaborative Research | 3,050 | -- | 3,050 | 80.544 | -- | 80,544 | 18,700 | -- | 18,700 | 3,000 | -- | 3.000 | 105,294 | -- | 105,294 |
| Consultants/Subcontractors | -- | 168,436 | 168.436 | -- | 46,850 | 46,850 | -- | 25,450 | 25.450 | -- | -- | -- | -- | 240.736 | 240,736 |
| Travel | 24,551 | 135,216 | 159.767 | 85,105 | 31,873 | 116.978 | 27.430 | 25,464 | 52,894 | 8.893 | 2.000 | 10.893 | 145.979 | 194,553 | 340,532 |
| Computer | 47,691 | 82,847 | 130,538 | 68,340 | 14,653 | 82,993 | 20,587 | 22,176 | 42,763 | 3,035 | 10,201 | 13,236 | 139,653 | 129,877 | 269,530 |
| Total | \$401,875 | \$599,410 | \$1.001,285 | \$846,240 | \$227.737 | \$1,073,977 | \$427,449 | \$139,295 | \$566,744 | \$298,759 | \$81,712 | \$380.471 | 81,974,323 | \$1,048,154 | \$3,022.477 |
| Ratio of Core and Special Projects within Programs | 40\% | + 60\% | - 100\% | 19\% | + 218 | = 100\% | 75\% | + $25 \%$ = | - 100\% | 79\% | + 21\% | - 1008 | 65\% | 35\% | 100\% |
| Ratio of Core Costs by Program | $20 \%$ |  |  | 43x |  |  | 22\% |  |  | 158 |  |  | 100\% |  |  |
| Ratio of S.P. Costs by Program |  | $57 \%$ |  |  | 22. |  |  | 13\% |  |  | 8x |  |  | 100\% |  |
| Ratio of Program Costs to Total |  |  | $32 \%$ |  |  | $36 \%$ |  |  | 19\% |  |  | 13\% |  |  | 1008 |

CHAPTER 6.

## SUPPORT SERVICES

## Background

The six support services include accounting, personnel and office, library, computing, information and seminars. The head of accounting services and the personnel and office manager report directly to the Associate Director, the other four heads of support services are coordinated by her for administrative matters, but report to the Director for matters pertaining to research. The work of the accounting section was described in Chapter 5 . The functions of the other support services are described briefly below.

Personnel and Office Management. The section providing personnel management and office services currently involves a staff of four. The personnel manager is responsible for recruiting and hiring support staff and for coordinating the hiring and relocation of senior research and senior administrative staff. IFPRI's comprehensive benefits program is also administered by the personnel manager. Office management functions include support services to staff, such as providing supplies, equipment, office space, and other administrative services.

Library Services. The library provides information to the staff through interlibrary Toans, current awareness and reference services, and through the regular acquisition of publications in the fields of agricultural economics and rural development. The library contains over 3000 research reports, 3000 monographs, and 165 periodicals. Geographically, the collection covers the Third World, especially India, China, Southeast Asia, and Sub-Saharan Africa.

Computer Services. The computer services department provides IFPRI research personne1 with computational advice and programming assistance. Since a large part of IFPRI's work is quantitative, computing services are particularly important and all programs are dependent on them. Currently, a staff of three provide technical support and training for some 28 research economists (some of whom are parttime) and 16 research assistants. Questions of priority are determined on the basis of common sense and negotiation with the individuals concerned.

Information Services. IFPRI publishes a series of research reports, a series of abstracts of the reports, a newsletter, an annual report, journal reprints, and other miscellaneous material. These
publications are distributed to 6,600 individuals, government officials, members of national research agencies, institutional and educational libraries, and international organizations concerned with food policy and agricultural development.

Information services are provided by a staff of seven, including the department head, two editors, an editorial assistant, an information assistant, a typesetter and a word processor. In addition to the full-time staff there are, on a part-time basis, one free-lance artist, two free-lance translators (Spanish and French), and a freelance editor.

Policy Seminars Program. IFPRI disseminates its research findings to administrators and policymakers and others who influence national and international food policy by publishing important research findings, and by convening national and international conferences, seminars, and workshops. In June 1982, IFPRI created the Policy Seminars Program with the purpose of facilitating the flow of information generated by IFPRI research to decision-makers in developing countries. The Policy Seminars Program has a staff of two.

## Observations

The quality of the support services was universally praised by members of the research staff in response to questions by members of the Panel. Even where it was believed that the service was not as prompt as would have been preferred, it was stated that the people were good but that there were not enough of them. Regarding the administrative services, a generally expressed need by the senior research staff was for more easily accessible information on routine administrative matters, such as travel arrangements and expense allowances.

Heads of several of the support services mentioned the potential benefits to be derived from greater investment in computers and information technology, for which they had already made provisional proposals.

Within the section covering personnel and office management, separation of the responsibilities of the personnel manager from those of office supervision has been under consideration as a means of covering gaps in the existing structure. This section carries a heavy load of day-to-day responsibilities with the consequence that longer-term projects, such as the preparation of administrative manuals, have not yet been completed.

## Conclusions and Recommendations

The Panel commends the staff of the support services for their competence and dedication and for the excellent rapport they have established with the senior research staff. Although, in the allocation
of resources, the support services have usually taken second place to the main research programs, the support services are now adequately, though minimally, staffed. Nonetheless, the Panel considers that efficiency and output could be increased by a relatively modest increase in investment in computer facilities and information technology. We also consider that some organizational and operational changes are desirable.

Computer Facilities and Information Technology. A preliminary study has been made by IFPRI staff to evaluate the feasibility of acquiring a mini-computer for the computing services, instead of hiring computer time in a nearby building, as at present. The Librarian has expressed a need either for a micro-computer or for access to a computer to assist with cataloging and retrieval. A similar requirement for access to computing exists for the accounting section. An additional need in the Library is for a terminal to give access to a main cataloging data-base.

The Panel strongly endorses all of these needs and considers that the provision of appropriate facilities should not be unduly delayed. A decision on how best to meet these needs would be dependent on evaluating a range of possible options in relation to the Institute's overall requirements, and to the extent to which networking with other institutions would be desirable and feasible. Accordingly, we recommend that IFPRI employ a consultant to review the Institute's requirements for computing facilities and information technology and that meeting these needs should be accorded high priority in the internal allocation of resources.

Organizational and Operational Changes. In order to strengthen the association between the research support services and the research programs we consider that the four heads of these services should report to the Deputy Director (see also Chapter 7). We would expect the Deputy Director to have more time than the Director to maintain an overview of the research support services and their relationships with the senior research staff. He could also be called upon to arbitrate on matters of priority.

We also consider that contacts with the research staff in respect of the library and computing services should be further strengthened by establishing two small "user" committees to be chaired by the Deputy Director. Each should comprise representatives from the research programs and should meet at least twice a year to consider priorities and to exchange information in a more structured way than is currently practised.

Within the administrative services, the Panel endorses the views of the Associate Director for Finance and Administration that the section dealing with personnel and office management should be split into two, to be headed by a personnel manager and office supervisor respectively. The personnel department would be responsible for the usual
personnel functions that are now being undertaken, including coordination of the secretaries, as recommended in Chapter 4. The office supervisor would be responsible for such things as purchasing equipment and supplies, supervising the copying machine, arranging space and furniture, dealing with vendors, assisting in logistics arrangements for conferences and board meetings and in travel coordination. This division of responsibility is required because, in the opinion of the Panel, the personnel functions require the full-time assignment of one administrator and the office management that of another.

The Panel noted the need, expressed by the senior research staff, for easier access to information on travel. Travel agents have proved unsatisfactory. And the Panel suggests that IFPRI develop a central mechanism for providing assistance in this area.

Furthermore, IFPRI needs more structure in its administrative procedures. This applies principally to personnel and accounting where manuals are already in preparation. The Panel recommends that IFPRI formulate a procedure for approving and reviewing its operating manuals and ensuring that they are made available as soon as possible.

The space that IFPRI currently occupies is inadequate. The Panel suggests that additional space be acquired on the fourth and eighth floors as it becomes available.

## CHAPTER 7.

## FUTURE MANAGEMENT OF THE INSTITUTE

## Style of Management

At IFPRI, the term "collegial" is used to imply a process of arriving at decisions through consensus among colleagues, rather than in the context of its wider meaning: "of or pertaining to a college or university." It may be that the use of this term has contributed to the impression of some donors and others that IFPRI's approach is too academic and not closely related to the applied research for which the CGIAR institutions were created. As we have seen, however, IFPRI's research, though emphasizing strong disciplinary backing, is focused on applied problems, and is continually subjected to scrutiny through collective discussion (see Chapter 1).

Although the value of the informal style of management was evident in the vigour and enthusiasm of the staff, some potential dangers were also apparent. For example, the term "bureaucratic" is used frequently by the Director and the senior staff, but invariably in a strongly pejorative sense. Consequently, there is a danger of dismissing as unwanted bureaucracy all of the more formal aspects of management, some of which might lead to a more systematic definition of responsibilities and a more disciplined approach to various aspects of management.

## Management Issues

In Chapter 4 we have identified some of the gaps in the management of human resources; in Chapter 5 financial management within the research programs is discussed; and in Chapter 6, the need for resolving issues of priority is mentioned. There are additional needs for monitoring and co-ordination that occur in the research programs, whether supported by core funding or special projects. Some of these are discussed in the Report of the Program Review. For example, in the larger research projects, which involve individuals from several programs, there is no formal assignment of a coordinating role in.circumstances where joint action is often essential. The problem could easily be overcome if one senior individual, such as the Deputy Director, had responsibility for maintaining an overview of this type of requirement and took action accordingly. There is a similar need for monitoring coordination among the increasing number of special projects, especially when several projects are undertaken in the same country.

To summarize, potential gaps in communication and administration, arising from the informal style of management, were noticed in several areas, including the following:
(i) the appointment of senior research staff (Chapter 4),
(ii) performance appraisal of staff (Chapter 4),
(iii) the maintenance of an overview of support staff across all research programs and support services (Chapter 4),
(iv) the administration of budgets at the program level (Chapter 5),
(v) the determination of priorities for the use of support services, such as computing (Chapter 6), and
(vi) coordination within and among research projects (Report of the Program Review).

Under the present organizational structure, the co-ordination of research and administration places a heavy burden on the Director himself, in addition to his primary role of intellectual leadership. In response to this pressure of work the Director's office has expanded to include a special assistant, a research assistant and an administrative assistant, as well as a secretary. Consequently the individuals reporting to the Director include four Program Directors, four Heads of support services (on research matters only), as well as his own three assistants. All of these contacts are additional to the direct interaction it is important for the Director to maintain with the research fellows individually.

## Proposals for the Future

Our proposals for the future place considerable emphasis on reestablishing the post of Deputy Director. Having regard to the heavy responsibilities currently being carried by the Director and the other senior management staff, we consider that a Deputy Director could play a key role in the future management of IFPRI. The Deputy Director should be either a social scientist or a natural scientist and should have an active involvement in research. His or her primary reponsibility should be to monitor staff relationships and to co-ordinate research activities.

In the spirit of IFPRI's management style, we considered redesignating Program Directors as "co-ordinators," "leaders" or "chairpersons." However, having regard to their need to interact with officials at relatively high levels in donor agencies and in developing countries, we thought it preferable to leave their titles as "Program Director." Commensurate with her responsibilities, we consider that the Associate Director for Finance and Administration should be re-designated "Director of Finance and Administration."

Looking to the future, the Panel considers that the Institute must move gradually towards greater delegation of authority and responsibility and less involvement of the Director General in day-today administration. In many institutes this would be accomplished by greater delegation to the Program Directors. For the reasons already discussed in the previous chapters, however, we favour assigning most of the responsibility for administration to a reinforced central management group. Because it is essential that research and administration should be closely integrated we consider that the Deputy Director should play a central role in overseeing the administration of research and related activities, while the Director of Finance and Administration should continue to play a central role in the administration of finance and personnel. Both would have strong coordinating roles. They would identify gaps and allocate responsibilities to re-inforce communication and coordination whenever necessary.

The Director, his Deputy and the Director of Finance and Administration would constitute the Management Group. It would meet on an informal basis whenever necessary. Continued communication among all three of its members would be essential and, in order to fit meetings into a crowded schedule, we envisage that some meetings would be called at short notice. A preferred day and time could be reserved to ensure that at least one meeting were held each week whether or not all three members were present. The meetings would be kept short and informal and each member would keep his or her own notes of items for the agenda and action to be taken.

The revised organization chart, implied by these proposals and others discussed in earlier chapters, is illustrated on page 38. It also shows the changes in the organization of programs recommended by the Program Review Panel. It does not, however, illustrate the informal working relationships discussed in Chapter 3. Many of these relationships run across the line management structure, covering both research and administration. Our proposals do not imply that we wish to diminish the effectiveness of these relationships nor to discourage others from arising. Rather, we see our proposals as reinforcing the framework within which more systematic procedures can be developed that are designed to detect deficiencies in management before they give rise to inefficiency and discontent.

In addition to the line-management structure, the organizational chart shows a "Research, Appointments and Promotion Committee" similar in composition to the existing Director's Advisory Committee (see Chapter 3). We see this committee as functioning along somewhat more formal lines than the existing advisory committee to discuss issues relating to research and the management of human resources. The agenda should be compiled systematically and circulated before the meetings. Comprehensive minutes should not be necessary, but summaries of the main conclusions should be recorded, disseminated and acted upon.

With this type of structure, its central leadership of research, central financial management and largely informal management within

programs, there is clearly a limit to the number of senior research personnel who could function effectively within it. We see no criteria that could be used to define that limit in absolute terms. The present research group works well together and clearly a few more senior staff would not destroy its cohesion or unity of purpose. Our view is that from 20 to 30 senior research personnel is reasonable for this type of structure. The "optimum" number would be dependent on the personal perception of the Director and on the definition of the future areas of research to be tackled. In this respect the recommendations of the External Program Review Panel will be crucial. The present basis of management, together with the modifications we have proposed, could evolve in a number of different ways to meet possible future changes in the size of the Institute and its patterns of work.

What is vitally important is that the critical mass of staff, their international experience, their multidisciplinary mix and their dynamic approach should be preserved. Given the critical mass at headquarters, other groups could be built up on a de-centralized basis as funds and opportunities permit. The administrative structure needed at headquarters to support them might well not be substantially greater than at present. The existing structure has the advantage of minimal commitment to capital investment and consequent flexibility. It could easily respond to the changes implied by building up additional, de-centralized staff.

## Conclusions

The proposals brought together in this chapter are designed to reinforce the mechanisms already in place at IFPRI and to preserve the informal management style of its staff. The Panel commends the Associate Director for Finance and Administration for the key role she has played, and the heavy load of responsibility she has successfully carried, in the efficient management of the Institute.

Looking to the future, we recommend that the organizational structure be amended so that the heads of the support services for research report to the Deputy Director and that his or her responsibilities be redefined to include a strong coordinating role in all matters relating to the administration of research. We further recommend that the Director's Advisory Committee be renamed the Research, Appointments and Promotions Committee and that it should operate on a more formal basis to resolve issues relating to research and the management of human resources.

LIST OF ISSUES<br>IFPRI EXTERNAL MANAGEMENT REVIEW<br>MARCH 26 - APRIL 6, 1984

I. IFPRI's mission, objectives and strategy
o Does IFPRI have a clear, concise, written mission statement? Has this been communicated effectively to staff? Have areas of conflict with other institutions within or outside the CGIAR system been clarified and communicated to staff?
o To what extent does IFPRI's long-range plan serve as a management tool? How were the long-term goals identified?
o Has a clear strategy been developed to reach the long-term goals? Have these been translated into operational, shortterm objectives for the center and for units within the center? Are these clearly understood and accepted by the staff? To what extent were the staff and the Board involved in their preparation?
o Are these (i.e., mission statement, long-range plan, goals, strategies, and objectives) reviewed periodically?
II. Board of Trustees
o What distance does the Board maintain between itself and the Institute's management?
o To what extent does the Board get involved with determining the Institute's policies, long-term plans, budgets, salary levels, and other policy and matters? To what extent is management per se left to the Board's Executive Committee? What implications do the practices of the IFPRI Board have for the Institute's management?

- IFPRI's Program Committee is composed of the Board as a whole. What are the advantages and disadvantages of this arrangement?
o Each year IFPRI usually holds one of its Board meetings in a developing country. What are the advantages and disadvantages of this practice? What implications can be drawn for other centers?
o What means does the Board employ to ensure accountability of the Institute's management and staff for their performance?
III. Organizational Structure
o What pattern of internal organizational structure exists on paper? What is the perceived pattern? What are the reporting relationships?
o Does the organizational structure differentiate clearly between staff/line authority? Is functional responsibility pinpointed clearly by work unit? Is there clear delegation of responsibility to the management layers below the Director General?

0 What is the span of control of key managers? Is the distribution of managerial responsibilities balanced?

- IFPRI's research is organized along the lines of the six questions noted in the long-term plan. However, the Institute is managed along functional program lines which its projects/programs cut across. How effective is this structural arrangement?


## IV. Management Style and Internal Communications

o How is communication, trust, morale and cooperation perceived within IFPRI? How satisfied are staff with their jobs?
o How effective is communication among staff in different disciplines and programs?

- What is the level of delegation and participation in decisionmaking? Is the management style conducive to innovation, creativity and effective scientific research?
V. Human Resource Management
o Is IFPRI able to attract and retain competent senior staff? How fast are key vacancies filled with competent staff?
o The IFPRI Board believes that the "minimum efficient size" necessary for the Institute to best fulfill its mandate and to meet the goals of the CGIAR system is about 25 senior researchers. How strongly is this argument justified, taking into account complementarities and management efficiency? What is the scope for IFPRI to contract some segments of the research it conducts to outside individuals or organizations, rather than increasing the size of its senior staff?
- Some have suggested that IFPRI seems to pick strong individuals and let them largely define their own areas of work, rather than selecting individuals who will most appropriately fit in with IFPRI's designated lines of work. Is the selection of individual staff members sufficiently related to team program requirements?

0 What are the gaps between current skills mix and future needs?
o Does IFPRI need a full-time personnel manager? Does it need written personnel rules and regulations for internationallyand locally-recruited staff?
o How attractive are IFPRI's compensation packages for staff recruited from the local area?

- Are appraisals and promotions based on merit and performance (for both internationally- and locally-recruited staff)? Has a clear link been established between incentives and performance? How effective is the performance appraisal process?
o What is the need for management training, especially among staff occupying key management posts? Is there need for training at the middle- and lower-management levels? What other needs exist in the areas of career development and staff training?


## VI. Financial Management and Budgeting

- How effective is the budget process? How well is budgeting linked with program planning? Is the staff responsible for budget execution involved in budget preparation? Do budgets serve as a device for financial and managerial control?
o What are the implications of the Institute's heavy dependence on a few donors for the stability of its future funding? What are the alternatives to expand the number of major donors?
- Does IFPRI use special projects to fill out the gaps in its program and bring it up to the minimum critical level? How well does this practice work? Does it allow reduction of core requirements and their replacement with special project finance which may be easier to obtain? Should IFPRI consider doing more special projects which do not overlap its core program, but support it less directly?
- The rigidity of IFPRI's budget structure (proportion that is restricted), unavailability of a working capital, and funding uncertainties the Institute faces point to the need for generating short-term sources of budget flexibility. How could IFPRI best approach this problem?
- Does IFPRI need to operate more conservatively, establishing reserves, and enabling it to respond to crises more readily? Or should it continue to follow the apparent high-risk policy of starting activities before they are fully financed? How much risk-taking is wise for IFPRI?
o How efficient is the allocation of resources between research and support activities?
o How much progress has IFPRI made in developing a cost accounting system which allows costing of programs, projects, and activities performed by the support units?
o How effective is external and internal auditing? What is the role and quality of the external auditors?
- How is overhead charged to special projects calculated?
o How much cost-consciousness is there among staff?


## VII. Other Issues

o How effectively is IFPRI able to communicate the results of its food policy research to decision-makers in developing countries? What mechanisms exist for decision-makers in developing countries to communicate their needs and problems to IFPRI?
o How effective are IFPRI's communications and linkages with other CGIAR centers, donors, and other related agencies? What can be done to improve them further?

- Should IFPRI consider purchasing or leasing computer hardware for its research and administrative operations?
- In what areas does IFPRI need written policies and procedures?
- How appropriate is IFPRI's pricing policy for its publications?
o How much performance- and efficiency-consciousness is there throughout the Institute? What management processes have been instituted to guard against inefficiency? Are these appropriate? Is there need for more?

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Dr. Michael H. Arnold, Chairman of the panel, is the Deputy Director of the Plant Breeding Institute in Cambridge, England. He has been closely associated with the CGIAR since 1978, first as a member of the ICRISAT Quinquennial Review Panel, next as the Study Director of the Second Review of the CGIAR and most recently as the Chairman of the IITA External Program Review Panel. Dr. Arnold had a twenty-year term with the Cotton Research Corporation (1952-72), initially as cotton breeder/pathologist at Ikiriguru, Tanzania and later as Deputy Director (1963-65), Director (1966-72) of the Cotton Research Station, Namulange, Uganda. He was educated at Cambridge University, England (BA-1952, MA-1954, PhD-1969).

Professor John Dearden, the Herman C. Krannert Professor of Business Administration, has been on the faculty of the Harvard Business School for the last twenty-five years. He spent two years at the Indian Institute of Management, Ahmedabad (1966-67) as a Ford Foundation Consultant. Prior to his tenure at Harvard, he was on the financial staff at the Ford Motor Company, latest as the manager of the Financial Systems Department. Professor Dearden was educated at the American International College and at the University of Pennsylvania. He is the author of eleven books and many articles on management information systems.

ITINERARY OF THE IFPRI EXTERNAL MANAGEMENT REVIEW PANEL

| Feb 4-8, 1984 | Field Trip to Manila and Bangkok (Arnold) |
| :---: | :---: |
| Feb 9-12 | Board of Trustees Meeting, Bangkok (Arnold) |
| Mar 14 | Briefing of the CGIAR Secretariat (Dearden) |
| Mar 22 | Briefing at the CGIAR Secretariat (Arnold-Dearden) |
| Mar 23 | Briefing at IFPRI (Arnold-Dearden) |
| Mar 26-Apr 6 | Main Phase of the Review in Washington (Arnold-Dearden) |
| Apr 5 | Presentation of EMR findings to the Executive/Finance Committee of the Board of Trustees (Arnold-Dearden) |
| Apr 6 | Presentation of EMR findings to the Board of Trustees (Arnold-Dearden) |

## LIST OF INDIVIDUALS INTERVIEWED AT IFPRI

Raisuddin Ahmed, Director, Food Production Policy and Development Strategy Program

Harold Alderman, Research Fellow
Barbara Barbiero, Head, Information Services
Romeo Bautista, Research Fellow
Robert Bordonaro, Head, Policy Seminars Program
Matthew DeVol, Controller
Robin Donaldson, Head, Computer Services
Neville Edirisinghe, Research Fellow
Jackie Gilpin, Personnel/Office Manager
Suzanne Gnaegy, Research Assistant
Loraine Halsey, Associate Director for Finance and Administration
Peter Hazell, Research Fellow
Tricia Klosky, Librarian
Darunee Kunchai, Research Assistant
John W. Mellor, Director
Cornelia Miller, Research Assistant
Leonardo Paulino, Director, Food Trends Analysis Program
Per Pinstrup-Andersen, Director, Food Consumption and Nutrition Policy Program
J.S. Sarma, Research Fellow

Ammar Siamwalla, Research Fellow
Bruce Stone, Research Fellow
Thongjit Uy, Research Assistant
Alberto Valdes, Director, International Food Trade and Food Security Program

Sudhir Wanmali, Research Fellow

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From: The Secretariat September 15, 1984

## Consultative Group Meeting

November, 5-9, 1984

Attached is a copy of the Report of the External Program Review of the International Food Policy Research Institute (IFPRI) (AGR/TAC:IAR/84/16) together with the transmittal letter from the Chairman of the Technical Advisory Committee (TAC) to the Chairman of the Consultative Group, TAC's Commentary on the Report, and the Response of IFPRI's Board of Trustees to the External Program and Management Reviews.

This Report will be considered under Agenda Item "IFPRI External Program and Management Reviews" of the Consultative Group Meeting in Washington, D.C. in November.

Attachment

Distribution:
CGIAR Members
TAC Members
TAC Chairman
TAC Secretariat
Center Board Chairpersons
Center Directors

# CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH TECHNICAL ADVISORY COMMITTEE 

Dear Mr. Husain,
I take pleasure in transmitting to you the report of the External Program Review of IFPRI which was completed in Apri1 1984 and presented to TAC last June at its 34 th meeting at Addis Ababa by Dr. L. Evans, who chaired the Review Panel. The report was then examined in conjunction with that of the External Management Review, the conclusions of which were presented by its Chairman, Dr. M. Arnold. The Committee was advised by Dr. R.K. Davidson, Vice-Chairman of the IF PRI Board and Dr. J. Mellor that the Center Board and Management were satisfied with both the comprehensive and probing nature of the Review and with its findings. They intended to take early action on the recommendations.

TAC is pleased to confirm that IFPRI is a research institute of high repute which has gained the confidence and support from policy analysts and decision makers in developing countries. It is a dynamic institution which is building an effective network of cooperative ventures both inside and outside the CGIAR System. It has also instituted a process for monitoring and continuously assessing its priorities. The out come of this process has been an increasing clarity in its program focus since the Institute became a member of the CGIAR five years ago, as well as changes in emphasis as examplified by the recent increase in work focussed on Africa south of the Sahara. The Panel has made several suggestions for program evolution on which TAC has commented.

The TAC conclusions and recommendations are contained in the attached Commentary which is somewhat more detailed than usual. Although the Panel made only eight recommendations, the report also contains many suggestions on which TAC wished to comment. Furthermore, this is the Institute's first Review and there was a complete agreement between the various parts concerned - the Center, the Panel and TAC - that the exercise should bring to light all the elements necessary to dispel the ambiguities which have surrounded IFPRI since its entry into the CGIAR System.

TAC is confident that this goal has been attained and it looks forward to receiving the Group's reactions and guidance.

Mr. S. Shahid Husain
Chairman, CGIAR


World Bank
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## TAC COMMENTARY ON THE EXTERNAL PROGRAM REVIEW OF IFPRI

1. In transmitting the report of the External Program Review of IFPRI to the CGIAR, TAC wishes to commend and thank Dr. Lloyd Evans and his colleagues for their thorough report. At its 34th Meeting, TAC discussed the report in the presence of Dr. Evans, Dr. Ralph Kirby Davidson, Vice-Chairman of the Board of Trusteees, and Dr. John W. Mellor, Director of the Institute and also examined the External Management Review report summarized for the Committee by its Panel Chairman, Dr. Michael Arnold. As indicated by the preliminary response of the Board, IFPRI agrees in principle with the recommendations made by the External Program Review Panel and proposes to define the most appropriate and speedy action on those requiring implementation.

## Mandate and its Evolution

2. Noting the evolution of IFPRI since its establishment 10 years ago, TAC recalls that its 1979 Review Mission on the suitability of the Institute for adoption into the CGIAR had led the Board of IFPRI to prepare a fully revised mandate. The Review panel had carried out its evaluation of IFPRI against this mandate and had concluded that the Institute's research is in line with it. TAC concurs with this conclusion and affirms the current validity of the principal provisions of the mandate.
3. TAC in 1980 noted that the revised mandate was very broad and could be read and interpreted in many different ways. Its translation in actual programs was considered as of crucial importance in determining the degree of concurrence of objectives between the CGIAR and IFPRI and the areas of complementarity and possible cooperation with relevant international organizations, particularly FAO. TAC is gratified to learn of the efforts made and wishes to underscore the importance it attaches to the development and maintenance of good working relationships of IFPRI with its sister Centers as well as with FAO.

Endorsement and Recommendations
4. A1though limiting its recommendations to eight, the Panel had made numerous suggestions and critical comments on IFPRI's program and mode of operation. TAC has reviewed these along with the formal recommendations and concurs that they are appropriate and require due consideration by the Institute. TAC indicates its broad endorsement of the recommendations and wishes to comment further as follows.

## Programs and their Evolution

5. IFPRI's four research programs as defined in 1976 were expected to work on Trends Analysis, Production Policy, Consumption and Distribution, and Trade Policy. The TAC 1979 Mission saw the central tasks of IFPRI's program as concerned with linkages and
interrelationships among micro-level problems that could arise from adoption of new technologies and the wider economic and social aspects of agricultural development. Work on trends and trade was considered as supplementary. Some change in relative emphasis in response to the needs of developing countries is evident from the current names of three of the Programs: Food Production Policy and Development Strategy, Food Consumption and Nutrition Policy, and International Food Trade and Food Security. The Panel noted the good and appropriate evolution of the research in areas of trade and consumption/nutrition; it recommended the establishment of a "Development Strategies Program" separate from the "Production Program", as well as a redirection of the work and a change in the name of the Trends Analysis Program.
6. Integration of Research. On earlier occasions the question had been raised whether the various separate research activities undertaken by IFPRI reflect an integrated research program. TAC notes the Panel's conclusions that a level of integration has been reached and that there is a well defined though evolving framework for IFPRI's research. TAC expects that this framework will emerge clearly through publication of research results in the next few years.
7. Importance of Trade Program. TAC recognizes that food and agricultural policy analysis and formulation in and for developing countries are crucially dependent on the impacts and constraints imposed by international markets and the policies of other nations. TAC endorses the importance of IFPRI's International Food Trade and Food Security Program as an essential and integral component of the research of the Institute in its own right, i.e. not just as a supplement to research in the production and consumption/nutrition fields.

## 8. A Separate Development Strategies Program. The Panel was

 concerned that IFPRI's work on development strategies, which up to now devolves principally from research on production "growth linkages", should have substantial input also from work on other areas including intersectoral linkages, on structural and infrastructural constraints, and on the effects of macro-economic policies. TAC agrees that effective research on development strategies could be facilitated through a separate program well coordinated with IFPRI's other programs. While thus endorsing the Panel's recommendation, TAC also strongly supports the position that this shall in no way engender evolution of IFPRI towards a comprehensive institute of development studies. Rather, the strict focus on food policy should be maintained also in regard to work on develoment strategies.9. A Food Data Systems Program. The Panel considered that the trends work of the present Food Trends Analysis Program could now receive reduced emphasis so that a problem of great urgency could be addressed, viz. lack of adequate and reliable food related data in many countries especially in Africa. This problem calls for research efforts into aspects of methodology and procedures for data gathering, evaluation and use in policy analysis. TAC will welcome IFPRI's work in this field, which should be carried out in association with national authorities and through close collaboration with FAO.
10. Research on Production Factors. TAC endorses the urging of the Panel that the Institute engage more in policy research into the different food production factors with particular and early attention to fertilizer.
11. Research on Structural Factors. TAC shares the Panel's view that in some situations policy options cannot be well formulated unless underlying structural issues are also addressed, e.g. such issues in Africa south of the Sahara may include land tenure and property rights. TAC suggests that IFPRI's Board should give careful consideration to this suggestion. TAC agrees that such work can be useful where it appears needed and where the national authorities give their approval.

## Institution Building

12. TAC commends the Institute for the effective way in which it has promoted the individual professional development of the peers of its researchers, both at headquarters and in the field. TAC supports the various further approaches suggested by the Panel, but underlines the importance -- both for the developing countries per se and for their better utilization of IFPRI's research results -- which IFPRI should attach in a systematic way to address more formally the needs for training and for strengthening the collective institutional capacity in countries with which the Institute works.

## Regional Balance

13. TAC notes and commends the changes in the regional distribution of IFPRI's research, including the significant increase in work focussed on Africa south of the Sahara. TAC wishes to add its concern to that voiced by the Panel that donors should be aware of the greater cost and hence need for increased support to IFPRI for work in this African region.

## Senior Core Research Staff

14. TAC concurs with the assessment of the Review Panel, which also reflects the views of IFPRI's Board and Director, that a size of the Institute commensurate with fully effective and efficient execution of its approved program is given by about 25 core senior positions, and that the performance of IFPRI fully warrants its claim to this size.
15. TAC takes note of and in general supports the suggestions of the Panel as to the desirability of broadening in time the range of disciplines represented on the staff of the Institute, both within and outside economics. TAC also notes and appreciates the intentions of the Director to deply any additional core staff principally to reinforce IFPRI's proposed greater research emphasis on Africa south of the Sahara. TAC agrees with the Panel that the various suggestions made are not mutually exclusive, and that they should not be construed
to encourage IFPRI to aspire to a size larger than the minimum/optimum of 25 senior staff.

## Impact Estimate

16. TAC recognizes that the nature of IFPRI's research and mode of transfer is at the base of the difficulties faced by the Review Panel in arriving at a quantified estimate of the Institute's impact to date. TAC concurs that IFPRI's output and reach of research reports and other publications, as well as its conferences and seminars, are evidence of a consistently high quality of research work and transfer effort.

## Interaction with CGIAR Centers

17. TAC notes with satisfaction the beneficial results of efforts made by IFPRI to collaborate and interact with its sister centers and institutions through joint projects and various other activities, e.g. collaboration with ISNAR in areas of research on agricultural research, and with IRRI on rice policies for Southeast Asia. In view of the important influence which food policy can have on the planning and orientation of the mainly biological work of the other Centers, TAC hopes that the latter will in future increasingly call on IFPRI to help in addressing major issues, wherever this is appropriate. TAC agrees with the Panel that fixed rules demarcating work appropriate for IFPRI from that of the other Centers should not be set. To avoid a situation in which governments could receive conflicting advice, TAC urges the other Centers to investigate food policy (macro-economic) issues only when there are compelling local reasons and advantages for doing so, and then preferably with the involvement of IFPRI.

## Conclusion

18. TAC commends the External Program Review report on IFPRI to the donors for their favourable attention. IFPRI emerges from the report, and from TAC's discussion of it, as a dynamic research institute of high quality and repute, whose work is focussed on the needs of developing countries and on equity aspects of food availability.

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Response of the Board of the Trustees<br>of the<br>International Food Policy Research Institute

to the External Program and Management Reviews

The Board of Trustees was most gratified by the extraordinarily high quality of the External Program Review and Management Review Teams, their dedication to the complex task they faced, and the thoroughness of the review they conducted. In particular we are thankful for their willingness to participate in the long and arduous visits to a wide range of field sites in Asia and Africa. We also note the timing of the Reviews is propitious in terms of the stage of development and receptivity of the Institute.

The Board of Trustees is now responding briefly and broadly to the reviews as the first round in a continuing dialogue on these issues with the Technical Advisory Committee and the donor communities. This response deals not only with the substance of the reports but purposefully underlines IFPRI's current extremely difficult financial condition, the relation of this condition to the findings of the review teams, and the additional financial requirements necessary to preserve the achievements lauded by the review teams and to make the additional progress called for in the reviews.

Succinctly, the current financial problem is to support an uneconomically small core senior research staff with an excessively large proportion of special project funding. The basic need is to enlarge the core senior research staff by four persons and to provide support for them. It is clear from the Management Review that the Institute is in danger of severe retrogression without a substantial increase in core support in 1985. We emphasize that this situation has arisen from the need for IFPRI, as any new institution, to grow until it reaches its minimum viable size. IFPRI has managed to do so through a level of special project funding, which is now recognized to be unsustainable.

The Board is gratified that the External Program Review clearly states the sharp focus of IFPRI's research and its substantial emphasis on both production and equity aspects. It also points to the process of interactions of the members of the Board of Trustees, the management staff, the research staff, and the user community in setting specific research priorities. The Board also welcomes the team's analysis of the geographic composition of IFPRI's research program and the recommendation that IFPRI's current efforts on Africa of less than 10 percent of IFPRI's total effort be increased to nearly 30 percent, while cautioning that there be no further reduction in the work on South Asia, given the low cost of research and the immensity of the food and poverty problems in that region. Further, the Board welcomes the team's understanding of the complexities and subtleties of IFPRI's outreach to and impact on policy processes, and it welcomes the team's proposal that the Institute prepare a biennial institute report for the CGIAR reflecting the state of food and agriculture as it pertains to the system's mandate.

The Program Review Team has made a set of recommendations that in effect call for a broadening of IFPRI's focus and approach. The Board fully recognizes the importance of the interaction of the set of issues to be accompanied by the broadening of approach. In response it expresses the following concerns and cautions:

1. IFPRI's current clear focus has been developed slowly and carefully to fit not only the exigencies of the food and poverty problems of developing nations but the special implications of IFPRI's presence in the CGIAR and the tightness of funding to the system as a whole. The Board therefore:
a) is concerned that a sense of urgency be preserved concerning the critical role of accelerating growth in food production in developing countries in meeting the income, consumption, and nutritional needs of the poorest people in those countries. In view of the special emphasis on poor people in IFPRI's mandate, the Board reiterates the need for research on the relation between agricultural growth and the growth in employment and incomes of poor people. The core of that work, in which IFPRI has been particularly innovative, needs further strengthening and broadening;
b) wishes to emphasize the vital role of IFPRI's credibility in maintaining the rigorous analytical approach for which it was complimented by the External Program Review Team. It is important that IFPRI not be interventionist, but rather that it play its role by adding to knowledge and bringing its findings to the attention of policymakers and analysts in an unbiased manner.
2. The Board welcomes the suggestions for broadening the focus of the six questions around which the research projects are organized but, again, is concerned that the present tight focus not be lost.
3. The Board welcomes the suggestions for broadening IFPRI's approach through staff additions assuming that IFPRI's strategic focus is retained and the financial implications are considered. The Board wishes to draw attention to the urgency of additions to the CG core budget in order to maintain the existing integrated program. Thus, the broadening of its disciplinary bases, the further outposting of staff, the strengthening of work in Africa and on fertilizer, and the development of the strategy work are all presented as broadening and strengthening efforts to be built on existing operations that themselves cannot be maintained without added funds. Both the External Program Review and the Management Review clearly state how extremely fragile and unstable IFPRI's core research program is at the present level of core financing.

The Program Review Team made specific recommendations concerning IFPRI's research program. The Board concurs with these recommendations as follows:

1. The broad concept of a program concerned with development strategy issues as they arise from and relate to food policy will add emphasis to an area we recognize to be important and will be advantageous from a management standpoint. The role this effort will have in defining the rest of IFPRI's research program is increasingly vital. How this area is to be defined is a complex and important issue, and the Board looks forward to tackling this issue itself and through its interactions with the TAC, the donors, the developing countries, and IFPRI staff. The Board recognizes that any further expansion and articulation of this work must be from its present welldefined focus and that the relation of this work to each of the other programs must also be taken into account. The Board wishes to take under advisement a title for this program, recognizing that too broad a title may lead to diffusion of the focus.
2. The Board concurs with the suggestion of a change in name and focus for IFPRI's Trends Analysis Program. It has requested the Director begin to explore such a shift with the various other interested parties.
3. The Board fully concurs in the team's urging that the work of the International Trade and Food Security Program be more visible including its explicit inclusion in the six questions.
4. It is urgent that the work on fertilizer policy be strengthened.
5. The Board shares the concern of the team about the high proportion of core research conducted in the Food Consumption and Nutrition Policy Program that is financed from special project funds, but views this as part of the larger problem of the need to reduce special project financing of core research from one third of the budget to a maximum of 25 percent. It notes that to address the recommendation and concern of the Review, this requires increased core financing.

The bulk of the recommendations of the Management Review are so clearly in order that the Board has fully concurred that the Director proceed as quickly as possible in implementing them. In particular the Board has requested the designation of a more explicit management committee and its attention to personnel, staffing, and performance appraisal. The Director will report regularly to the Board on the implementation of these various recommendations.

Many of the Management Review Team's recommendations documented the weak financial base of the Institute, which has been a continuing concern of the Board. Earlier the Board had expressed its reservation about leaving the position of Deputy Director vacant, but felt it necessary to do so because of the even greater urgency of maintaining the research program. The team's articulation of the role of a Deputy Director is very helpful and reinforces the Board's view of the need for such a person.

Even more serious is the problem of working capital. The team's documentation of the problem is welcomed. The stated need for more capital equipment in the Information Services and Computer Services and administrative areas as well as the observation of the cramped space for the staff and its activities are valuable to the Board, which will take action as soon as finances permit.

Finally, the Board feels reinforced in its concern for the high level of special project funding, especially for key core programs. This, however, cannot be dealt with except through a substantial increase in core funding.

We look forward to a continuation of the high level of immensely valuable and constructive dialogue, and IFPRI's evolution to a stabilized position as a productive member of the CG system.

# the Consultative group on international agricultural research TECHNICAL ADVISORY COMMITTEE 

REPORT OF THE EXTERNAL PROGRAM REVIEW OF THE INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE (IFPRI)

Review Panel: Dr. L.T. Evans Prof. Y. Hayami Dr. A.M. Khusro Prof. M. Lipton Dr. R.W. Herdt (CGIAR Secretariat) Dr. K.O. Herz (TAC Secretariat)

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April 1984

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Dr Guy Camus,
Chairman,
Technical Advisory Committee,
FAO,
Via delle Terme di Caracalla,
00100, ROME, Italy.
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Dear Guy,
I submit herewith the Report of the first External Program Review of IFPRI for consideration by TAC before it is transmitted to the CGIAR. I trust that it meets the increasingly stringent requirements of TAC for such reviews.

As you well know, these reviews require intense effort, under severe time constraints, from all members of the panel. Ours was no exception, but it was nevertheless a pleasure to review such a lively Institute in company with such an able team. It was a memorable and educational experience for all of us.

Our sense of purpose was enhanced during the preliminary field trips by the evident appreciation in the developing countries we visited for IFPRI's work and style of collaboration.

Our understanding of IFPRI was enhanced by two valuable discussions with its Board, in Bangkok at the outset of our Review in February, and in Washington on its completion in April.

Our appreciation of the quality of IFPRI's staff was enhanced by their first hand accounts of their research and particularly by the five wide ranging and dynamic discussions we held with the whole staff on various aspects of IFPRI's role. From these we emerged with an awareness of the shared consensus on what IFPRI should do, within which the research by each member of staff is undertaken.

From the beginning to the end of our Review we have been in close touch with the Management Review under Dr M.H. Arnold, and have tried to avoid overlapping work and conflicting suggestions. Given the interest donors take in avoiding duplication of research between Centres, we have felt it was as important for us to avoid duplication of review effort.

Although we make a large number of comments and suggestions in our Review, we have kept the number formal recommendations to a minimum. In part, this reflects our wish to focus discussion on their implementation. In part it reflects the variety of opinions within the panel on some issues. And in part it reflects the fact that we think IFPRI is already in good shape.

We wish to thank the Institute for its open and cooperative approach to the Review, and I wish to thank all the panel members, as well as Dr R.W. Herdt of the CGIAR Secretariat and Dr K.O. Herz of the TAC Secretariat, for their enthusiastic, unstinting and thoughtful contributions to this Report. Its virtues are theirs, its faults belong to their Chairman.

Yours sincerely,


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The External Program Review panel finds IFPRI to be a dynamic research institute whose staff and work are of high quality and whose research is clearly focussed on the needs of developing countries, and of the poor people in them. IFPRI's work is appreciated by these countries, as is its style of working with them. IFPRI has gained much from its admission to the CGIAR System, and has much to contribute to it. The panel enthusiastically commends IFPRI to the donors for their continuing, indeed enhanced, support.

The panel has made a large number of specific suggestions and comments in relation to IFPRI's research and related activities in the report, but we have confined our formal recommendations to the following:
R. 1 that IFPRI consider the establishment of a separate Development Strategies Program (paras. 121 and 305);
R. 2 that core-funded positions be provided for two regional co-ordinators, to be based in S.E. Asia and Africa (paras. 124 and 308);
R. 3 that the "Trends" program be renamed as the "Food Data Systems" program, its primary purpose being to design, in association with developing countries and relevant agencies, especially FAO, better systems for gathering, evaluating and using food-related data for policy analysis (paras. 155, 162-165 and 311);
R. 4 that the Director of IFPRI be invited to prepare a biennial review of agricultural and food policy, to be delivered at Centre's week in the alternate years when IFPRI's program and budget are not due for presentation and discussion (paras. 242 and 319);
R. 5 that IFPRI should not be directly involved in the processes determining the allocation of resources within the CGIAR system (paras. 247/248 and 321);
R. 6 that (a) during the next five years, IFPRI should make determined efforts to broaden the approach to economics amongst its staff, without loss of rigour;
and (b) during the next two years, consideration should be given to appointing one senior social anthropologist and one senior political scientist to the core staff in Washington (paras. 265 and 323.);
R. 7 that IFPRI's core research staff be increased to 21 (from 17) as soon as possible, with a proportionate increase in support funding (paras. 277 and 327);
R. 8 that IFPRI continue to have its headquarters based in Washington (paras. 292 and 328);

For a more extended recapitulation of the panel's assessments and recommendations, see Chapter $X$ of the report.

1. The International Food Policy Research Institute (IFPRI) was established in 1974 to identify and analyze alternative national and international strategies for meeting the need for food in the world, with particular emphasis on low-income countries and on the poorer groups in those countries.
2. In 1979 IFPRI became one of the thirteen international centres supported by the Consultative Group on International Agricultural Research (CGIAR). This group, founded in 1971, is an international consortium of donors, sponsored by the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Program (UNDP) and the World Bank, for the purpose of increasing food production in the developing world through research and training programs.
3. Each of the 13 institutions supported by the CGIAR is an autonomous body, with an internationally recruited staff, and governed by an independent, international Board of Trustees.
4. The Technical Advisory Committee (TAC) to the CGIAR is charged with the periodical assessment of the achievements, the appropriateness and the effectiveness of the research and training programs of each of the thirteen centres. A review panel is commissioned by TAC for this purpose. TAC decided that IFPRI should be reviewed early in 1984, five years after its admission to the CGIAR and ten years after its foundation.

## Composition of the Review Panel

5. The panel was chaired by Dr. L. T. Evans (Division of Plant Industry, Commonwealth Scientific and Industrial Research Organization, Canberra, Australia), the other members being Professor Y. Hayami of the Metropolitan University, Tokyo, Japan, Dr. A. M. Khusro of The Planning Commission, New Delhi, India, Prof. M. Lipton of the Institute of Development Studies, Sussex, England, and Professor C.T. de Wit of the Department of Theoretical Production Ecology, Wageningen, The Netherlands. Dr. R. W. Herdt, Scientific Adviser to the CGIAR Secretariat, assisted to the panel in the role of observer, while Dr. K. O. Herz of the TAC Secretariat acted as panel Secretary.

## Panel Operations

6. The External Program Review of IFPRI was conducted in two phases. During the first phase, $4-21$ February 1984, several members of the panel visited field sites and discussed IFPRI's work with national policy makers in the Philippines, Thailand, Zambia, Kenya and Egypt. During this period the panel also joined IFPRI's Board of Trustees during their meeting in Bangkok for two days of vigorous discussion of the Institute's role and work. Details of these visits and meetings are given in Annex 2. The second phase of the review took place at IFPRI's headquarters in Washington, D.C., from March 26 to April 6, 1984. On April 6 the Chairman of the panel presented its observations and recommendations to the members of the Board, the Director and the staff of IFPRI.

## Terms of Reference

7. The panel was charged to conduct the review under the standard Terms of Reference for External Program Reviews of the International Agricultural Research Centres (Annex 1) to which was appended a list of specific questions to be considered during the review. In general terms the panel was asked to assess the content, quality, impact and value of IFPRI's research and to examine whether its operations are being carried out in line with declared policies and to acceptable standards of excellence. An independent management review of IFPRI was conducted at the same time as the program review, under the chairmanship of Dr. M. H. Arnold. Consequently, management issues are considered in this report only to the extent that they bear directly on the research program and related activities of IFPRI, which are our primary concern.
8. We begin this report with an outline of the origin and evolution of IFPRI, of its initial objectives and of the ways in which these have been modified. We then consider IFPRI's clientele, whom it can and should serve, and what research might be done, before assessing its actual research, role and impact. We do not attempt to answer individually the questions attached to the Terms of Reference, but they were all considered by the panel, and we believe that our report covers them in a way that complies with TAC's wishes for advice. The paragraphs in this report which are most relevant to each question are listed at the foot of Annex 1 .
9. The panel wishes to acknowledge the thoroughness of the preparations for the review made by IFPRI, and the high quality of the documentation. In particular, we appreciated the openness to comment and question displayed at all stages of the review by the Board of Trustees, Director and staff of IFPRI. The panel also acknowledges the value of the wide variety of comments, assessments and suggestions made by many donors, institutions, officials of developing countries and staff of other international centres. The interest and constructive intent of these comments greatly enhanced our understanding of IFPRI and its role.
10. The panel has felt free to make any observations or recommendations it believed to be significant, recognizing that its report in no way commits TAC or the CGIAR to act on these. The panel accepts sole responsibility for this report and was unanimous in its support of all the recommendations. An overall assessment, with recommendations, is presented in Chapter $X$, which should be read as an extended summary.
11. This report was presented to TAC at its 34 th meeting in Addis Abbaba in June 1984, in the presence of the Vice-Chairman of the Board and the Director of IFPRI, before submission to the CGIAR in November 1984.
12. The third Bellagio meeting, in April 1970, recognized the need for socioeconomic research on which improved agricultural policies and programs could be based. From its very first meeting TAC was concerned with the need for research on the socio-economic implications of new agricultural technology. At its fifth meeting there was an extensive discussion of priorities and approaches to socioeconomic research within the CGIAR. The micro-economic work being done at the already established centres was valuable, but TAC felt that many policy issues arising from the work of the centre economists, and macro-economic issues such as commodity movements and trade and price policies, were not appropriate for research at the existing centres, and that they constituted a weak link in the CGIAR System.
13. The need for an independent research institute dealing with socio-economic policies for agricultural development was discussed at a special seminar held at the World Bank and sponsored by the CGIAR in July 1973. From this meeting there emerged the concept of a "World Food Policy Research Institute" to analyse and comment on the current world food situation and to carry out research on policy aspects of food production, trade and related issues. As a result, the CGIAR requested $T A C$ to recommend ways of meeting the needs for socio-economic policy research.
14. A further consequence of the Washington seminar was the appointment by the Ford Foundation of a consultant (Mr. O. V. Wells) to report on the need for research related to world food policy, and the approaches that might be followed in undertaking it. At the same time, FAO was also developing a proposal for a semi-autonomous Development Research Centre, to examine the socio-economic framework for better use of agricultural technology.
15. Both of these initiatives were discussed at the seventh meeting of TAC. As a result of these discussions TAC concluded "that there were important policy issues of a global or inter-country nature on which research was needed, and where an analytical approach by an independent high-level group could enable governments and agencies concerned with agricultural development to be better informed and thus permit more rational international policies to be shaped." TAC also pointed out that the outcome of such research could have a significant bearing on the research priorities and direction of future programs supported by the CGIAR.
16. A subcommittee of TAC therefore prepared a "Proposal for a World Food Policy Institute" for discussion with representatives of FAO and other interested parties at the eighth meeting of TAC, in June 1974. Given the sensitive nature of food policy issues for relations between countries, it was agreed by all parties that the Institute must have independent funding and governance. Because no single institute could be expected to conduct socioeconomic research covering all aspects of agricultural and rural development, the mandate of the institute "should be circumscribed to research and related activities concerned primarily with world food policy." (Annex 3).
17. Through analysis of selected key policy issues the institute would offer guidance to national and international planners on the measures required to improve the management of agricultural production resources, to increase world food supplies, and to achieve a more equitable distribution of available food.

The problems selected for analysis would often be between and among several countries, but within-country studies should also be carried out where these were expected to have a wider significance.
18. The institute should complement, not duplicate, the work of FAO, the World Bank and other international agencies in the fields of food and agricultural policy analysis. Thus, the collection and compilation of national statistics on a routine basis as well as agricultural sector analyses should be the province of FAO, but selected comparative studies of agricultural development could be valuable.
19. The sub-committee defined the functions of the institute as follow:
(i) Research
(a) To keep the current global food and agricultural situation under independent surveillance...
(b) To examine selected major food and agricultural policy and trade problems, particularly those involving sensitive relationships between and among countries...
(c) To identify and research emerging and future problems of global concern likely to have an important bearing on food production and utilization... in the longer term.
(ii) Information
"An important task of the Institute must be to transmit up-to-date and relevant information on the world food situation and outlook to national policy makers." Two annual publications were envisaged:
(a) A World Agricultural Policy Review
(b) An Outlook on Food and Agriculture
(iii) Training
"The Institute is not seen by the Subcommittee as having a formal training role; but a limited number of graduate research associates from developing countries (probably around 10 in any one year) would be working as part of its research staff and would in effect be receiving "in-service" training in this way. Their experience would also be invaluable in helping to ensure the relevance of the work of the Centre to the key problems affecting the food and nutrition situation in the developing countries."
20. Following discussion of the subcommittee's report at its eighth meeting, in which representatives of FAO and the Institute's sponsors also participated, TAC made several amendments taking into account the need to avoid duplication and overlap with the activities of other institutions, in particular the responsibilities of FAO with regard to the proposed first "surveillance" function of the Institute, which had reflected concern at the weakness of short-term intelligence on the global food situation, as revealed by the 1972 crisis. It was not intended that the Institute should undertake short-term food intelli-
gence work, properly the province of FAO which was in the process of strengthening its capacity in that area. Rather, TAC had intended that the Institute should undertake analysis of the causes of longer-term trends in world food supply, and it therefore agreed to reword the proposed function as: "To keep the global food and agricultural situation under continuous independent review and analysis." FAO also expressed some concern over the sub-committee's proposal that the Institute should publish an annual 'Outlook on Food and Agriculture,' and TAC agreed to delete this element of the proposal.
21. Apart from these concerns, however, there was a large measure of consensus between TAC, FAO and the sponsoring organizations on the need for an independent, international institute for research on food policy, and on its functions. The proposal for the Institute was therefore put forward to the CGIAR at its meeting in July 1974, for later consideration.
22. At a meeting in Ottawa in September, 1974, the Ford Foundation, the Rockefeller Foundation and the IDRC (International Development Research Centre, Canada) indicated their willingness to provide initial financial support for IFPRI. In the absence of a clear consensus for IFPRI's admission to the CGIAR at the meeting in October, 1974, the three sponsors decided to proceed with its establishment in Washington. The first meeting of the IFPRI Board of Trustees was held in March 1975, under the Chairmanship of Sir John Crawford, the Chairman of TAC, with Mr. Dale Hathaway as Director.
23. The letter transmitting the offer of a grant to IFPRI by IDRC contained the following directive as to the use of its grant:
"to provide for the establishment of IFPRI and to enable IFPRI to undertake research on selected policy problems affecting the production, consumption, availability and equitable distribution of food in the world with particular emphasis on the needs of the low-income countries and especially the needs of the vulnerable groups within those countries. Specifically, IFPRI would work:
(a) to identify major opportunities for expanding world food production with particular emphasis on the development actions and policies best suited to remove present constraints to production and to establish the framework for the sustained use of the potential agricultural capacities existing in low-income nations;
(b) to determine and publicize those actions which could be undertaken, and those policies which could be adopted by governments, regional and international agencies, to effect a continued increase in the quantity and quality of food supplies available to all people through enhanced food production, wider trade;
(c) to provide information, an expanded base of knowledge and objective analysis of world food problems, and to indicate the opportunities and options open for their solution."
24. This wording corresponds broadly with the objectives listed in the IFPRI Prospectus of May, 1975, prepared by Mr. Hathaway and substantially endorsed by the Board, except that it put somewhat less emphasis on the early warning role of IFPRI. The Prospectus, issued after the first meeting of the IFPRI Board, defined the objectives of the Institute essentially as given in paragraph 23, but in the order (c), (a), (b).
25. With respect to training, the Prospectus stated: "It is expected, as the TAC subcommittee recommended, that IFPRI will have no formal training program. The training activities would consist largely of learning by participating in multidisciplinary policy research. This relates to the proposed high proportion of non-permanent staff. These individuals may vary widely in experience and seniority, and most of them will return to positions where they do policy research or are involved in the policy process of their organizations or countries."
26. As a first step in developing the research programs, IFPRI staff prepared three discussion papers entitled:
a. The target audiences for IFPRI research.
b. Research areas and priorities for IFPRI.
c. IFPRI relations with national and international research institutions.

These were debated by a widely based group in February 1976, and formed the basis of a subsequent discussion of IFPRI's research programs by its Board. Three further conferences were then held in mid-1976 to define the areas in need of research more closely in relation to (i) technology and investment, (ii) trade, and (iii) nutrition. In addition, a former Director of the Statistics Division of FAO was commissioned to report on IFPRI's data needs and sources.
27. As a result of these widely-based reports, conferences and consultations, the Board approved the establishment of four research programs, namely:

Trends analysis
Production policy
Consumption and distribution
Trade policy,
and these four programs have continued, with some evolution of emphasis and name, to the present. Nutrition, for example, was first included among the names in 1980. The programs are currently called:

Food trends analysis (referred to hereafter as "Trends"),
Food production policy and development strategy ("Production"),
Food consumption and nutrition policy ("Consumption"),
International food trade and food security ("Trade").
28. In September 1978, IFPRI's three sponsoring organizations requested that consideration be given to the inclusion of IFPRI within the CGIAR (Annex 4). The request was referred to TAC, which commissioned a review under the leadership of Professor Carl Thomsen to report on the suitability of IFPRI for membership in the CGIAR system.
29. The TAC review mission confirmed the need for a special international effort in research on world food problems to provide a better basis for the formulation of food policies at national and international levels. It saw the uniqueness of IFPRI research in this area as being associated with a staff with wide diversity of experience in both research and policy making in a wide range of developing countries, and focussed on linkages and interactions between food production, consumption, distribution and trade in an holistic approach. The mission considered that the Institute's uniqueness would be further enhanced within the CGIAR, that IFPRI could enlarge the impact of ongoing national and international efforts in agricultural research, and that its inclusion would make a significant contribution to the objectives of the CGIAR. The mission supported the broad mandate given to IFPRI and the manner in which this had been interpreted, and was favourably impressed by the volume of IFPRI's research output, by its relevance to the objectives of the Institute and to the problems addressed, and by its overall quality.
30. The mission's report was discussed at the 21 st meeting of TAC, whose conclusions and recommendations on the inclusion of IFPRI in the CGIAR system are given in Annex 5. The most significant conclusions were:
(a) TAC recommended that from the point of view of CGIAR support, the mandate of the Institute should give its principal emphasis to the problems of developing countries and that the central tasks in its programme should be concerned with the linkages and inter-relationships between the microlevel problems of the adoption of new technologies and the wider economic and socio-economic aspects of agricultural development. Thus the work on trends analysis and international food trade should be considered only as supporting activities to the main research programme.
(b) TAC invited IFPRI to pursue its efforts in defining its complementarity to many other institutions such as FAO, the World Bank, WFC, GATT, UNCTAD, OECD, particularly in regard to its work on trend analysis.
(c) TAC endorsed the recommendation of the panel that IFPRI should be located in a developing country.
(d) Assuming that the Board of the Institute would be ready to examine favourably these recommendations and make them effective, the committee strongly recommended a favourable consideration by the Group for the inclusion of IFPRI in the CGIAR System.
31. TAC did not comment on the issue of IFPRI's size. However, the mission stated that "Over the longer run it would probably be desirable to station 4-6 out of a staff of 25 outside of headquarters." This implies support for the frequent assertion by Dr. John Mellor, IFPRI's present Director, that the optimum size for the institute's staff, given its four programs and geographically wide-ranging projects, is about 25 research workers.
32. At the CGIAR Meeting in November 1979 IFPRI was formally adopted into the system of international centres. The chairman concluded from the discussion that "the Group continued to be interested in the Board's decision on location. Careful consideration should be given to a move to a developing country, on which the Group appeared to have an open mind."
33. In March 1980, the Chairman of the Board of Trustees wrote to the Chairman of the CGIAR concerning the two outstanding issues of the focus of the mandate and the location of the Institute. The mandate was revised (Annex 6) to highlight IFPRI's emphasis on problems of developing countries and on collaboration with their national institutions. The opening section reads: "The International Food Policy Research Institute was established to identify and analyze alternative national and international strategies and policies for meeting food needs in the world, with particular emphasis on low-income countries and the poorer groups in those countries. While the research effort is geared to the precise objective of contributing to the reduction of hunger and malnutrition, the factors involved are many and wide-ranging, requiring analysis of underlying processes and extending beyond a narrowly defined food sector."
34. As for the location of the Institute, the Board appointed an independent consultant to evaluate this issue, and in the light of his report concluded that "no alternative location, at least in a developing country, can currently provide better operating facilities than Washington, although the Board agreed with TAC on the over-riding importance of IFPRI's staff being able to maintain a clear and up-to-date perception of the food and nutrition situation in the Third World.
35. In June 1982, IFPRI published its long term plan, called "Looking Ahead." Rather than describing its research in terms of the four programs, the long term plan focuses on six major questions that are expected to dominate food policy for at least the next decade, thereby emphasizing the interactions between the four programs and the team approach by IFPRI to many issues. The six questions are:

1. What food policy adjustments are needed in response to rapid growth in food import demand by developing countries?
2. What policies will allow technological change to play its central role in raising food production in developing countries?
3. What combination of farm product incentives can achieve growth and equity simultaneously?
4. What relative weight should be given to alternative agricultural commodities in future production patterns?
5. What policies are needed for technological change in agriculture to stimulate the growth of income and employment necessary to alleviate rural poverty?
6. How can food security be provided to the world's poorest people in the face of unequal distribution of income, fluctuating production, and high costs of storage?
7. In the ten years since its foundation, IFPRI's mandate and its research have clearly evolved in response to changing needs and perceptions of the problems faced by developing countries. In the remainder of this report we reconsider the questions of to whom IFPRI's research is directed and what most needs to be done, before assessing the Institute's work in the light of these
considerations. We should emphasize at the outset, however, that we (as the Review Panel shall be referred to henceforth) have emerged from our review of IFPRI with a very favorable impression of the great need among developing countries for the Institute's work, of the relevance and high quality of its research, and of the high standing of the Institute and its staff. It is against this background that we have felt free to make critical comments.
III.

WHO SHOULD IFPRI WORK FOR?
37. IFPRI's primary purpose, both before and since it joined the CGIAR, has been to help developing countries in the analysis and improvement of policies for food production, consumption/nutrition and distribution. Without question, therefore, its primary clientele must be those responsible for food policies in developing countries.
38. The food and agricultural policies of developing countries are, however, influenced by the food and trade policies of developed countries, and by the policies of a variety of international financial, aid and development agencies, which constitute IFPRI's intermediate clientele. As indicated in Chapter II, (Paragraph 17) this wider clientele was recognized from the outset of the discussions on IFPRI, with the expectation that the Institute would offer guidance to national and international planners, and to the CGIAR.
39. The early planning paper on "The target audiences for IFPRI research" considered the many quite different but interacting target groups, at four levels:

1. both natural and social scientists, including policy analysts;
2. policy makers in developing countries;
3. policy makers influencing the allocation of bilateral and multilateral aid for agricultural development;
4. opinion formers within the international political fora and agencies.

The second of these levels was regarded as the primary target for IFPRI. While we agree that IFPRI must develop strong interactions with national policy makers, we suggest that the policy analysts in developing countries, IFPRI's peers, are at least as important a part of the Institute's clientele, in agreement with IFPRI's own perceptions.

## A. Developing Country Clientele

40. With some striking exceptions, developing countries as a whole have only limited or no high-level capacity for food policy analysis and an urgent need for greater expertise in this area. Moreover, able policy analysts in developing countries are frequently thrust early into policy-making positions. While such erosion of national capacity for policy analysis has its disadvantages, it also means that relevant work conducted by IFPRI often fills a real gap and can have considerable and quick impact on national food policies. We were impressed during our field trips by the high level of interest in, indeed impatience for, the results of IFPRI research in the developing countries we visited.
41. However, the food policy analysts and policy makers within each country are a somewhat amorphous group, scattered through many government agencies and research institutions. While the ministry of agriculture may have greatest
impact on production policies, many other agencies may influence consumption, distribution and trade policies. And beyond these, other agencies influencing industrial and macro-economic policies may have profound influence on the structure of incentives for agricultural production, as demonstrated for Colombia and Argentina in IFPRI's Research Reports RR24 and RR36. Given such a broad clientele within each developing country, it is not easy for IFPRI to ensure that its work is known to all the relevant agencies. Also, the capacity for policy analysis and the routes to policy making vary greatly among developing countries.
42. As indicated in IFPRI's mandate (Annex 6) its research is conducted, whenever possible, in active collaboration with national systems. Not only should this mode of operation play a major role in building national capacity for food policy analysis, it should also promote the impact of the research at the national level, and clearly did so in the countries we visited, because of the high regard of policy makers, up to Ministerial levels, for IFPRI and for the quality of its analytical research. Some of the national policy analysts whom we met also appreciated the greater impact on national policies of their work when done in collaboration with IFPRI.
43. Another important role for IFPRI could be in helping to initiate and widen the policy dialogue between developing countries and international agencies. Aid agencies may have particular enthusiasms and international financial institutions may impose conditions which are not always the most appropriate for a particular developing country, and which may prove to be counter-productive. We refrain from quoting examples, but they are many and diverse. A developing country is in a weak position to challenge such conditionalities or to suggest alternatives, and it is here that IFPRI can play a crucial role, so long as it maintains its reputation for independent, rigorous and objective analysis which is at the same time sensitive to local conditions. Collaboration with IFPRI can greatly enhance the confidence and capacity of developing countries to engage in policy dialogue with international agencies such as the World Bank. Indeed, this role was seen as extremely important by policy makers in some of the countries we visited, even though they recognized that IFPRI's analyses might often support the validity of the international institution's conditionalities.
44. While food policy makers in developing countries are naturally most interested in research on policy options done by IFPRI in their own country, we found that they were also acquainted with IFPRI's work in other countries. They were also interested in IFPRI's comparative studies, while appreciating the hazards of extrapolation from one developing country to another. There is an important role for $I F P R I$ staff here in discussing with national policy analysts and policy makers the likely implications for their country of IFPRI analyses of relevant problems in other developing countries.
45. The policy analysts in developing countries are the clientele most crucially in need of IFPRI's help. They have an intimate knowledge of their country's problems and the capacity to understand the analytical tools used to examine these problems. But they are, for the most part, isolated, overworked and underfunded. Contact and collaboration with an institute like IFPRI can be their lifeline, breaking their isolation, making them more aware of related problems in other countries, strengthening and expanding their work, and reinforcing its impact. They are IFPRI's "invisible college", and the primary target for its institution building.

## B. Institutions for Agricultural Development

46. Amongst these, FAO is central, and for IFPRI to be maximally effective requires it to maintain positive interactions with FAO staff at many levels and in many areas. Complementarity with FAO's activities is a guiding principle, as enshrined in IFPRI's mandate, but the Institute must also be prepared to respond to FAO initiatives, to collaborate with them, and to identify problems in need of action by FAO. In particular, there are important but controversial or politically sensitive issues where FAO may be constrained and which are appropriate for objective and independent analysis by IFPRI.
47. IFPRI's relations with the aid donor community are bound to be constrained to some extent by the Institute's need to win continuing support for its work. It is in the nature of IFPRI's research - unlike that of the other CGIAR centres - that it may sometimes reveal inadequacies or counter-intuitive aspects of the aid policies of some donors. We consider this to be a valuable part of IFPRI's work, and were impressed by the significance attached to it by developing countries. But it puts IFPRI in a vulnerable position. The aid process is very much in need of objective analysis, in view of its many-stranded approaches and effects. We urge upon all donors an appreciation of what IFPRI has to offer in this context, and a fuller understanding of its unique vulnerability within the CGIAR because of its work in this area. If the Institute is to honor its obligations to its primary clientele, the developing countries, IFPRI must be free to speak out forthrightly on policies and strategies for aid, because the recipients of that aid may be even more vulnerable.
48. Many other aid agencies and international institutions might be mentioned here, in view of the wide relevance of IFPRI's research on food policies. To give but one example, IFPRI's varied approach to food security has clearly been of immediate relevance to both the International Monetary Fund and the World Food Program, as has been abundantly acknowledged. But given its small size and the priority given to national systems for its attention, IFPRI may not always be in a position to respond to requests from aid and development agencies, even in its areas of special competence.

## C. International Financial Institutions

49. The World Bank and the regional development banks play a dominant role in agricultural development, and their priorities and policies have great impact on the path of development followed by, or sometimes prescribed for, developing countries. Each institution has its own policies, and each has considerable capacity for policy analysis. However, in view of the variety and changing fashions in these policies, as well as the great effect of their normative aspects - which are often not made explicit - it is desirable that such policies should at times be subject to independent analysis, for the sake of the developing countries. We consider that IFPRI has a most important role to play here. Given the capacity for policy analysis within the Banks, IFPRI's work will have an impact on Bank policies only so long as it is seen to be of the highest quality, rigor and objectivity. Once again, such a role could make IFPRI vulnerable, and will require courage on the Institute's part as well as understanding and encouragement from the Bank.
D. The CGIAR and its Centers
50. From the very beginning, it has been suggested that IFPRI could play a significant role in objective analysis of the allocation of resources within the CGIAR. Clearly it could do so, but we suggest that it should not participate directly in the allocation process, although its research output obviously contributes to a framework within which the allocation is developed by others. We suggest this partly because of the primacy of the national systems within IFPRI's clientele but also because of our wish to encourage IFPRI to work as much as possible in tripartite collaboration with the other CGIAR centres and the national systems.

The other centres may often be able to provide effective local support for IFPRI's collaborative work with national systems, their technical innovations may provide the engine for change in food policies, and their economists have much to contribute and to gain from greater interaction with IFPRI. These are important opportunities, which we consider could, on occasion, be compromised if IFPRI were to play a significant role in the allocation process within the CGIAR, even where its contribution lay only in defining priorities. We make this comment with some awareness of opinions in the other CGIAR centres.
51. Clearly, IFPRI's clientele is complex, many-stranded and multi-layered. It is highly sensitive, both professionally and politically. IFPRI must be fully aware of these sensitivities, yet it must also speak out forthrightly and independently if it is to be effective. In doing this it will be subject to conflicting loyalties to the various parts of its clientele, and vulnerable to criticism and loss of support. IFPRI therefore requires, and merits, considerable understanding by donors of the complex and uniquely vulnerable position of IFPRI within the CGIAR and amongst its clientele.

## A. Principles of Research Selection

52. The aim of this chapter is to see whether IFPRI's Mandate (para. 33 and Annex 6), together with some general principles of research selection, imply a set of desirable research emphases, both within and beyond the context of IFPRI's four existing programs. The quality of IFPRI's research is, in general, extremely high, as indicated in Chapter $V$. Here, we suggest principles for determining IFPRI's research specialization and balance, given the Mandate's "precise objective of contributing to the reduction of hunger and malnutrition".
53. This Mandate rules out much that IFPRI should not do. Further, even within research into food production, consumption and nutrition there are certain areas where a small research institute based in Washington is at a disadvantage. Project-oriented evaluation, data collection, and projection are required by major development agencies - the World Bank, FAO, USAID - which have larger and more appropriate resources for such tasks than IFPRI has. Pure, nonpolicy research - to test social-science theories - is best done in universities. Farm-management analyses, consumption surveys, and other work on micro-level data, unless needed as an intrinsic part of policy research, are better done by social scientists in other CGIAR centres and applied research institutions than by IFPRI.
54. When we have ruled out activities where a small, Washington-based institute has an absolute disadvantage, there remain many areas of policy research where IFPRI's skills and resources give it an absolute advantage - too many for IFPRI to tackle them all. Three principles of selection suggest themselves.
55. The principle of comparative advantage suggests that IFPRI would contribute most by selecting the research in which its scholars have the greatest proportionate capacity to perform better than others. This principle was often put to us by IFPRI's clients and competitors. However, it is of limited practical use. For example, if cassava policy research were more relevant to the reduction of hunger than wheat policy research and less likely to be done effectively outside IFPRI, then IFPRI should give cassava policy research priority - even if it could outperform its rivals more dramatically in wheat policy research.
56. A second principle is that IFPRI's own experts are best equipped to judge changing research priorities. Good researchers respond most rapidly when unconstrained by rigid overarching principles of research selection. The Director has been careful, within the framework of strong intellectual leadership, to ensure the academic freedom without which good researchers cannot function. However, this principle cannot completely suffice. If it could, neither peer review of publications nor External Program Reviews would be required.
57. There is a third principle of selection, also frequently applied by IFPRI: seek the major unfilled gaps in food policy analysis; ask in what activities of gap-filling (which, at a high level of research, include gap-defining) IFPRI research can do most to fulfill the mandate; then determine what program structure is needed to steer IFPRI's resources towards such activities. In the real world, this "optimal gap-filling" principle gives very different results from comparative advantage.
58. For IFPRI, such gaps can often be filled by new work within one of the four current programs. However, a program should shrink if it can discover few or no such topics which are not researched adequately elsewhere. Conversely, a new program may be needed to accommodate other topics.

## B. The Four Main Areas of Work

59. Past performance and current research in the four programs will be assessed in Chapter $V$. Here, we briefly ask what role work on trends, production, consumption, and trade, if optimally done, might have in the next 5-10 years within an IFPRI policy "research effort ... geared to... reduction of hunger and malnutrition".
60. Any researchers, to identify the best policies to reduce hunger, need to examine likely trends, to spotlight where that hunger is likeliest to be. Yet, outside IFPRI, many food policy researchers successfully operate without a "trends" program in their own research institutes. They have to rely on other organizations for the analysis of overall trends. However, hungeroriented, country-specific, at-risk-group-specific, and project-specific trends analysis is necessary for some IFPRI studies. The Institute, moreover, increasingly may need to undertake research into food data systems (para. 155), absorbing the statistical skills that, in IFPRI's formative years, were directed into an independent capacity for trends analysis.
61. A food policy research institute requires work on production that allows for the necessity - and frequent insufficiency - of extra food output to reduce hunger. Hungry people need either to grow and eat more food, or to get non-farm jobs or assets so they can buy it. Hence IFPRI's production research must formulate cost-effective policies, not only to grow more food, but to get it to people at nutritional risk. IFPRI has so far not researched rural programs aimed explicitly at asset distribution (or at employment creation), nor policies to improve nutrition of the urban poor through better land use. IFPRI's research into policies for increased production, within the context that the extra food output - even from wealthy farmers - can benefit the poor via employment and consumption linkages, is refreshingly unorthodox. However, policy research into more direct employment and land-tenure policies may now be needed. Such research, to reconcile societal equity with production economics, should be tackled within IFPRI's production program and not left only to primarily equity-oriented and sociological research groups such as UNRISD. This program should also address parallel issues of production and urban food access (para. 68).
62. Research into consumption and nutrition policies is essential to meet IFPRI's goals, and requires the skills of nutritionists as well as economists. As the Institute's work well illustrates, IFPRI needs to study food policy alternatives - e.g. food subsidies, shifts to cash crops or high-yielding varieties - that affect nutrition. But policies beyond the conventional area of food, e.g. on exchange rates or employment, can affect nutrition even more. Also, the nutritional and consumption work itself needs to be linked with the production research at IFPRI.
63. IFPRI rightly studies policies for food trade and food security. Superficially, trade policy research might seem remote from its mandate's focus on the reduction of hunger and malnutrition. A hungry rural person consumes few food imports; the growing role of such imports in low-income urban diets may well require better policies for domestic food production and consumption rather than for trade. Problems of food exports occur only in a few middleincome developing countries. Employment on non-food export crops, being unreliable, is sometimes associated with hunger, but does not present obvious research gaps for IFPRI. However, such a dismissal of trade policy research would be mistaken. For small countries with high trade/income ratios, the level, terms, and stability of trade, and the distribution of gains from it, greatly affect food production - a key aspect of IFPRI's work - and also food consumption. For example, policy choices to expand trade among developing countries could have big nutritional effects. Trade involving small low-income countries, therefore, is and should be an object of IFPRI's food policy research. The trade mixes, levels, practices, and policies of rich nations, also significantly affect growth and stability of poor people's food production and consumption, and are thus proper topics for IFPRI research. A nutritional focus, however, should steer an IFPRI program on trade and food security more towards the distribution, within a poor country, of gain or loss from trade policy options. Moreover, much IFPRI research involves food security and food financing; here, too, research into the impact on at-risk groups within poor countries, e.g. from different storage policies, would be indicated by the mandate.

## C. Possible New Research Directions

64. The existence of a trade program testifies to IFPRI's recognition that, in the Mandate's words, "reduction of hunger... requir[es] analysis of underlying processes ... extending beyond a narrowly defined food sector". This extension is fully recognized in IFPRI's research in international policies and now needs to be more extensively incorporated into its research on national policies. The totality of development policy of poor countries - not just food or even agricultural policy - impinges on their success in growing more food and in feeding poor people.
65. Several examples suggest how a Development Strategies Program might help; not all, of course, would justify long-term staff.
(a) FAO is currently seeking guidance on how the "health environment" affects dietary energy requirements; there is little quantitative factual evidence, and almost no policy research, on resource allocations between health and nutrition sectors.
(b) Almost every month, one or another poor country must make very big shortrun policy adjustments, either to balance-of-payments and debt crises, or to conditions imposed by the International Monetary Fund's Extended Financing Facilities or the World Bank's Structural Adjustment Loans. What policy choices, in these short-run adjustments, least harm the nutrition of children or adults at risk? Developing-country governments would benefit if, in such areas, IFPRI could provide the sort of policy research input it is providing to several South East Asian countries in relation to their options for irrigation development. Such options have been defined as "food policy"; adjustment options have not.
(c) Since publication of the 1981 issue of its annual State of Food and Agriculture, FAO has abandoned attempts to track the proportions of public outlay and investment, or of total investment, devoted to agriculture by different countries. The proportions derived from the IMF's functional classification (in "Yearbook of Government Finance") are not very useful either. Both lacunae are due to the bad state of the data, the unclear links between such proportions and food or agricultural output or efficiency, and the scarcity of economic theory to analyze the effect of, let alone to guide, alternative policy decisions about the proportion of resources that agriculture gets. IFPRI could well analyze these issues.
66. IFPRI's resources can be used cost-effectively for such tasks. In much of its research, IFPRI is already edging towards this wider perspective on development policy. A further move might well be welcomed by the Institute's staff, and donors, and could help promote coherence among the existing programs. A "Development Strategies Program" is outlined in Chapter V, (para. 119).
67. Some redirection of the "Trends" program research would be indicated by IFPRI's increased emphasis on Africa. Before useful trend analyses can be based on African food production data, the quality of most such data must be greatly improved. Indeed, food policy research - and food policy - in a country needs a sound statistical base, and the "Trends" Program at IFPRI could play a much needed role by investigating the improvement of food data systems (para. 155).
68. An increased emphasis on work in Africa would also require some involvement with the food policy consequences of the demographically-led transition, in many parts of Africa, from land plenty to land scarcity (see FAO "World Food Report" 1983). Policy on land use, in the wake of urban expansion into prime farmland, is an urgent and neglected area for research in many African countries: to what extent is urban food production a cost-effective way to improve nutrition? (cf. para. 89). While the stress in this analysis should be on urban population impacts on land use, policy options for other, non-urban, encroachments on food lands - desertification, over-grazing - might also be considered.
69. There are other gaps that IFPRI might fill. Some are dealt with in Chapter $V$. Here, we have confined ourselves to several promising areas where IFPRI, given its mandate and expertise, could fill major gaps.
70. IFPRI's existing program, its justified wish to increase its African work, and the changes suggested above, all have major implications for the regional and disciplinary balance in the Institute's research. These are considered below, especially in Chapters VI (para. 324) and IX (para. 387) respectively.

## D. Some Implications for Procedures

71. Regions apart, in what sorts of countries should IFPRI's policy research be carried out? Three groups of countries can be distinguished. In group (a) extreme hunger is negligible, and/or domestic policy analysis, information on
food production and consumption and capacity for governmental implementation are in good shape. IFPRI should occasionally study countries in Group (a) to learn "dos and don'ts", and to assess how their policies might affect hungry people elsewhere; but its main policy research should lie where the needs are greater. Group (b) countries, whatever the degree of hunger, can not or will not use policy research and policy making to alleviate it. Here, too, there is little point in IFPRI seeking to provide research input, except occasionally to learn what to avoid. Most developing countries lie between these two groups, in Group (c). There is much hunger; the information base is partly developed and the country is to some extent willing and able to implement measures to reduce hunger; local policy research has limited, but upgradeable, capacity to select appropriate measures.
72. Some research on food policy in those Group (c) countries with a relatively good policy system - the foci of IFPRI's early work - should continue, especially because in some, notably India, the incidence and severity of hunger have not declined. An "optimal IFPRI" should build on the lessons of past research on such Group (c) countries - India and the Philippines - for the benefit of countries with less information, research, or implementation capacity.
73. IFPRI's justified tilt towards Africa (paras. 331-333), and thus, within Group (c) countries, from those closer to Group (a) towards those closer to Group (b), implies changes in procedure: first because the countries closer to Group (b) have, in general, less capacity to absorb or use outside policy research without help; and, second, because the researched realities are different, in several respects:
(i) A much larger part of policy research in Africa must be devoted to post-publication follow-up. This is not strictly a research function, but is essential if research is to be used. We are glad to note that IFPRI plans to extend its capacity here.
(ii) Because of the relative shortage in most countries of local institutional support, and because of the rapid turnover of key African research and policy personnel, larger IFPRI teams may be needed in Africa than in Asia (para. 332).
(iii) In Africa the knowledge base across the whole range of food policy sciences is much smaller than in the other major developing regions. Food policy research, therefore, is likelier to require a wider range of disciplines to develop an adequate understanding.
(iv) IFPRI should consider how it might better use attachments to strengthen, and retain locally, national policy research skills inside African institutions.
(v) To reduce the risk of early and discouraging failures, IFPRI should not, at first, work in the most obviously difficult countries.
(vi) Given the costs and difficulties, regular, senior overview should be strengthened and simplified by regional concentration of work on a small number of countries.
74. After an initial period in which a sharp focus on one form of economic analysis was justified, a broader attack on the whole range of key food policy variables now seems desirable. Shifts in research directions, and in regional and disciplinary balance may also imply some shift in research methods, although most of the principles remain unaltered:
(a) Farm management research explores how resources may be used optimally within individual farms. IFPRI carries out some such field studies, in order to understand how farmers may react to policy changes. To the extent that this research is needed to understand the implications of policies - whether directly or through linkages to consumption and the non-agricultural sector - it is appropriate for a policy institute. However, IFPRI should not play a major role in developing farm management research methodology or in doing farm management research.
(b) Research on farming systems can be sub-divided into (i) farming systems research sensu stricto, (ii) on-farm agronomic research in a farming systems perspective and (iii) research to develop new farming systems. The latter two categories necessarily involve large biological research components and hence could not be undertaken by IFPRI. The first, like farm management research may sometimes be of direct concern to IFPRI, e.g. in examining the production and nutritional consequences of crop substitution, but farming systems research per se is hardly appropriate for a small, Washington-based food research institute.
(c) Policy analysis, especially in little-researched countries, may require IFPRI to supervise a few "village studies", in order to identify how intra-village transactions and balances affect the impact of alternative policies on the nutrition of the poor. Hunger ultimately hits individuals, but is affected by policy as mediated through inter-household (inter-farm, employer-worker) power relations. There is much to be said for localized field surveys to understand such processes.
(d) It may be unwise to select localities in which the problem under investigation is relatively less severe. In little-researched countries, a larger number of field surveys, in quite different areas, may sometimes be needed. Together with a shift towards more African research, this implies that projects should be fewer, larger, and more intensively supervised (e.g. para. 124).
75. Finally, what should be the balance between policy research and policy advice? We have at several places (e.g. para. 7l) assumed that IFPRI exists not only to analyse research, but also to improve the impact of food policy on hunger. Also, the distinction between analysis and advice can be overstated: if research proves that one policy yields more food, no less of other outputs, and less hunger than another equally costly policy, then such research implies "advice". However, most IFPRI research is on a particular region or country; is based on a number of challengeable assumptions - and may depend for its findings on particular constellations of times and policies. IFPRI's Research Reports almost always fully recognize, and state specifically, these limitations. Great care is necessary to ensure that summaries, abstracts and verbal presentations, which are more widely used by policymakers than the reports, do not drop crucial cautions, even though policy makers sometimes try prematurely to insist on answers.

## V.

WHAT IFPRI DOES: ASSESSMENT OF THE FOUR PROGRAMS

## A. Introduction

76. IFPRI has established a reputation for high quality food policy research among international and national policy makers and policy analysts. Its research has also proved to be relevant to the problems of developing countries, useful to their policy makers, and of considerable impact and value. On the basis of our discussions with a wide spectrum of IFPRI's clientele, and of our own evaluation of its research output, we consider that IFPRI's Research Reports (RR) generally set a standard of excellence for research on food policy problems confronting many developing countries. We have no doubt about the overall quality of IFPRI's research although, as with any institution, some parts of its program can be criticized.
77. The International Food Trade and Food Security program made a major contribution to the international discussion that led to the establishment of the IMF cereals import facility. In the area of food security, the program has stimulated research which has been summarized in two important books. Other work in food trade; aid and security of great value to particular developing countries is summarized in 13 Research Reports. The Food Production Policy and Development Strategy program has worked intensively on a number of priority problems covered in 15 Research Reports and many journal articles and working papers. The Food Consumption and Nutrition Policy Program has been well thought out and productive, as is evident also from its 10 Research Reports and numerous articles of a high analytical calibre. Examination by the Food Trends Analysis Program of the food needs of developing countries has led to 5 Research Reports which have been used as reference works by national and international organizations.
78. IFPRI has sought to develop expertise in food policy research in countries through its own senior researchers, its consultants, and its collaborators in field projects. These relationships have contributed significantly toward building research capacity, although it must be recognized that in many developing countries this capacity remains extremely weak.

## B. Food Consumption and Nutrition Policy Program (CNPP)

79. This is a coherent and productive program, of high analytical calibre. Its coherence stems partly from the fact that the program evaluates policy options mainly by comparing their impact on one clear-cut goal, namely increased dietary energy intake for the hungry. Most clearly of IFPRI's four programs, therefore, CNPP meets the Mandate's directive that IFPRI's "research effort is geared to the precise objective of contributing to the reduction of hunger and malnutrition".
80. Thanks in part to CNPP's reputation for high quality, it has been good at attracting outside funds for special projects. That is excellent, but the very small allocation of core funding - only $31 \%$ of spending specific to CNPP is core-funded for 1984 , as against $66 \%$ overall - may reduce career stability of staff, continuity of planning, and attention to long-term work. The great
dependence on special project funds could discourage outside funders and threaten CNPP's coherence.
81. We were presented with seven "priority areas", yet in 1984 CNPP has only 3.55 staff-years and 1.9 special-project-staff-years of research capacity. With resources this scarce, CNPP requires tighter priorities. It should be organized around (a) consumption and nutrition effects of food prices and subsidies, (b) the shift to cash cropping, and (c) technical change. These are reviewed in paras. 82-87 below. Two further small sub-programs (paras. 88-96) offer prospects of breaking into exciting, new, policy-related areas, and should be expanded and reorganized - one in an enlarged CNPP, the other in the proposed new Program on Development Strategies (Ch.V, paras. 119-121). A proposed data function (para. 97) should be undertaken as part of the proposed work on food data systems (para. 155). Some problems of research methodology (paras. 98-101) and program organization (para. 102) also need attention. We stress, however, that CNPP's publications, fieldwork, and "mandate-relevant" policy-orientation are generally of a very high order. Concentration of effort and expansion of core support are now needed to make the best use of the acquired experience.
82. The sub-program on food prices and subsidies includes five completed country studies, with several more in progress. The work is producing results of great importance to policy makers. It has been shown that in Egypt (RR42), Kerala (RR5), and Sri Lanka (RR13), consumer subsidies on cereals have greatly improved poor people's nutritional status. Regional and urban biases, in sharp contrast to the large ones reported in the Bangladesh subsidy program (compare RR8, p.12, with RR34, Ch. 6), are now at much lower levels than is generally alleged. Current work shows a serious deterioration in levels of food consumption in Sri Lanka between 1970 and 1980, with increase in the level of acute malnutrition. There are indications that these findings are partially attributable to the process of economic liberalization in general, and to reduction of the food subsidy in particular. This is a warning that great care is needed to minimize harm, when the need for fiscal saving dictates the contraction of subsidies. IFPRI's Egyptian research has guided policy makers on how to reduce such harm by selecting foods and methods suitable for targeting.
83. This sub-program should clearly continue. Some common problems, however, beset most of the eight case-studies. First, calorie requirements of different groups - according to differences in family size and structure, work intensity, body weight, climatic region, etc. - need to be analyzed and more prominently presented in evaluating alternative regional allocations of a food subsidy.* Second, when reviewing the effects of subsidies on the whole economy, CNPP needs to take more account of the implicit fiscal effects of both the expansion and the changing pattern of government spending. These effects suggest that the sub-program should be broadened to examine the nutritional effects of alter-

* Probably because requirements were understressed, some CNPP
publications claim regional differences in calorie adequacy
that seem to clash with their own behavioral findings: compare p. 18
and Table 7 of RR13 on Sri Lankan estate populations; and, on
Brazil, compare the claim that "the malnourished [are] centered in
urban areas" (RR32, pp.9, 20) with food-income behavior indicating
the opposite (Tables 13 to 16).
native, fiscally less burdensome, ways of getting more food to the poor, such as employment guarantee schemes (with or without "food-for-work"), and schemes to enable the poor to create their own productive assets (e.g. Proshika in Bangladesh and Oxfam's program in West Orissa). Third, in identifying groups at risk of undernutrition (and thus perhaps needing food subsidies), CNPP should look into the rather weak links between calorie intake, body size, and health and performance.

84. The sub-program on consumption and nutrition effects of shifts to cashcropping involves work in Kenya, Zambia, the Philippines, and India. It promises to illuminate policy choices now much influenced by prejudices against either subsistence or marketing. To do so usefully, the sub-program needs to go - as indeed it partly does already - beyond asking whether farm workers or farmers who shift to cash-cropping eat better or worse than others. The crucial question is why. The mechanisms, including the possible impact of a spreading cash economy upon the structure of property rights and of security, need careful review.
85. The sub-program is to be commended for its detailed fieldwork. However, this carries a risk of an over-localized approach. If a region of Kenya shifts from growing maize for local consumption to growing sugar for export then buying its food needs from elsewhere, the main effects, good or bad, on food prices and scarcities and hence on nutrition, may well be felt outside that region.
86. The third major sub-program, on consumption and nutrition effects of technical change, is under way in Malaysia (effects of irrigation), Northern Nigeria (fertilizers), India (dairying) and the Sudan. The great importance of this subject to policy makers and in IFPRI research make the omission of nutrition from Q. 3 and $Q .5$ of "the six questions" rather unfortunate.
87. The sub-program is promising but, like others (para. 84), it needs to concentrate upon mechanisms, not just statistical comparisons of "with and without" and "before and after" change. For example, in Muda, Malaysia, some observers allege that irrigation, by permitting double-cropping, has so encouraged rapid harvesting that many farmers have adopted combines and displaced very poor migrant harvest workers, thereby worsening nutrition. Such allegations need to be scientifically evaluated in the sub-program.
88. This completes the three sub-programs that CNPP can effectively handle alone without more core resources. CNPP has, in the past, worked usefully on the structure of demand for food in Indonesia, Brazil, Egypt and the Philippines. Currently this sub-program comprises two small projects, on how changes in land use affect the structure of demand for food, via both crop-mix and the use of labor-time. In response to donors, and perhaps to fashions in research (admittedly important ones), the changes in land use involve erosion and social forestry.
89. These small projects should be completed. They somewhat strain the coherence of CNPP work, but may direct IFPRI's attention towards policies affecting the impact of land use on food production, not first consumption. This will be a major food policy issue in the coming years. Urban, road, and other built-up expansion is occupying some of the best available agricultural lands. Conversely, urban food production is often very high-yielding and an excellent generator of employment. More than 1 in 10 workers in Indian and $S$. American cities with populations over 100,000 appear to be engaged mainly in food production. Both issues are almost wholly unresearched, yet are vital to food availability in Africa, with its rapid population growth, rising urban share, and steady shift from plenty of land to scarcity of land. IFPRI's interest in changing land use and effects on food availability, therefore should
(a) embrace food production as well as consumption, and (b) concentrate on policies to affect or to respond to changing land use due to demographic, especially urbanizing, growth.
90. The proposed Development Strategies Program (see paras. 119-121) should begin a joint sub-program here. This would relieve two of our concerns: that CNPP, except when it considers food subsidies, tends to neglect urban malnutrition and hunger; and that CNPP's work is not sufficiently related to food production which not only determines but may also be determined by consumption and nutrition.
91. CNPP is considering work in a new area: consumption and nutrition effects of fluctuation in food production, prices, and rural incomes. Unlike much nutritional research, that of CNPP has paid careful attention to seasonal effects of the policies researched. CNPP now wishes (a) to extract and integrate such findings from its studies, and (b) to examine how policy can best alleviate the nutritional effects of interacting fluctuations, e.g. in the intensity of work and the risk of infection, as well as in food production, prices and rural incomes.
92. We warmly support exploratory work of this nature. If extra resources can be found, it could well grow into a major sub-program because many suggestive observations exist,* but little policy-oriented research as yet. Three suggestions may help IFPRI in formulating this work.
93. First, it is the poor who are most liable to be harmed by fluctuation. Often they are casual workers, dismissed when labor is in slack demand. Such casuals seldom have access to credit or insurance markets. Also, the poor are most hurt by downward fluctuations in well-being. Recent work, including some by Dr. Edirisinghe at IFPRI, indicates that below a point of "ultra-poverty" i.e. well below the income-level sufficient to afford average calorie requirements, there are rather drastic changes in behavior in respect to food consumption, labor participation, and risk-bearing. For example, very poor people, when income rises, may not reduce the proportion of income spent on food, nor their participation in work. IFPRI's work on fluctuations might profitably concentrate on households at risk of falling below the ultra-poverty threshold.
94. Second, for reasons as yet little understood, there appears to be considerable variation in the capacity to use dietary calories efficiently. Nutritionists agree that different individuals have different average needs, even when age, sex, work, and weight are the same; they disagree about how much, for how long, and why any one person can adapt, without harm, to lower calorie intake by more efficient calorie use. Both aspects clearly affect the choice of policy, whether to reduce fluctuations or to improve response to them. For example, people in some areas might need extra dietary calories more than people in other, apparently similar, areas. We suggest that the research topic named in para. 91 could usefully concentrate upon fluctuations near the threshold of ultra-poverty, as affected by variable efficiency of dietary energy utilization.

[^15] Poverty, Pinter, 1981.
95. Third, we advise against confining "fluctuations" to seasonal variation. This variation is largely expected, and even the poor make preparations for it. Unexpected variations - bad harvests, low prices for cash crops - can affect nutrition more seriously. Also, the worst harm is done when unfavorable variations in the environment coincide with unfavorable contingencies in a family's life-cycle, whether expected or not. One or two carefully-prepared field studies of both sorts of fluctuation - contingency plus variation - could tell us more about preventing hunger than several studies of seasonality in food production, prices and rural incomes alone.
96. This more fundamental research should not be used prematurely to derive policy results; IFPRI can afford, indeed must do, some basic conceptual research. However, the need for ultimate relevance to food policy should be borne in mind throughout the design of this research.
97. This ends our assessment, broadly very favorable, of CNPP research and its possible courses. One other proposed activity needs comment. Two senior CNPP staff members hope to help develop household-level data collection and analysis in some African countries. These data are needed to document the food production, needs, and consumption of the poor. Such work could be highly relevant to the development of better food data systems (para. 155).
98. We turn now to some general issues of method and organization. A vexing problem of consumption and nutrition studies is lack of so-called panel data, i.e. time-series which track the fortunes of particular households and individuals. If available also for a control group, such data provide much the best way to evaluate the effects of, say, technical change or a shift to cash-crops on nutrition. We feel that some CNPP studies are limited by reliance on crosssection data, and/or very brief time-series, to assess fairly long-term nutritional effects. The remedy is sometimes to search out and use existing panel data (e.g. from ICRISAT's village studies); occasionally, where essential to policy research, to collect new panel data; but most often, to design one's policy questions sufficiently rigorously so that careful use of cross-section data suffices to answer them. CNPP's Egyptian research illustrates the last route. Some CNPP work, however, is forced, by the lack of a research design that allows properly for the absence of panel data, into questionable policy conclusions and/or diversion of research from policy to descriptive analysis.
99. This is an especially serious problem if changes in "structural", longterm factors such as labor-hire practices or land tenure are excluded when we evaluate how (say) irrigation affects nutrition. Survey questionnaires designed by economists and nutritionists, even of great skill and experience, often tend to close options and fix responses (and reasons for behavior) into inappropriate, yet closed and internally coherent and unchallengable, logical frameworks. Moreover, in IFPRI's excellent and wide-ranging review of professional opinion in "Nutrition-related Policies and Programs: Past Policies and Research Needs" (Kennedy and Pinstrup-Andersen, 1983, p. 68), several reviewers indicated that family cultural practices [and community, especially urbanizing, behavior] might well prove to be more important than income or food prices in determining nutritional status. No wonder, then, that several CNPP staff members emphasized the need for help from anthropologists. This may well mean a senior, core post, rather than ad hoc, junior project staff.
100. We encourage CNPP to follow up some of its findings. Have the surprising falls in Indian food consumption between 1964 and 1973 (RR12, pp. 39, 59) been redressed? Is the food subsidy in Bangladesh (RR8) still as anti-rural as it
was in the mid-1970s? Rapid demographic change can very quickly date findings about nutrition and consumption.
101. A final point about methods concerns production-consumption links. Different output-mixes, production locations, and labor hire and search practices impose very different calorie requirements on different groups by age and sex. Although IFPRI's production work is concentrated, perhaps excessively, on a special sort of linkage to consumption, the CNPP, in its equity-linked work needs to look more closely at these linkages of production to calorie-consumption needs and choices.
102. We shall not end on a quibble. This well-integrated, high-quality group is producing excellent work, central to IFPRI's mandate. Its ability to attract special outside funding is a sign of high repute. However, this great reliance on special funds takes much energy away from research, and can create insecurity and a sense of second-class citizenship within IFPRI's financial structures. The existing imbalance (para. 80) does not fairly reflect CNPP's outstanding record.

## C. Food Production Policy and Development Strategy Program

103. This program is the largest among the four program areas of IFPRI, absorbing about 40 percent of its research manpower. The large share of resources for this program can be justified on the grounds that the primary goal of the CGIAR is to increase food production in developing countries. The major research objective of the food production policy program is, therefore, conceived as how to improve policies for accelerating growth in food production, which is a necessary, though not sufficient, condition for ameliorating poverty and malnutrition in developing countries.
104. Research in this program area has encompassed a wide range of production policy problems and has produced results of high quality. The various research projects appear to be not as closely coordinated as in other program areas. The three sub-programs, (a) Specific Production Policies, (b) Production Strategies, and (c) Growth Linkages, are not sufficiently well linked, possibly because of the diversity of problems requiring attention in this program. Yet, a sharper focus on priority policy issues relevant to the acceleration of food production in developing countries could improve research productivity.
105. There is now a consensus that technological change geared to increasing yield per unit of land area is the key to growth of food production in most areas in developing countries where land frontiers are closing. Leaving aside for the moment the question of structural change, it is generally agreed that critical factors for the development and diffusion of yield-increasing technology are agricultural research, fertilizer, water control and irrigation, and the control of pests, diseases and weeds. IFPRI has three of these major issues on its research agenda. Incidentally it is a misnomer to call this sub-program "specific production policies"; it would better be called "strategic production factors". Clearly the major production policy problem is how to organize agricultural research, fertilizer supply and investment in water control in such a way as to maximize both output and employment in food production so that both growth and equity can be achieved.
106. Weakness in agricultural research capability is probably one of the most serious impediments to the increase in food production in developing countries. Research resources, especially high-calibre scientists and technicians, are scarce in developing countries. How to use this scarce resource efficiently and how to increase the endowment of this resource are aspects of a major policy question bearing on the achievement of rapid growth in food production. Analysis of the problems of resource allocation to agricultural research in developing countries, especially those characterized by weak research capability, should therefore have a high research priority. IFPRI's attempt to work on this important but difficult problem must be commended. However, it must also be recognized that the allocation of research resources is an elusive problem for which the methodology has not yet been established. Hence, any research on agricultural research must be experimental and exploratory, starting with careful documentation and comparison of experience in a few countries together with a search for useful research methods. IFPRI's past work on Nigeria (RR 17) and the current comparative studies of six African countries and of Nepal is along these lines. At this stage this research should aim at setting clearer objectives, developing appropriate methodologies and beginning to move towards defining the requirements for successful agricultural research organizations. Intensive discussions with research scientists and administrators in the national systems and in CGIAR institutes will be necessary, and close collaboration with ISNAR is desirable. Assuming that the present level of effort (two senior researchers) is maintained in this field of study, we suggest that, not later than 1986, IFPRI's results and methods in "research on research" be subjected to critical external review before deciding whether changes in this program are required.
107. Research at IFPRI has shown that availability of fertilizer plays a more critical role than incentives on the demand side in leading to increased fertilizer use (RR 31). Fertilizer is a critical factor in raising food production not only in irrigated areas but also, if supplemented by appropriate technologies in non-irrigated ones, as is clearly illustrated for India in a paper prepared by Desai for an IFPRI Workshop on Food and Agriculture Price Policy. Some developing countries have built inefficient fertilizer plants, others tax fertilizer imports, and others subsidize fertilizer sales. Often the fertilizer formulations available to farmers are agronomically inefficient. In many cases fertilizers are distributed through government marketing channels in a fixed package with credit and extension, without due consideration of differences in economic returns to fertilizers among regions and among farms. In general, market intervention and other government policies substantially alter the incentives to farmers, and hence the level, distribution, and efficiency of fertilizer use. We consider that IFPRI could add significantly to research at IFDC and elsewhere on fertilizer policy problems and that the resources currently allocated to work on fertilizer policy at IFPRI are insufficient relative to the need. The assignment of one senior researcher to work full time in this area would, in our opinion, be amply justified.
108. In the past IFPRI has done little research on water control. This lack of emphasis has probably been due to the large amount of research on irrigation that has been done by the World Bank and other international financial institutions in relation to their lending operations. The effect of irrigation on multiple cropping was analyzed in an Indian case study (RR 20). The project now being undertaken by IFPRI in collaboration with the Asian Development Bank on irrigation in the Philippines, as well as the ongoing research in ASEAN countries under the rice policies project are welcome steps towards a more effective coverage of water control as one of the three dominant strategic fac-
tors. Although the project is relatively small in terms of both the area covered and IFPRI's staff committment, it is highly comprehensive, covering macro as well as micro aspects, and output as well as equity effects of irrigation construction, maintenance and operation. In these respects, IFPRI may be able to make a unique contribution to irrigation policy analysis. Until the outcome of the collaborative project in Southeast Asia has shown that this is indeed the case, the research on irrigation should be carried out within the currently proposed scale. It is essential that IFPRI's work on irrigation should be carried out in close consultation and collaboration with institutions with technical expertise in this area, such as IIMI and the Water Management department at IRRI.
109. It must be emphasized that research on water control cannot be independent of socio-political analysis. Construction and maintenance of small irrigation systems involve communal activities which are conditioned by the socio-political structure, such as class structure based on land asset distribution and tenure relationships in local communities. Traditional ethical principles, such as mutual help in village communities, are important parameters in determining the cost effectiveness of irrigation investments. Explorations into those social, political and cultural aspects must supplement the purely economic analysis.
110. If we call the first of the sub-programs "Strategic Production Factors", the second sub-program would be better named "Specific Production Policies", because this sub-program does in fact include various specific production policies. In our judgement, projects in this sub-program should be more closely linked with the three strategic factors identified in the first sub-program. For example, research on instability in food grain production which was first examined the Indian case (RR25 and RR30) and is now being expanded to cover the United States and other countries, should be more explicitly structured so that the roles of water control and fertilizer can be clarified. Likewise, research on substitution among crops in SAT Africa should incorporate an analysis of the effects of agricultural research, irrigation and fertilizer on crop combinations. To produce meaningful policy insights, such work should, from the outset, be designed and executed in close collaboration with natural scientists from other CGIAR centres and the national systems.
111. The emphasis on greater integration between the first and the second subprograms does not preclude the need for work on some projects that fall outside the area of the strategic factors. The latter are vital for agricultural growth in a labor-abundant, land-scarce environment. However, in some areas in developing countries such as Zambia, people are poor despite abundant land resources. A proposed project on the causes of low labor productivity in SubSaharan Africa seems to represent an important exploration into such situations. This type of research will need gradual expansion since Sub-Saharan Africa is currently the most serious food problem region.
112. The third sub-program, "Growth Linkages" is an innovative approach seeking to cover the wider problems of economic development in relation to agricultural development. Since problems of agriculture and the food sector really cannot be treated in isolation from the rest of the economy, the extension of IFPRI's research to inter-sectoral relationships is inevitable and desirable. Yet it is important to recognize that such analyses should not be limited to the production program. Other program areas should also explore the inter-sectoral problems from different angles. In fact, significant research of this kind has already been done in Egypt by the Food Consumption and Nutrition Policy program in the study on the effects of subsidy policy on overall economic development
(RR40). Research on inter-sectoral relationships and overall development strategy should be structured on an inter-program basis rather than as a component of the Production Policy program.
113. The inter-program research group for overall development strategy discussed below (paras. 119-121) might be structured according to the model of the cropping systems program at IRRI. There, scientists of various disciplines such as agronomists, economists and plant breeders, who continue to belong to their respective disciplinary departments, are mobilized for cropping systems research, which is by nature interdisciplinary, under the coordination of a program leader who has an independent office and supporting staff.
114. The "Growth-Linkages" analysis, which may be more appropriately named "Production-Linkages" analysis, when seen as one component of such inter-program research on overall development strategy, will need a sharper focus and better coordination with the first two sub-programs in the Production Policy program. It should specifically address the inter-sectoral linkages as they relate to the strategic factors and any effect they have on increased food production.
The project on the linkage effects of high yielding varieties (HYVs) clearly has such a focus. The previous studies in Malaysia and Nigeria were unfortunately limited because only consumption linkages were taken into consideration (RR41). The new project for the Punjab is expected to produce much more useful results because the linkages through farm production (input), consumption and capital formation are incorporated in the form of a social account matrix.
115. Other projects in the "growth Linkages" program seem to need sharper focus and better coordination. For example, it is probably wise to limit the scope of the project on "linkage effects of rural infrastructure" to irrigation infrastructure only instead of including all forms of rural infrastructure, at least in its initial stage. It is not clear whether the project on "Marketing Channels and Service Provision" in rural India belongs to the "Growth Linkages" program within the production policy program. This could be an important project bearing on the problem of market development, which has been insufficiently researched. It encompasses production and consumption, or more correctly, the linkages between production and consumption. By nature, this is inter-program research for which better coordination between programs may be needed.
116. In short, the "Growth Linkages" sub-program should be considered as one component of the Institute-wide inter-program research on overall development strategy and, as such, it should be focussed more sharply on the strategic production factor problems initially identified in the production program. At the same time, "Growth Linkages" analysis in the production policy program needs to maintain close collaboration with linkage analysis in other program areas so that the effects of growth in food production on consumption, nutrition and trade, and conversely the effects of consumption and trade on production, can be comprehensively analyzed.
117. The main emphasis of research in the production policy program should continue to be placed on how to improve production efficiency so as to maximize food output available for developing countries, recognizing, however, that the choice of production policies has a direct bearing on equity. For example, employment and income of the poor who have no production means other than their own labor will be adversely affected if agricultural research is geared to develop labor-displacing technologies. Irrigation investment in a relatively favorable area might contribute much to growth in aggregate food output while increasing inter-regional disparities. In the past, IFPRI's approach to the equity implications of production strategies has been limited mainly to linkage effects of increased production on regional employment and income (RR33
and RR41), except for an excellent overview of growth and equity in India (RR28). Greater emphasis is essential in the future on the direct incomedistribution effects of alternative production policies particularly within the agricultural sector.
118. IFPRI should not hesitate to undertake socio-political investigations where these impinge on its production policy research, as in the socio-political workings of local communities in mobilizing their own resources for construction and maintenance of small irrigation systems, as emphasized previously. In general, however, such topics should not become major research projects in themselves.

## D. The Case for a Development Strategies Program

119. As the mandate states: "IFPRI's policy oriented research is to stress alternative development strategies from the viewpoint of their implications for food production and consumption; food production processes, particularly the role of technological change in agriculture; food consumption issues, particularly as they relate to low income groups; and international food trade, aid and food security."
120. This formulation recognizes development strategies as a central element in IFPRI's work and, implicitly, that all of the Institute's programs should contribute to this. However, under the present organizational arrangements, Development Strategy is identified with the Production program, and is viewed largely from the perspective of direct effects flowing from enhanced food production.
121. In our opinion this rather narrow framework should be widened. We therefore recommend that IFPRI consider the establishment of a separate Development Strategies Program, for the following reasons:
(a) It would explicitly recognize that the impact of alternative development strategies on food production goes far beyond the linkage effects so far emphasized in studies by the Production program.
(b) It would provide an appropriate framework within which IFPRI could broaden its consideration of other bottlenecks and inputs to the development process, such as structural and infrastructural limitations which may need to be modified before technological change can get under way and generate linkage effects. The wider representation of disciplines which we recommend in Chapter IX.A could play a significant role here.
(c) It would allow IFPRI to work with developing countries to enlarge the opportunities and scope for policy dialogue, especially with the major finance and development agencies in regard to the effect of advice of these agencies on food production and nutrition.
(d) It should focus IFPRI's collective mind more sharply on the impact of alternative strategies on food production and nutrition - macro-economic (e.g. fiscal policy), intersectoral (e.g. share of public investment or personnel in agriculture) or short-term adjustment (e.g. to IMF conditionalities).
(e) It would provide a mechanism for greater coherence and coordination between the work of the programs in this area, and more clearly identified leadership of this work.

One structural framework within which to consider this proposal is indicated in the diagram below, but other possibilities readily suggest themselves.

122. We are definitely not suggesting that IFPRI should evolve towards being a comprehensive institute of development studies. Its focus on food and nutrition should be retained for the strength and clarity it gives to the Institute's objectives. But, as the mandate states, IFPRI's work must sometimes extend "beyond a narrowly defined food sector." Some structural issues, such as tenure and property rights, may have to be addressed before production or consumption can significantly improve in some situations. Infrastructural development may also limit such improvement, so that questions of priorities and of the best sequence of developmental steps could often be important. Fiscal questions, personnel allocation and macro-economic policies in the non-agricultural sector may also have to be addressed before meaningful research on food policy options can be initiated (cf. also paras. 65 and 112).
123. To date, IFPRI has been uncertain whether it should carry out research on, for example, questions of tenure and property rights, even when it has recognized their major significance in some situations. But as IFPRI's work in Africa increases these issues can no longer be avoided. Certainly they are sensitive matters, but the mandate states that "IFPRI is to be alert to important research and information gaps, paying special attention to the need for objective analysis of controversial or politically sensitive issues which IFPRI is in a particularly favorable position to approach."
124. One advantage of establishing a Development Strategies Program is that it could encourage IFPRI to concentrate some of the work of all of the programs in one or two locations where production, consumption, nutrition and trade aspects, and their interlinkages, could be analyzed in a comprehensive manner. We recognize that research on particular issues can often be done most effectively or cheaply in particular countries, just as certain organisms are more suited than others for particular kinds of biological research. Even so, there should also be real advantages in bringing a full cross-section of IFPRI's expertise to bear on the development process at one or two suitable locations. Judging from what we saw of the Southeast Asian rice policies project, it would be essential to associate a regional coordinator with any really comprehensive research project of this kind, and to be sure of reasonably long term funding for the position. The S.E. Asian Rice Polices project coordinator has been able to develop excellent contacts with an extensive network of government agencies and universities not only with the country where he is based, but also in the other three countries involved in the project. Being located at another CGIAR centre (IRRI) has not only provided a highly effective base for his role as coordinator, but has ensured the closest cooperation with IRRI throughout the project. Moreover, the comprehensive network he has established is already proving of value to other IFPRI projects, and in the longer term could greatly enhance the Institute's overall effectiveness and impact in the region. We therefore recommend that core-funded positions be provided for two regional coordinators, in S.E. Asia and Africa, to enhance the effectiveness and impact of major long term projects in these regions and to promote a more comprehensive, Institute-wide approach for them.
125. To put these proposals into effect would require relatively modest additional resources. We hope that they it will be of interest to donors, because we see considerable advantage to their own policy making, in the long run, from the work of a Development Strategies Program at IFPRI, as well as widespread interest and support from developing countries.
E. International Food Trade and Food Security Program
126. The Trade and Food Security program has produced a steady stream of high quality research output. The enviable reputation of IFPRI work in this area is attested by a series of requests from UNCTAD, FAO, IDB, WFC, IBRD and WFP for IFPRI staff to provide analyses, reports and advice and to undertake consultancies on trade and food security issues. We believe this reputation is well deserved. The number of senior researcher years in this area fell from 5 to 4 in 1979 and has been maintained at that level, with one of these positions funded through special projects. Continuation of this level of staffing is considered essential for IFPRI to be able to maintain adequate evaluation of international and national policy options in the areas of trade and food security.
127. The current projects in this program deal with (1) the effects of trade and exchange policies on production incentives and growth in agriculture; (2) the impact of agricultural trade and investment policies on area expansion of crop production and on exports in Thailand: and (3) short-run supply management for food security in selected developing countries. The program is based on the belief that food consumption and production in developing countries are shaped through interaction with other participants in the international markets. Many developing countries, especially the smaller and poorer ones, have open economies in which agriculture is dominant, but depend on imports to provide their needs for food security. A country's trade policies affect its ability to meet short term food consumption needs and affect the structure of incentives for growth in food production. Trade policies of other countries determine the economic environment in which developing countries attempt to meet their needs for imports of food and of development investment goods. The "Trade" program investigates how these factors are affected by policy.
128. The analysis of both national and international measures to promote food security has been a major component of IFPRI's "Trade" program. Food security, the ability of nations, regions and households to maintain adequate levels of food consumption, is affected by food prices, food availability and fluctuations in prices and availability. Because developing countries rely on the international market to meet their marginal requirements for food commodities, food security research must have a strong trade dimension.
129. Food security failures at the aggregate or national levels mirror those affecting individuals. The food security of individuals is threatened when their food production fails or when income and credit are insufficient for the acquisition of needed foods. Similarly, regional or national food security crises arise due to production failures or when food storage and distribution mechanisms, foreign exchange reserves or government financial resources are not sufficient to ensure adequate food availability. Poor weather, other natural disasters and political upheavals also affect availability. Production losses or producer price reductions lead to falling individual incomes.
130. IFPRI has completed a comprehensive publication, "Food Security for Developing Countries" (the result of an IFPRI-CIMMYT conference) in which these problems are clarified and assessed through studies of individual countries and from data covering sets of countries. The book presents a systematic evaluation of different national and international approaches to food security. In the few years since its appearance it has become the standard reference on food security in developing countries.
131. The impact of international negotiations to stabilize world markets, the role of stockholding both at the national and international level, and the use of financial mechanisms to ensure food security, all these have been important objects of IFPRI's research and contributed to the decision by the IMF to create a cereals import facility. A forthcoming book on "International Finance for Food Security" (by IFPRI, World Bank and University of Chicago researchers) examines different approaches to establishing and operating a financial facility for food security.
132. IFPRI's research on food aid has been directed at analyzing how food aid can contribute to food security. Ways in which potential disincentives to local production may be overcome have also been examined recently. National efforts to achieve food security have been evaluated in research on the trade-offs between stock-holding and reliance on trade in the context of Sahelian countries (RR26). The role of food imports, the relationships between domestic demand and imports and the role of government in food procurement and sales have been studied in India ( $R$ R 38) and Egypt ( $R$ R 29, RR 40).
133. The impact of alternative policies for stabilizing prices and food supplies at minimum cost to governments are the subject of current studies in Pakistan and Kenya. Key policy variables are procurement, commercial and occasional sales, trade volumes and stocks.
134. Research on commodity markets has been an important area of work at IFPRI. Cereals are the primary staple food throughout the world, so IFPRI's early research has concentrated on understanding the world wheat and rice markets. The reliance of developing countries on these markets for filling their food deficits makes international understanding of their structure, conduct and performance important.
135. IFPRI has looked at the structure of the world wheat market over the 1950-1975 period, has examined the role of developed countre wheat exporters (RR14), and their impact and that of the USSR in the world wheat market on developing countries ( RR 22 ). This research has shown that the net effect of many recent developments in the world wheat market has been to shift the burden of short-run adjustment onto the importing developing countries, thereby providing these countries with additional evidence to argue for stabilization measures.
136. IFPRI's analysis of the world rice market ( $R R$ 39) concentrates mainly on the actions of developing countries because, with the exception of the United States, they are the main actors in that market. The performance of the rice market is poor with respect to stability and efficiency. Lack of information is identified as a major problem, and the development of a world central market for rice is analyzed as a possible instrument to improve market performance.
137. In open economies, and even in those with some protection, trade regimes influence domestic food consumption as well as agricultural production incentives. Trade and exchange rate policy may determine these variables to such an extent that a comprehensive approach, taking account of trade opportunities, is required. Most developing country policy makers face the major dilemma of a choice between reliance on domestic food production, which carries with it the risk of increased food insecurity, and reliance on imports, which is inevitably constrained by the supply of foreign exchange. IFPRI has the clear objective of developing a framework within which to analyze the policies established to pursue the conflicting goals for consumption nutrition and for production, and which can determine the relative merits of alternative trade instruments for achieving these goals.
138. One alternative that IFPRI has evaluated is the capacity of developing countries to finance increased food imports by increasing their own agricultural exports. The results showed that over half of the developing countries examined had experienced a decline in their share in the world market for the commodities they exported, indicating the importance of a country's own national trade and pricing policies in determining the expansion of its exports.
139. Research on the process by which non-agricultural policies affect the structure of incentives for agriculture has revealed that an overvalued currency and a system of protective tariffs favoring industry at the expense of agriculture amount to a sizable tax on agricultural exports (RR 24). This and later work (RR 36) illustrate the magnitude of these effects of trade regimes and exchange rate policies.
140. New projects under way use the approaches developed in these earlier studies to determine how trade and exchange rate policies affect agricultural incentives in Nigeria and Thailand. Nigeria is particularly of interest because of the damaging influence of its oil exports, Thailand because of its food exports. Research on Kenya's food exports is exploring how constraints such as high marketing costs due to inadequate infrastructure, weak institutional linkages in production, the lack of "demand pull" policies and political objectives may retard food exports. Research on instability in food and export crop incomes in the Philippines is getting under way to explore the impact of increases in exports on incomes of farmers.
141. IFPRI has identified two distinct sets of issues concerning trade reform: policies of the developed countries and the issue of trade in agricultural products among developing countries. In one of its earliest efforts, IFPRI collaborated with CIAT to explore issues related to growth of the beef sector of Latin America. That study highlighted the prospects and potential for trade within the region and the benefits to be derived from liberalization of OECD trade barriers. An expansion of earlier work, provided to FAO for its use in "Agriculture: Toward 2000", was an examination of the impact of developedcountry policies on the food security of developing countries and on projected trends in grain imports of the Soviet Union (RR 22). IFPRI has also investigated the impact of hypothetical liberalizations of OECD trade barriers, as well as the impact of trade preferences which some developing countries view more favorably than trade liberalization. Some recent IFPRI research suggests that although the EEC common agricultural policy for wheat destabilizes the prices paid by developing countries, it may, in an average year, produce net gains to them.
142. IFPRI's trade and food security work is marked by thoroughness and a high degree of conceptual and operational efficiency. Food security is mentioned in the list of the Six Questions which IFPRI poses for itself, but international trade does not figure among them nor in IFPRI's own assessment of "What Can Be Expected From Future IFPRI Research" in its long term plan. The Institute ought obviously to give more explicit recognition to its need to undertake trade research, perhaps as reflected in our later comments on the "Six Questions" (paras. 181-189).
143. Food Security has two aspects: (a) that internal to developing countries-appropriate domestic policies for generating food surpluses, support prices, storage, transport, insurance, etc., and (b) that external to developing countries--trade and food aid. Research on food security at IFPRI properly takes note of both aspects.
144. Conventional analyses of food and agriculture have been intra-sectoral and in the context of a closed economy, but trade has important impact on agricultural output, income, income distribution and nutrition and goes beyond the agricultural sector. IFPRI researchers have realized this and the boundaries in the trade and food security program extend well outside the bounds of agriculture. Moreover, IFPRI has recognized that it is not merely trade in food and agriculture alone that affects the sector's output, income and nutrition. Exports of oil from Nigeria and Indonesia and exports of metals and minerals from Chile and Zambia have as much potential for an impact on the fortunes of food and agriculture as exports of groundnuts from the Sudan or exports of rice from Thailand.
145. IFPRI workers must therefore ask the basic questions: in whose hands do the receipts from trade accrue? How much of these receipts is siphoned to the agricultural sector for production and consumption expenditures? How much, through fiscal and other policies, does the State invest in agriculture for building infrastructure? The multiple effects of these expenditures will affect, among other things, income generation, income distribution and nutrition, and these effects should be recognized somewhere in IFPRI's research.
146. In developing countries trade is clearly affected by internal policies including the impediments which these policies place in the way of trade. But it is also greatly influenced by the trade policies, fiscal policies and macroeconomic policies of developed countries. These policies have recently been affected by high interest rates, mis-valued and volatile exchange rates, depressed growth rates and protectionism. Declining export sales, low export prices and adverse terms of trade of developing countries all have their roots in these policies and extraneous occurrences. High interest rates augment the debt burdens particularly of developing countries in Africa and Latin America and dry up investments, including those in the infra-structure for food and agriculture. While IFPRI should not undertake research on the causes of these misfortunes, its trade policy research would be quite barren if it did not take note of these world realities. Policy research should be concerned with the effects of possible future changes in exchange rates and interest rates on agricultural production, income, consumption and nutrition.
147. Research in trade policy should ask whether today's exports of food and agricultural commodities by the developing countries are economically and socially justifiable in view of the depressed and recession-ridden world markets on the one hand and the extremely poor local nutritional situations on the other. What alternatives and trade-offs are possible? Many agricultural exports of raw materials do not directly affect nutrition, but if more land at the margin was devoted to food production rather than to cash crops for exports this could determine whether a developing country will be better off or not. Some countries already are pursuing policies aimed at achieving food selfsufficiency. Some of this agricultural production is obviously high-cost production not based on comparative advantage. The investigation of comparative advantage is important and cannot proceed without exploring the endowment advantages which different countries have in terms of food and agricultural products. IFPRI ought to devote some of its energies to an exploration of human and
material endowments for food and agricultural production, and develop appropriate methodologies for studies that can be used to recommend suitable directions for specialization in agricultural production. The distribution, in developing countries, of gains from the alternative patterns of specialization and trade should also be examined in this context.
148. Common markets for promoting trade among developing countries through reductions in tariff barriers, adjustment of pricing policies and commodity specialization have attracted attention. If many developing countries have the same patterns of commodity production and are at a low level of industrialization and product diversification, they are competitive rather than complementary to each other. Industrialization and diversification may make some countries specialized producers of some commodities, for example Thailand in rice and certain Sub-Saharan African countries in groundnuts and other oilseeds. Such differences in the degree of industrialization and in the rates of agricultural and industrial growth open up possibilities for greater trade among developing countries. IFPRI should explore the extent of specialization that is possible among the developing countries in terms of food and agricultural commodities. In this context of policies based on specialization, IFPRI may take stock of protectionist policies of different countries and their impact on trade.
149. Two criticisms of IFPRI's trade research have been aired: (a) its excessively pro-free-market stance and (b) its failure to adequately recognize the possibility for developing countries to use forward marketing devices. In some respects these criticisms contradict each other, the one suggesting that IFPRI places too much faith in market mechanisms and the second suggesting that some market mechanisms are ignored. However, we believe that there are enough analysts in other institutions conducting such research on international market development, so that IFPRI should be free to concentrate its attention on other areas.

## F. Food Trends Analysis Program

150. Trend analysis constitutes one of the four major areas of IFPRI's research. The Institute devotes a fair proportion of its research time and resources to this program. Out of its 21 senior staff members 4 are working in the Trends program.
151. There is no doubt that the program has been of value to the Institute. Estimates of the emerging food demands and supplies and the emerging food gaps in the major areas of the developing world - Asia, Africa and Latin America have been worked out in such Research Reports as "Meeting Food Needs in the Developing World" (RR 1) and "Food Needs of Developing Countries: Projections of Production and Consumption to 1990" (RR 3). Trend analyses have been undertaken for some sub-areas like North Africa/Middle East and Sub-Saharan Africa in respect of some broadly aggregated categories of products like cereals and livestock. Country-specific data of major foodgrains variables have been analyzed in terms of trends as well as other estimations in such Research Reports as "Two Analyses of Indian Foodgrain Production and Consumption Data" (RR 12) and "Food Production in the People's Republic of China" (RR 15). One Research Report specifically attempts to estimate the number of people who are underfed in developing market economies and the amount of foodgrains required to achieve
basic calorie standards ("Recent and Prospective Developments in Food Consumption: Some Policy Issues" - RR 2). Another Report, entitled "A Comparative Study of FAO and USDA data on Production, Area and Trade of Major Food Staples (RR 19), identifies commodities and countries for which wide differences exist in the data from the two sources and examines the nature of these differences. These and other projections have been used by the other IFPRI programs as a basis for their analyses of policy options.
152. IFPRI's trend analyses have been criticised on at least three counts. The first is that of duplication of data and trend research; the second pertains to the methodology adopted in working out the trends; and the third has to do with the question as to whether IFPRI still requires, as it did in its formative stages, an independent capacity for trend analysis.
153. In relation to the first of these criticisms, we note that other organizations like the FAO, the World Bank, the IIASA and the USDA also undertake trend research in food and agricultural commodities and follow this research up with projection and forecasting work. The expertise and the financial and staff resources which these other organizations can devote to commodity analyses by far exceed IFPRI's resources. Some of the projections and forecasting work of these organizations also have a greater degree of sophistication. The implication of this criticism would seem to be that IFPRI should use the work of these other organizations as the basis for its own analyses and policy conclusions, so that it is not necessary to devote about $20 \%$ of the Institute's scarce resources to such work.
154. We find ourselves in only limited agreement with this criticism. It is true that where the trend analyses and projections worked out by FAO and other bodies are useful for its policy research, IFPRI need not duplicate the effort. The crucial point to note, however, is that while not all research institutes need to do trend research, a'major research institution which deals with food and agricultural policy on a world canvas should be able to formulate its own questions that are in part based on an independent trend analysis. Different methodologies, different time-periods and different initial and terminal years may give different results in respect of trends, and some methodologies may be better for some purposes and other methodologies for other purposes. Moreover, no organization is likely to supply all the trends for all the items another organization wishes to analyze. For these reasons, and others, IFPRI may have to maintain some capacity for trend analysis, although if it found the work of another institution appropriate for its purpose, it would, of course, use that work and not duplicate it unnecessarily.
155. But even when IFPRI needs to do its own research on trends, this does not mean that it needs to do it in exactly the way it has been. As trend and projection methodologies become better established and once the sources of data have been identified and tapped, trend research will become increasingly routine, and the expertise within the program could be deployed in other analyses. As pointed out in para. 67, there is a great need to improve the quality of food data, especially in Africa, and we consider that the existing expertise within the Trends program could make a substantial contribution towards this end. Indeed, the work on China, and a paper prepared for FAO by Dr. Sarma, deal with related problems. A good food data system is not merely a set of figures. It is a regular arrangement for collecting timely data, with known margins of error; for presenting and analyzing such data to obtain conclusions in a form relevant to policy makers; and for using the data in policy design and implementation. In most of Sub-Saharan Africa, first priority should
go to generating or improving sample-based data on production and area for major food crops; second priority to timely data on nutritional levels for at-risk groups; and third priority to price, cost, and inputs data.
156. Another criticism of IFPRI's Trends work is that the models used in estimating trends and projections are not sufficiently sophisticated. In its demand projections IFPRI uses FAO projected values of income elasticities of demand obtained from previous years' data and applies these values to future income and population growth rates in order to obtain future demands for food etc. It does not include price elasticities of demand. When it comes to supply projections IFPRI uses only time projections of past supplies without reference to price elasticities. Thus basically different models are used for the projections of demand and supply. IFPRI then interfaces these independent demand and supply projections with estimates of the food gaps or other commodity gaps for major areas of the world. Moreover, because of insuffiency of staff and for other reasons, IFPRI lumps a number of commodities together and makes highly aggregated projections, often for aggregates of countries.
157. IFPRI's omission of price impact on trends and projections might appear to be a serious criticism. The situation may be viewed as follows: If the demand and supply of a commodity (or group of commodities) were projected on the basis of past trends without taking prices into account and the projection indicated a widening commodity gap, then in actual fact the prices would rise. In consequence demand would be constrained and supplies would augment. At some point in time the gap would vanish and the trend estimates would be proved wrong.
158. A developing country could, in theory, close the demand-supply gap through the price mechanism. But as on the consumption side there are few substitutes and on the production side there are no idle capacities in land or capital stock, the gap can be closed either with imports, which may place heavy burden on foreign exchange resources, or with a politically infeasible rise in price. Thus it is futile to argue about price changes bringing about an equilibrium and making the projections go wrong. However, so long as the projections are not looked upon as correct forecasts but as indications of tendencies, they can highlight an emerging gap or likely calamity, as the IFPRI Trends staff claim.
159. Some organizations like the FAO do work with the price factor, and if prices rise they allow for changes in demand and supplies as well as for substitutions. But it is not at all clear that such price-inclusive methods give better or more reliable projections. For example, how can one know what changes in price are to be built into the models and -- in the state of flux of the world with its recessions, inflations, exchange rate fluctuations and protectionism -what future relative prices will prevail? Furthermore, how can one be sure that the projections based on hypothetical or extremely uncertain relative prices would forecast the future better than would fixed relative price projections? Moreover, as stated earlier, if the aim is mainly to discover the broad direction of demands and supplies--and of food gaps--by aggregates of commodities and areas of the world, without trying to forecast the actual magnitudes, IFPRI's present methods may be more defensible than those using assumed prices and price elasticities.
160. Trends are often worked out before policy recommendations are made and implemented. That is to say, policies impinge upon the normal trends and modify them so that trend projections will invariably go wrong if the recommended policies become effective. But that is no reason why trends should not be worked out to inform ourselves about what the gap would be if new policies were not
deployed, and indeed to deduce policies that would change the trends. It is for this reason that research organizations must re-work the trends as the policies recommended by them are adopted.
161. In order to accommodate the above concerns and to meet the needs of IFPRI, we suggest that research manpower in the Trends program should be increasingly directed to two areas: one in the context of IFPRI's greater emphasis on Africa, and the other in relation to its mandated emphasis on the poor and the hungry in developing countries.
162. Trend analysis based on African food production data is vitiated by the poor quality of data. Yet food policy research and good policy making need a sound base in regularly gathered information on major food outputs, on inputs and on nutritional yardsticks in different regions. This requires considerable strengthening of the statistical cadres, which is not a policy research job. However, the design of their activities, and even more of the food information systems that can analyze such data promptly in a form that can be used by policy makers, is a policy research job. This design task has a high priority and it is not performed elsewhere. Moreover, within the Trends program of IFPRI the special skills to do this work are available among the senior staff.
163. In any such program in-depth analysis is required of the relationships between the monitoring and evaluation systems for rural development projects, the national agricultural statistics systems, and household surveys wherever the latter are undertaken. In this way the tendency can be overcome for trends analysis to be concerned with national and regional averages rather than with the prospects of the at-risk groups, prospects which should inform policies to reduce hunger.
164. A critical analysis of the trend and projections work of other research institutions is also a possible line of work for IFPRI, and the development of a methodology that leads to a hunger-oriented and at-risk-group specific trend analysis could be yet another area into which to direct the efforts of the Trends program. The Food Consumption and Nutrition Policy program could very well cooperate by helping national governments and other organizations to develop household-level data collection methods for use in Africa. Trend analysis work which focuses on the increased demand for meat due to urbanization could also be an important area of effort.
165. We consider these new tasks to be so important that we recommend that the "Trends" program be renamed the "Food Data Systems" Program, its primary purpose being to conduct research on improving systems for gathering, evaluating and using food-related data for policy analysis, in association with developing countries and relevant agencies, especially FAO. The change in anme would highlight the proposed shift in emphasis for the program and widen its scope, while making use of existing expertise and not curbing too greatly its traditional tasks.

## A. Formulation: Is there an Overall Strategy?

166. IFPRI's impact will be considered in the next chapter, but the most visible product of its research programs is the series of 43 Research Reports. Taken on their own, these might give the impression of a rather disconnected set of individual studies, high in quality but lacking in coherence. The question of whether there is an over-arching strategy to IFPRI's attack has been in the forefront of our approach to this review, and was vigorously pursued in our discussions with the Board, Director and staff of the Institute. As a result of these discussions, our own concerns have been allayed, and we consider that there is a strong framework and an evolving strategy within which the individual pieces of research are initiated. We are confident that this framework will become more apparent as more of IFPRI's work is completed and published.
167. In the first place, the mandate, in the form in which it was revised in February 1980 (see Annex 6), is quite explicit about what areas of research IFPRI should concentrate on and about the strategy of attack on these. The criteria for program development and the broad objectives of the work are defined, as is the preferred mode of working in collaboration with national institutions and in complementarity to the work of other organizations. The mandate cannot, nor should it, spell these matters out in conclusive detail, but it can and does provide a clear framework for the work of the Institute. It could be improved in its mode of expression at several places, but we do not consider that any substantive changes are needed.
168. Beyond this formal mandate, however, the staff of IFPRI have a shared understanding of what IFPRI is for and what they should do. This was quite apparent in our discussions, and derives from the collegial approach so strongly encouraged by the Director. We believe this shared consensus plays a considerable role not only at recruitment but also in guiding the staff in their selection and planning of research project proposals. For example, one senior researcher has not put forward research proposals in an area which he personally considers to be of importance in the belief that it falls outside the currently shared understanding of IFPRI's role. On the other hand, he hopes that the ongoing discussions of this "informal mandate" by Board, Director and staff may eventually recognize the significance of his proposals to IFPRI's work.

## 1. The Role of the Board

169. Our two meetings with IFPRI's Board left us in no doubt about its active and influential role in defining IFPRI's strategy and guiding its research. The significance attached to this role is highlighted by the fact that, perhaps uniquely within the CGIAR, the whole Board constitutes the program committee. The Board of IFPRI is an exceptionally able and eminent one, well balanced by region and experience, and is therefore in a position to offer considered guidance to the Director on IFPRI's research program.

170: Given the differing backgrounds of Board members there are, naturally, considerable differences of opinion on what IFPRI should be doing. Some of the issues which we heard the Board debate were: Was IFPRI giving too much attention to food security and subsidy issues? Should its work on trade be broadened to include more on the impact of the developed countries and of COMECON? Did IFPRI need to get involved with "research on research" in developing countries? Should its approach to agricultural development take more account of macroeconomic policies and of structural issues such as land tenure? On this latter issue, some considered that a broadening of IFPRI's work beyond its sharp focus on food was necessary, whereas others preferred to see the Institute confine itself to subjects suited to particular proven styles of economic analysis. The vigor and level of these debates were clear evidence of the importance attached by IFPRI's Board to continually re-assessing the strategy of the Institute, as well as to commenting on the individual research projects.

## 2. The Role of the Director

171. IFPRI's Director is also vigorous and wide ranging in his efforts to keep IFPRI's work relevant to current problems, in clear focus, and of high quality. There is no doubt that he has a strong influence on the shape of the overall research program, and that his own interests and expertise are reflected in it. At the same time, however, he allows the senior staff considerable initiative in the formulation and development of their own research.
172. In our assessment, the Director provides quite outstanding creative leadership and stimulation to the research of the Institute. By its very nature, such leadership is highly individual in style, and may be impatient of bureaucratic constraints.
173. One other aspect of the Director's role requires comment and wider understanding. IFPRI's research, as is evident from its Reports, is rigorous in its approach and careful in not going beyond the analysis of policy options. In their contacts with developing countries the research staff appear to be equally careful, even when pressed to extrapolate their analyses to advice, and it is important for IFPRI's reputation that they should remain so. On the other hand, if IFPRI is to have an impact on high-level policy making throughout its clientele, both in developing countries and in international agencies, as well as on opinion-formers on the problems facing the Third World, it is essential for the Director to extrapolate and generalize rather boldly at times. Where such comments are well based on the accumulating and wide-ranging work by IFPRI - in both case histories and comparative studies - they should be welcomed as an important part of IFPRI's role. It is essential, however, that the staff must feel free to comment on such extrapolations and generalizations, given their broad collective experience and the complexity of the issues.

## 3. Research Staff Influence

174. The preceding paragraphs have indicated that IFPRI research projects are developed within the strong consensual framework of the "informal mandate", but that this itself evolves in response to inputs by the Board, the Director and the staff. As with all good research, shifts in emphasis may come as much from unexpected findings as from planned changes. In IFPRI's case, a good example is provided by the work on the causes of instability in agricultural production. Entry into this important area of research, one of considerable significance for the CGIAR, was made by a visitor to IFPRI, Shakuntla Mehra. Its further development hinged on a methodological re-examination of the Indian data, leading to
important new insights which are now being explored in work on several countries ranging from the USA to China. Moreover, the analysis has reached the point where active collaboration with biological scientists is needed. Another good example of how several independent lines of research at IFPRI and elsewhere may suddenly coalesce in an unexpected but productive way is provided by the work, leading to the creation of the IMF Cereal Import Facility. This has been described in the IFPRI pamphlet by Richard Adams.

## 4. Other Influences

175. Since much of IFPRI's work is done in collaboration with policy analysts in developing countries, their concerns and experience and the priorities of their governments also have a major influence on the objectives and the design of individual projects. Indeed, it is common for IFPRI to respond to specific requests and invitations from developing countries. For example, the choice of commodities and areas to be studied in a joint project with the National Nutrition Council of the Philippines, was determined by the Council. IFPRI's nutrition-related work in Zambia, likewise, was planned from the beginning in direct consultation between Dr . Kumar and representatives of the Government. The emphasis on maize pricing policies and their impact on consumption, nutrition and income distribution, as well as the area selected for study, were determined primarily by Zambian concerns. Many similar examples could be given.
176. A major input into the initiation and planning of the Zambian project also came from FAO, which had previously conducted a major nutrition survey in Zambia. As would be expected, FAO has in fact been actively involved in the initiation or modification of research in all four of IFPRI's programs, e.g. in several agricultural price policy studies in the Production program, in a review of FAO's methodology for estimating the incidence of undernutrition by the Consumption program, and in several projects to evaluate food reserves, food aid and food security by the Trade program. Altogether, FAO has had a substantial involvement in about 20 of IFPRI's research projects.
177. Many other organizations have also participated in the framing of IFPRI research. Several projects have arisen in conjunction with other CGIAR centers, often with the participation of yet other groups. The project on Rice Policies in South East Asia is a major collaborative effort involving IFPRI, IRRI and IFDC in conjunction with staff of four national systems. In both Indonesia and the Philippines the local research collaborators are drawn from several government bodies as well as from universities, while the Asian Development Bank has also played an active role in the project's formulation. The project on the changing role of coarse grains in SAT West Africa provides another example of a multiple collaboration, in this case in association with national research bodies in the Ivory Coast (CIRES), Senegal (ISRA), and Upper Volta (CEDRES), together with ICRISAT and Goupement d'Etudes et de Recherches pour le Developpement de 1'Agronomie Tropicale (GERDAT). Such multiple collaborations require a great deal of organizing effort on IFPRI's part, but they undoubtedly broaden its impact and effectiveness in institution building. They also highlight the wide range of input into the planning of IFPRI's research.
178. The concerns of donors are also brought to bear, especially through the special projects which currently constitute about $30 \%$ of IFPRI's overall budget. This proportion is high compared with many other CGIAR centres, and could distort IFPRI's research program away from its mandate. However, it is the
policy of IFPRI to undertake special projects only when they fall clearly within their mandate. Support by the Asian Development Bank of work on different kinds of irrigation schemes in Southeast Asia, for example, clearly reinforces other work within the Production program, and our examination of IFPRI's special projects yielded no cause for concern that IFPRI was being diverted away from its mandate by these.

## B. The Integration of IFPRI's Research

179. It is a general rule that external review teams always notice missed opportunities for what they believe would be fruitful interactions within a centre. To this rule we are no exception, and in our discussions with the staff, and elsewhere in this report, we have commented on a number of areas where we thought that greater interaction between programs was desirable.
180. Nevertheless, overall we were impressed by the high degree of integration of the research programs and by their sense of common purpose. Quite a few of IFPRI's research projects involve the collaboration of staff from several programs. Collegial discussions are held towards the end of each project and we encourage IFPRI to hold similar discussions at an early stage of each. This would almost certainly improve the planning of the projects, and would also increase the extent of interactions and collaboration across programs.

## The Six Major Food Policy Questions

181. In 1982, in the context of its long term plan, IFPRI formulated six questions as a basis for setting the Institute's research priorities, and as a forward-looking framework which could be expected to integrate research across the four programs. We considered this set of questions to be important for IFPRI in both contexts, i.e. for priority setting and as an integrating mechanism, and we therefore held two long discussion sessions on them with the senior staff of the Institute.
182. The six questions which were believed to define the major food policy problems of the period are:

Q1. What food policy adjustments are needed in response to rapid growth in food import demand by developing countries?

Q2. What policies will allow technological change to play its central role in raising food production in developing countries?

Q3. What combination of farm producer incentives can achieve growth and equity simultaneously?

Q4. What relative weight should be given to alternative agricultural commodities in future production patterns?

Q5. What policies are needed for technological change in agriculture to stimulate the growth in income and employment necessary to alleviate rural poverty?

Q6. How can food security be provided to the world's poorest people in the face of unequal distribution of income, fluctuating production, and high costs of storage?
183. Such a specification of major policy questions is a useful device to focus various research projects in different program areas on a common set of priority policy issues, thereby facilitating appropriate collaboration and division of labor among IFPRI's four program areas. The current six questions address important policy issues for which research effort must be allocated, but we consider that they merit further discussion with a view to their possible reformulation by IFPRI.
184. The issue of international coordination in trade and aid is not included as a major question. It is possible to discuss this issue as an aspect of several other questions. For example, commodity aid may be discussed under Ql. Technical assistance may be discussed under Q2. The trade (and exchange rate) issue is closely related to Q3. However, the problem of the effects of agricultural protectionism in developed countries on food production in developing countries, which has been a major research area at IFPRI, cannot properly be linked with any of the present six questions. Since the solution of food policy problems in developing countries depends critically on international coordination in trade and aid, it should be included as one of the major policy questions.
185. It is debatable whether the problem of appropriate commodity mix (Q4) should be treated as an independent issue. The question of what relative weight should be given to alternative agricultural commodities is inseparably linked with the problem of public resource allocations for research and irrigation (Q2); e.g., how much public funding should be allocated to irrigation for rice and how much to development of dryland crops. Appropriate incentives for the production of alternative commodities (Q3) cannot be defined without regard to optimum commodity combinations. The position of food versus non-food commercial crops must bear on policy adjustments in response to the growing food import demand by developing countries. Although the net value of imports of food grains by developing countries is increasing, the net value of exports of total agricultural products is also increasing. This could mean that the growing food deficit in some developing countries is simply a manifestation of an appropriate international division of labor within agriculture, which does not necessarily call for any adjustment. Thus the question of relative weights for alternative commodities is better discussed as an aspect of other questions, especially the current Q1, Q2 and Q3.
186. The current specification of $Q 2$ seems to be too narrow. Technological change in agriculture will indeed be the most important factor in raising food production in most developing countries. Yet, in some areas of the developing world there is still room to increase food production through expansion of cultivated area. In most cases, however, further area expansion requires public investment in irrigation, drainage, and public health (such as eradication of malaria). These investments compete with demands for research on new technology and its extension. Therefore, the question is not really "what policies will allow technological change to play its central role in raising food production?" but rather it should be "what forms of public investment will be needed to increase food production at a rate sufficient to meet the overall economic and equity needs?" Of course, how to accelerate technological change is a very important element in this broader question.
187. The present Q 5 is also too narrowly specified. This question should address all of the linkages between agriculture and the other sectors of the economy with special reference to the effects of alternative agricultural and food policies on growth of income and employment nationwide as well as in the
rural space. For example, low food-price policies may have a positive effect on industrial development by keeping the industrial wage rate low but a negative effect by reducing rural demand for industrial products or curtailing the savings that might be mobilized from farm households for the development of the industrial sector. What will be the net effect of a low food price policy on national or regional development? Q5 should be specified more broadly so that it can address these questions.
188. The six questions as presently stated seem not to be based on the clear identification of the different roles of the government and the market in the allocation of resources. If the market were perfect in the texbook sense, it would achieve efficient resource allocations for private goods. In that case the role of government may be limited to the allocation of resources for public goods, such as research and large-scale irrigation systems. This role is an essential part of the problem posed by Q2. However, the market in developing countries is underdeveloped and characterized by imperfect information and segmentation. This market imperfection has often been used as one rationale, among others, to justify government intervention into the market. Furthermore, the market per se is inherently incapable of achieving equity and security. In developing economies in which the institutions serving equity goals (such as progressive income tax and social security) are not well developed, the government market interventions, such as public distribution of cheap food to the poor, might be called for as a substitute. Many government market interventions based on such reasoning have, in fact, been found to serve mainly non-targeted vested interests, resulting in both inefficiency and inequity. A clear understanding of the effective approaches for correcting the defects of market mechanisms is critically important. If the ill of market imperfection, such as a local trade monopoly by middlemen, is based on imperfect information and market segmentation, the more effective remedy could be to develop market institutions such as commodity exchange, crop forecasting and official grading of agricultural commodities as well as to invest in transport and communication infrastructure rather than to replace private monopoly by state monopoly. Such policies may be called "market-development policies" as distinct from "market-intervention policies." Market-development policies by themselves cannot solve the equity and security problems. To achieve the equity and security goals, some forms of market-intervention policies might be needed. Considering the different goals for which the market-development and the market-intervention policies can serve effectively, Q3 should be stated so as to facilitate investigations into the means to achieve appropriate price incentives in terms of the two different goals. So far, the potential contribution of market-development policies has been largely neglected in development policy studies. This is one area in which IFPRI can make a major contribution.
189. We trust that the preceding discussion has indicated some of our concerns about the six questions. Further concerns are discussed later on, in Chapter IX (para. 262). One suggested reformulation of the six questions was presented to and discussed with IFPRI staff, but we refrain from presenting a reformulation here because we consider this properly to be a function of the Board in the context of its continuing efforts to foster interaction and integration of IFPRI's research programs.

## C. Regional Balance of IFPRI Research

190. We first review the regional balance of IFPRI's 61 publications so far,* and of current research. Next, we ask how IFPRI should trade off the need to represent major areas fairly against the need to avoid costly or inefficient dispersion of effort. Third, given the need for some dispersion, we suggest an appropriate balance among areas, and between location-specific and general research. In the process, we suggest some implications for IFPRI staff and for funding by donors.
191. The following table indicates the regional balance of IFPRI's work:*
Geographical
Classification

## Completed

 studies
## 61

23

Ongoing or
planned studies

| Total studies | 61 | 45 |
| :--- | :--- | :--- |
| Global/General | 23 | 15 |

Regional:
Sub-Saharan Africa 3
S/SE Asia 1
Latin America 1
Arab/N. Africa 1
Industrialized 2
1

Country:

| Sub-Saharan Africa | $2 \frac{1}{2}$ | 3 |
| :--- | :---: | :---: |
| S/SE Asia | $16 \frac{1}{2}$ | $15 \frac{1}{2}$ |
| Latin America | 4 | $1+\left(2 \times \frac{1}{2}\right)$ |
| Arab/N. Africa | 4 | - |
| Industrialized | 3 | $\frac{1}{2}$ |

[^16]192. In IFPRI's first seven years, eleven of the thirty country studies were on India; four were on Egypt; and two each were on Brazil, Bangladesh and the USSR. Of the nineteen proposed or ongoing country studies, three each are on India and the Philippines, and two each on China and Thailand. The emphasis on South and Southeast Asia appears to be increasing - from $17 \frac{1}{2}$ out of 38 non-global completed studies ( $46 \%$ ) to $16 \frac{1}{2}$ out of 30 ( $55 \%$ ) non-global ongoing or planned studies; but the concentration on India is declining sharply.
193. A significant increase in work on Sub-Saharan Africa (SSA) took place in the early 1980s. No such work was published before 1980. The major output so far, a set of papers discussed at a high-level and apparently successful conference at Victoria Falls in 1983, is in press. The proportion of non-global research on SSA is to rise from $15 \%$ so far to $27 \%$ in the planning period from 1984. The concentration on regional studies, and on comparisons of one SSA country with one country elsewhere, are noteworthy; only one study of a singlecountry SSA topic is ongoing (nutritional implications of Zambia maize marketing policy), but others (Kenya, Zimbabwe) are in early stages of development.
194. There is a slight fall in the proposed role of global and general studies (from $38 \%$ to $33 \%$ of all studies). However, the main counterpart of the rise in work on SSA and (non-Indian) Asian work is a fall in the proportion of work on the less poor developing regions (Latin America, the Arab world); on industrialized countries; and on India. A noteworthy feature of IFPRI's plans is the greater dispersion of country-specific studies; current work covers at least nine countries in S/SE Asia, and four in SSA, with more under consideration.
195. IFPRI's position vis-a-vis donors, recipients, and CGIAR centres requires it to maintain an active presence in S/SE Asia, SSA, Latin America, and West Asia/North Africa. The early heavy concentration on India was justified by India's serious and persistent food problems, and by the fact that the welldeveloped food data, policy, and research systems render India a cost-effective place to work, learn, and interact. While considerable work in India should continue (para. 201), there is a case for some dispersion, especially towards SSA (para. 198).
196. However, heavy costs in the great dispersion of IFPRI's small staff are implicit in the research plans. Dispersed research tends to be assigned to consultants, who lack full integration into IFPRI's research planning and career structures. This is particularly risky if special skills, such as anthropological ones, are left almost entirely to such consultants, and are not represented at IFPRI's base. Also, especially in Africa, projects with only one or two senior staff are handicapped by weak local institutions and long transport links. Moreover, isolated projects deprive IFPRI staff of the benefits of compared experiences that alone can permit economies of scale in learning about a country's policy systems. The great power of such a learning process was clear to us in our visits to the Philippines and Egypt, and is obvious in respect of IFPRI's strength in depth on India.
197. We suggest that - except for long-term studies in countries with strong local research support - IFPRI should avoid working where it does not plan for more that one staff member and research publications to be involved. A few carefully selected countries, each relevant to one or two of a small number of IFPRI research themes, will improve focus and help create an effective minimum for policy analysis in each country. We hope that donors will agree that the need
for effective policy research, at low administrative and travel costis, outweighs the diplomatic case for an IFPRI presence in numerous countries, or even for that matter at many CGIAR centres.
198. Where should IFPRI concentrate its research? The shift to SSA is probably justified by growing concern about (a) steadily falling food output per person in most countries (though the data are bad) and (b) policy dialogues, and major aid commitments in which neither donor nor recipient has adequate information or analysis regarding the food policy process or system. IFPRI's proposal to raise the proportion of its research in SSA from 15-20 percent in 1979-84 to 25-27 percent in 1985-90 seems about right. However, SSA contains fewer than half as many hungry people as India and Bangladesh combined, and has much less capacity to absorb research-based policy guidance. The need for IFPRI to help build this capacity in SSA must be offset against the still-pressing food problems - and the major impact IFPRI can make upon them - in those equally poor countries outside SSA which give their food policy and policy research higher priority than do many SSA countries in equal need.
199. Donors will recognize that a tilt towards SSA greatly increases the unit cost of IFPRI research output. African collaborating personnel in policy research are usually much more expensive, subject to higher turnover, and of ten in need of more training than their Asian counterparts. Operational costs are also much higher in SSA. Many experienced social-science researchers suggest that a shift to SSA from S/SE Asia at least triples the overall cost of research. IFPRI should contain this rise by concentrating its work in a few countries, but in turn the donors, if they wish the proportion of work in SSA to expand, must expand IFPRI resources correspondingly.
200. We endorse IFPRI's wish to raise the share of its regionally-specific research resources in Africa towards an upper limit of $30 \%$ by about 1990 ; but any such rise must be dependent on the growth of core funds to take full account of extra research costs in the region.
201. We agree with IFPRI's implicit decision (para. 192) to maintain a roughly $50 \%$ share in its regionally-specific work for S.E. Asia, but we wonder whether the dispersion away from India (and into many countries, with implicit problems of research management) is going too far. The current heavy emphasis on Southeast Asia is largely due to special project funding, and is fully justified by the excellent research output (produced and pending), the close cooperation with IRRI and local researchers, and the good research management by IFPRI. The policy system of the Philippines, at least, has gained greatly. But several of these Southeast Asian countries are not the most obviously poor, hungry, or lacking in domestic policy research capacity. We advise a greater concentration of IFPRI research resources on understanding China's food policy experience and performance; China's one billion people and inadequately understood food policy processes are under-represented by the research of one IFPRI Fellow, outstanding as his work undoubtedly is.
202. The retention of some $8 \%$ of regionally-specific IFPRI research in each of Latin America, North Africa/West Asia, and the industrialized countries is about right. Latin America is rich in CGIAR centres, and (despite income-per-person 3-4 times higher than Afro-Asian levels) in residual and policy-related problems of undernutrition. We hope that future Latin American work will stress these problems, both in their production and their consumption aspects. We are more sceptical about Latin America as a study area for IFPRI in respect of overall agricultural issues, of foreign exchange management, of tests of high-risk
research for later possible application elsewhere, or in general of a search for case-study-based lessons or comparisons with poorer continents. These issues are best studied directly. Some work on the making of trade and agricultural policies in industrialized countries (with special reference, we hope, to their effect upon malnutrition and hunger in the developing world) will continue to be required. However, the great majority of IFPRI's work should continue to be where the gravest food problems lie, in "low-income countries", as laid down in the mandate.

## D. Systems Analysis and Modelling

203. Systems analysis and modeling at IFPRI are used mainly as a research tool within individual projects and then predominantly within the Production program. Some of the models are of the linear programming type and are designed to study the consequences of behavioral and technical changes at the farm and regional levels. Examples include the studies of the trade-offs between food crops and cash crops, of the impact of changed practices on income and subsistence consumption, and of the possibilities of introducing crop insurance systems. In the work on linkages, use is made of an input/output based model that contains consumption linkages.
204. The model used to analyse the efficiency and equity of irrigation water distribution for crop production is of the simulation type. It follows the water from source to final use by crops in the field and is linked with a production equation that allows computation of the ultimate effect on yields.
205. Another simulation model describes inter-sectoral factor mobility. This enables analysis, at a rather high level of aggregation, of the relations between particular aspects of growth in agriculture and in other sectors of the economy, giving particular emphasis to the roles of capital and labour. The model enables study of the effects of exchange rate and of some taxation policies, and could also be used to study the effects of re-allocation of government expenditures to and from agriculture.
206. The linear programming type of modeling is an appropriate tool to elucidate the consequences at farm level of certain policy measures, especially in farming situations where there is some reliance on subsistence.
207. The simulation model of irrigation is formulated in such a way that it can be applied outside the area where it has been developed. It could therefore be put to use in Africa, for instance to make a first analysis of the technical and economic possibilities of irrigation. If it appears useful, one could then consider whether to develop analogous models for reclamation and water control in non-irrigated areas. Good working relations with others in this field would be necessary to deal with the bio-technical aspects of the problem. The strengthening of contacts with appropriate IARCs and with the Centre for World Food Studies in the Netherlands could be useful for this purpose.
208. Equilibrium modeling is receiving attention on only a limited scale at IFPRI. We support this position because this type of model is being developed elsewhere at IIASA in Vienna and at the Centre for World Food Studies in Amsterdam and would drain too much of IFPRI's resources away from other work. Moreover, it remains to be seen to what extent equilibrium models will prove to be useful as instruments of policy making on the national and international levels; the experience of the World Bank staff so far seems not very positive.
209. Part of the work that is done by IFPRI could contribute to the modeling work in Vienna and Amsterdam, and conversely the models that are being developed there could be used to investigate policy options that are being developed at IFPRI. It is therefore suggested that IFPRI strengthens its working contacts with both of these modelling groups.
210. Inter-program research on linkages and development strategy at IFPRI might profit from systems analysis and modelling techniques, but we consider these techniques as means and not as an end in themselves and refrain from making any specific suggestions.

## A. Overview

211. An excellent paper on IFPRI's outreach and impact, prepared for our review by Alberto Valdes, was particularly helpful in focussing our discussions with national institutions and development agencies prior to the main phase of the review in Washington. We make this comment because IFPRI may be at some disadvantage in relation to other CGIAR centres in not having new varieties or improved farm practices to display, nor genetic resources conserved for the future, nor a highly visible training program. We think it has effective equivalents of all these, and has already had an impact of which the CGIAR can be proud, although it is not easy to describe or quantify.
212. IFPRI's equivalents of new varieties and practices are the policy changes which have already been put to use by developing countries as a result of the Institute's work. Valdes' paper mentions a great variety of these and we shall refer to a few below. IFPRI's equivalents of genetic resources are the new policy options and new light shed on old problems by IFPRI analyses, "the vision of a better tomorrow" as one member of the Board put it. IFPRI's equivalent of the other centres' training programs may not be numerically so impressive, but in terms of developing national capacities, through collaborative research IFPRI's "invisible college" could grow with time into a compelling example of institution-building.
213. The most visible component of IFPRI's output is the series of 43 Research Reports. It is on these that the Institute's reputation for rigorous and objective analysis rests, and various aspects of their publication are considered below.
214. Several of our respondents queried the need for IFPRI's Research Reports to be so rigorous in their approach. The more we considered the matter, however, the more convinced we became of the absolute necessity for IFPRI to maintain the highest standards in this series of reports. IFPRI's reputation among policy analysts and policy makers in all sections of its clientele hinges on the quality of these reports. Were that reputation to be compromised, so too would be IFPRI's hopes of influencing the policies of international and other institutions which have substantial in-house capacity for policy analysis. Moreover, we noted a distinct sense of pride among national policy analysts who have collaborated with IFPRI in the preparation of these reports; government ministers commented favorably to us on them; and their growing use for teaching purposes, especially in developing countries, will enlarge their impact.
215. The Research Reports are aimed at IFPRI's primary clientele, the policy analysts. On their own, they are not appropriate for the policy makers, many of whom will have neither the time nor the expertise to read them closely. For this part of their clientele, IFPRI Abstracts and the 4 -monthly IFPRI Report series are more appropriate vehicles for the significant results of the Institute's research. These are considered further below.
216. IFPRI's impact on national systems will always be difficult to assess, partly because of the multi-stranded and multi-layered composition of the food policy analyst/maker group in each country, and partly because of the genuinely collaborative nature of the Institute's research. When we speak of IFPRI's impact, we mean the joint impact of IFPRI and its collaborators.
217. The role of IFPRI's research is to elucidate, not to recommend a specific policy or even a best course of action. Thus the ultimate impact of IFPRI's work rests on the judgement of the policy makers and their advisers. Nevertheless, strong implications for policy change often emerge clearly from policy analysis.
218. During our field trips in Asia and Africa, we were assured by policy makers in several of the countries we visited that IFPRI's work was highly relevant to their problems and was having an impact on national policies. Of course, IFPRI naturally selected for our visits those countries where it has active collaborations and good contacts. Given the small size of its staff there are, inevitably, many developing countries where these conditions are not met, and where IFPRI's work may hardly be known. But what impressed us particularly about our visits was the conviction by national policy analysts and policy makers that IFPRI's work was needed, at least as urgently and as widely as the biological research supported by the CGIAR.
219. In studies like those on food subsidies in Egypt and other countries, there can be no question that IFPRI's research has had a direct and substantial monetary impact. Egypt spends two billion dollars on food subsidies annually and the request by that country's Minister of Food Supply for certain types of analyses could well save Egypt hundreds of millions of dollars without compromising the food security of the poorer sectors in the country. In other cases, the impact has been less direct, and has required follow-up action of one kind or another. IFPRI's reports on the effects of commercial policy and exchange rates on both Colombian (RR 24) and Argentinian (RR 36) agriculture were quickly cast by national initiative into the arena of public policy debate without the need for follow-up activity. Other IFPRI reports, such as the two on agricultural production instability in India (RR 25, RR 30), generated considerable public debate leading to wider recognition of the importance and nature of the problem. The Board's practice of holding its annual program review meetings in developing countries provides excellent opportunities for publicizing IFPRI's role and for discussions with national policy makers on the food problems of the country and the region, and also enhances the Institute's impact in the Third World.
220. IFPRI's impact on policy analysts and policy makers in international financial and development institutions is more difficult to assess. Within each institution there can be quite different opinions of IFPRI at different levels or in different branches, as in the World Bank and FAO. That is to be expected, but IFPRI is making determined efforts to improve its interactions with these institutions, and we are optimistic that these interactions will become increasingly productive with the passage of time. The representatives of the Asian Development Bank with whom we met were highly supportive and appreciative of IFPRI's work. But among the international institutions, the clearest instance of IFPRI's impact on their policies is provided by the creation of the IMF cereal import facility.

## B. Reports and Publications

221. The main vehicle for reporting research results is the Research Report series. These reports, of which 43 have appeared since 1976, present the data, analyses and findings of completed research projects. The reports are thoroughly and anonymously reviewed by experts from outside the Institute, as well as by colleagues within, who not only judge whether the reports are worth publishing but are also urged to improve them with critical comments on their quality and readability. The reports are widely distributed, free of charge, through direct mailing to 6,600 selected addresses of researchers, policy makers, journalists and libraries.
222. We do not suggest any changes in either the review or the distribution practices, and consider that the Research Reports are prepared to acceptable standards of excellence.
223. Criticism has been voiced that the Research Reports suffer from an excessively econometric approach, making them unsuitable for having impact on policy makers. Since 1980, therefore, each report has also been summarized as an IFPRI-Abstract, a 4 page leaflet that highlights the results and implications of each Research Report. These Abstracts are more accessible, readable and interesting for policy makers and other possible users outside the primary clientele of policy analysts.
224. Other regular publications are a four page newsletter published three times a year, which contains commentaries on specific food policy issues and information on recently completed or soon to be completed research, as well as the Annual Report which summarizes the work in each of the four major programs. We found it difficult to assess the impact of the IFPRI Abstracts and newsletters and suggest that the Institute should undertake a study of this, their actual distribution and use with a view to maximizing their impact.
225. IFPRI also issues working papers, such as those from the project on Rice Policies in South East Asia (together with the International Rice Research Institute), on Food Policy Issues and Concerns in Sub-Saharan Africa and on Nutrition Related Policies and Programs, to mention just a few. The most important information from the papers usually finds its way into the Research Reports or other publications.
226. The senior research staff of IFPRI also publish many papers in specialist journals. The outgoing manuscripts are not reviewed internally but rather by the editors and reviewers of the journals.
227. The issues that are considered and studied at IFPRI are often so complex that well-organized policy seminars are very useful in coming to grips with them. Effective symposia and seminars require so much organizational effort and expense that they frequently justify publication in book form to make the results more widely known, and agencies financing the symposia/seminars would be well advised also to provide support for publication of the proceedings. As for IFPRI it should be recognized that the editing of symposium reports in book form usually requires considerable effort by both research and editorial staff.
228. A list of IFPRI publications through 1983 is attached (Annex 7).

## C. Seminars and Conferences

229. The Policy Seminars Program established in mid-1982 has as its primary purpose "to facilitate the flow of policy-relevant information generated by IFPRI research to decision-makers in developing countries." A senior staff member and an administrative aide service the program. Various meeting formats are employed. Of ten meetings completed, ongoing or planned through mid-1986, five are seminars or workshops and five are conferences or symposia; five have their venue in developing countries, four in the Washington area and one in Europe.
230. In line with the purpose of the program, issue-oriented seminars and conferences serve to inform policy makers of the conclusions and policy implications of IFPRI's research. These and other meetings also invite participation by researchers on matters of data collection, analysis and interpretation. The meetings benefit IFPRI and its staff through opportunities to increase contacts; to allow wide dissemination and critical review of the Institute's work; to learn about and assess existing research needs; and to stimulate dialogue on policy research and options both within and outside IFPRI.
231. Our impression is that these activities are soundly conceived to increase the awareness and use of IFPRI's research results in food policy analysis and formulation. The handling of this activity separately from, but in close cooperation with, the substantive research programs is desirable and cost effective.

## D. Training and Education

232. IFPRI's mandate specifies that training through participation in research at headquarters and in the field should be an important part of the Institute's effort. Training has been seen from the outset (Ch. II, paras. 19 and 25) mainly as resulting from a process of interaction with and among IFPRI staff.
233. Accordingly, IFPRI does not have a formal training programme. Individuals become more knowledgeable and competent by taking part in IFPRI's research, whether in Washington or in the field. Since all this research is necessarily done by qualified professional persons, none of it is analogous to the technical or production training provided at other IARCs. The turnover of staff, and of cooperators in individual nations, is the main expression of IFPRI's direct training function at a relatively high level, in a largely "invisible college" of professional peers rather than of teachers and taught. About 80 persons have so far worked with IFPRI in these ways. At a relatively lower level, less senior officials and students registered for higher degree courses may join field surveys, analyze their data at IFPRI and write up their results in consultation with more experienced colleagues. They also learn by collaborative doing, and a number of masters and Ph.D. degrees have been gained in this way.
234. A less direct but certainly no less important training function is exercised through the various meetings conducted by IFPRI. The policy seminars program was launched in 1982 to strengthen these activities, which also include conferences and workshops and which are designed to increase the capacity of individuals at a high level of professional competence or of decision making power to deal with specific areas or problems of food policy and its analysis. Interaction with IFPRI staff and work is again the main device in an activity which, because of the level of the audience, is best not referred to as "training".
235. IFPRI's field of work (and consequently its audience) differs substantially from that of the other IARCs. That part of the audience classified as policy makers is highly placed in governments of developing countries and influential in other national and international institutions. Only a few of them may be found in the government agencies dealing with agriculture and rural development. This situation implies great potential for complementarity with other units of the CGIAR system and ways should probably be sought to exploit it.
236. That part of the audience considered as "primary" for IFPRI are the policy research workers and institutions in developing countries. These should provide the policy makers with the analyses, or recommendations on the analyses, necessary for decisions at national level. The researchers will usually be found in dispersed, isolated positions, often performing other tasks. Their inputs to policy formulation need strengthening through training and other outputs which IFPRI can provide, at least in part. An assessment of the needs of developing countries in this respect would be helpful.
237. The lack of professional talent in the food policy research field in many developing countries is felt by IFPRI to be a serious constraint to its ability to achieve the requisite impact through its research. Efforts need to be made to remove this constraint, and IFPRI should examine the role it can play. This role may be largely one of stimulating others. For example, the United Nations University could be urged to nominate and support appropriate academic and other institutions to strengthen capacity in food policy analysis training and associated graduate education. A similar approach could be made directly to appropriate universities. Such an approach should encourage graduate study in food policy research by promising students of economics and other relevant social sciences, regardless of nationality. IFPRI through its knowledge of the requirements for conducting good food policy research may also be able to assist in curriculum development, and to give guidance to students doing thesis research in Third World food policy areas.
238. A few things IFPRI has been able to do on its own in a limited way. Research assistants at headquarters are undergoing in-service training. In view of the scarcity of places and resources for such positions at IFPRI, we suggest that these should largely be reserved for candidates from developing countries. Opportunities might be sought wherever possible to encourage research assistants to earn a higher degree while performing their work, and donors should be aware of the need for this and for the expertise so developed in the home countries. Similarly, competent collaborators in the field might receive support to complement course study or their work so that they may earn a higher degree. IFPRI could well have a role in identifying and supporting candidates before donors for this purpose.

## E. Food Policy Review

239. As indicated in Chapter II (para. 19/20), the originators of IFPRI considered that an important role for the Institute would be to make an annual review of world agricultural and food policy, for the purpose of highlighting the effects of shifts in policy and to identify emerging problems.
240. Although such annual reviews have never been undertaken by IFPRI, the present Director has given occasional addresses of this kind, and we think that IFPRI's work and accumulated experience have reached the point where a regular periodic review should be undertaken.
241. Such a review should be complementary to existing major reviews such as FAO's State of Food and Agriculture and World Food Report and the World Bank's Development Report. Consequently, we are not recommending an additional major review, which would in any case be beyond the resources available to IFPRI, but rather a regular annual or biennial perspective review, presented as a speech by the Director at an occasion which would give it the requisite impact and standing. Such standing would most appropriately be conferred by one of the cosponsors of the CGIAR. By way of example, the annual meeting of the Governors of the World Bank would provide the appropriate level of impact. A speech of the kind proposed may be impractical on those occasions, but it might be feasible at least to have a section of the President's Report devoted to such matters.
242. Shifts and emerging problems in food policy must also be of major concern to the CGIAR and its donors. We therefore recommend, in addition to the action suggested in the preceding paragraph, that the Director of IFPRI be invited to prepare a biennial review of agricultural and food policy, to be delivered at Centres Week in the alternate years when IFPRI's program and budget are not due for presentation and discussion.
VIII.

IFPRI, THE CGIAR AND ITS CENTRES

## A. The CGIAR

243. One of the attractions of the CGIAR is that each of its Centres and Centre Directors play many roles within the system. IFPRI is no exception and one significant role is that of Socratic gadfly in a predominantly biological community. It represents a different but equally rigorous approach which widens debate on the system's goals, priorities and mode of attack. By and large it does this without acting as an apologist for the social sciences.
244. IFPRI's staff represent only about one-quarter of the socio-economists employed by the Centres ( 22 out of 81 in 1982), and the question might be asked whether there is duplication of effort between IFPRI and the other Centres. Our impression is that, by and large, this is not a problem. IFPRI staff concentrate on the analysis of issues that operate at the economy-wide level in developing countries, while economists in the other centres concentrate on analysis at the farm level. These two types of economic research complement one another effectively.
245. A problem may be emerging, however, because several Centres, most notably ILCA, wish to work in the arena of agricultural and food policy analysis, including trade. Several Centres keep an eye on trends in both their mandate commodities and competing ones, as indeed they should, but in all cases such work is done in collaboration with the IFPRI Trends program and with FAO. But if more Centres enter the arena of policy analysis, as ILCA is proposing, TAC may need to consider what is the best strategy for the CGIAR system to follow in this context. We recognize that, just as there are occasions when IFPRI must undertake some micro-economic work, e.g. in the household surveys by the Consumption program, it may also be desirable for the other Centres to analyse policy issues relevant to their work at times. Consequently, no hard and fast line should be drawn, and the problem is really one of scale and expertise. Given IFPRI's expertise and mandate in the area of food policy analysis, we suggest that such work should be undertaken by the other Centres only when there are compelling local reasons or advantages, and even then preferably in collaboration with IFPRI.
246. It has occasionally been suggested that IFPRI should help those Centres in the system that have little or no economic expertise amongst their staff. For two of these Centres there currently appears to be no real need for such expertise (e.g. at IBPGR and ILRAD), and in the others it would be difficult - and probably undesirable for a number of reasons - for IFPRI staff to act as surrogate Centre economists. In fact, we would turn the argument around and suggest that IFPRI can and does interact most effectively with those Centres which have their own strong groups of socio-economists. IFPRI's productive collaborations with IRRI, CIMMYT and ICRISAT support this argument, and we are hopeful that its forthcoming workshop in Latin America will widen its interactions with CIMMYT, CIAT and CIP. The point should be made that in these cases, e.g. in the joint project with IRRI on irrigation and rice policies in S.E. Asia, superficially there may appear to be some duplication of effort. But closer examination will show that the apparent overlap between the two groups is complementary and reinforcing, and this is often the key to productive collaboration in projects of this kind. It is fertile and should be encouraged, not discouraged, within the context of joint projects.
247. It was foreseen from the beginning (cf. para 15) that IFPRI's research would be highly relevant to the priorities of the CGIAR system as a whole and to the allocation of its resources. The logic is irrefutable, but the wisdom of encouraging IFPRI to play a direct part in the allocation process is not. IFPRI's analyses of trends and trade, and of policy options for production, consumption and distribution all help to define the framework within which CGIAR priorities and allocations are determined. Similarly, were IFPRI encouraged to increase its primordial research on research in developing countries - which we are not suggesting - this would inevitably lead on to a consideration of the overall picture of agricultural research in the Third World and hence to the role of the CGIAR within this. From there it is only a short step to playing a role in the allocation of CGIAR resources. In the final analysis, such allocations are determined by donor perceptions, guided by TAC. And in offering such guidance TAC, as a technical committee, must take into acount not only the unquestionably important economic policy framework but also such matters as the likely solubility of the technical problems, the likely scale and rate of advance, the most promising path of attack, etc. Thus, while economic parameters are a necessary consideration in the allocation process, they are not a sufficient one, and should not predominate. It is one of the strengths of the CGIAR that they have not done so in the past.
248. We have already given, in para. 50, two other reasons why IFPRI should not become directly involved in the allocation process. First, because such an involvement could divert the Institute from its primary task of analyzing options for policy makers in developing countries, especially given its relatively small staff. Secondly, because such a role could compromise its collaborations with other CGIAR centers, which we regard as a more important part of IFPRI's work. We therefore recommend that IFPRI should not be directly involved in the processes determining the allocation of resources within the CGIAR System.

## B. The Centres

249. The greatest advantage of bringing IFPRI within the CGIAR System lay in the enhanced opportunities for interaction and collaboration with the other Centres. If there is a central dogma in IFPRI's research strategy, it is that new technology is the engine of agricultural development and, through various linked effects, of improved nutrition. New technology for the Third World is the major concern and achievement of the other Centres, so IFPRI has much to gain from a closer awareness of the current work of the other Centres and from collaboration with them. By the same token, the Centres have much to gain from IFPRI's research. The collaborative projects with IRRI on rice policies in S.E. Asia and with ICRISAT on coarse grains in SAT West Africa, for example, leave us in no doubt about the mutual benefits of such collaborations.
250. At first sight, there might seem to be scope for many more such collaborations. In fact, quite a few are in the process of being developed. But there are twelve other Centres, IFPRI's staff is small, and each collaboration involves a substantial effort on IFPRI's part if it is to be really worthwhile. Consequently, the Institute can sustain only a small number of such collaborations at any one time, however willing it is to develop more, and even though such collaborations amplify its output and impact.
251. Most of IFPRI's joint projects with other CGIAR Centres also involve developing countries in trilateral collaboration. IFPRI's role in these trinities is quite varied, but we were impressed by the effectiveness of such collaborations, and see them as the most effective form for IFPRI's joint activities with other Centres. However, as put to us by one Centre Director, there is also advantage at times in IFPRI not being seen as an associate of one of the other Centres, either because IFPRI's action on the policy scene might constrain the other Centre's efforts with the national programs, or vice versa.
252. The 1979 review team suggested that it would be useful for IFPRI to take the initiative in arranging joint meetings with Centre economists to discuss the implications of their research for policy issues. IFPRI tried to act on this suggestion, but it is evident that a formula acceptable to most Centre Directors has yet to be found. We endorse the intent of the earlier review, but in a somewhat different context. Now that IFPRI's series of seminars on food policy issues is well established, frequently on topics that cut across the research interests of many Centres, such as the forthcoming ones on instability and on production price policies, we trust that IFPRI will invite, and that Centre Directors will encourage, the participation of the IARC economists in these meetings. But we would add the suggestion that IFPRI and the Centre Directors should consider the advantages of also involving Centre biologists in appropriate IFPRI meetings, such as that on production instability.
253. The scope for greater interaction between IFPRI and the other Centres is considerable, and the advantages are being increasingly recognized on both sides. However, for the time being, this highly desirable objective, which would enhance IFPRI's comparative advantage in food policy analysis, remains constrained by the small size of IFPRI's staff.

## A. Staff Composition by Disciplines

254. IFPRI's Director, the four Program Directors, and a high proportion of the Washington-based research staff are economists. IFPRI's interpretations of economics, moreover, tend to emphasize incentives and inputs rather than power, interest-groups, structures, or institutions, and thus fall within a rather narrow band within the wide spectrum of methodologies and approaches in the profession. Both of the above factors contribute to the exchange of ideas, shared views about how to test those ideas, rigorous project design, and above all a clear thrust of argument: an "IFPRI approach". However, other approaches - at their best as rigorous as IFPRI's and widely represented among developingcountry professionals and policy makers - are possible even within economics. Secondly, other social sciences may be required to analyze societal or political variables that decisively influence the effect of food policy alternatives. Thirdly, in respect of both food production and nutrition, expertise from the natural sciences may be needed.
255. Communication among disciplines is expensive. We do not advocate it for its own sake. The question is: are inputs from experienced specialists outside the normal ambit of IFPRI's approach to economics essential to formulate policy research? This cannot be answered in abstract terms. It depends on whether past IFPRI policy research - and future guidelines - are limited by IFPRI's approach to an extent which would justify the costs of widening it.
256. If that turns out to be the case, we would not accept that:

- concentration on a particular sort of economic approach can be sufficiently remedied by a series of distinguished short-term visitors with different approaches;
- expertise in particular disciplines, e.g. anthropology, can be obtained from non-core field consultants after project design has been completed by staff economists;
- able junior core staff can provide such skills, especially if most of their time is spent in fieldwork;
- natural-science disciplines can be adequately represented by IFPRI's economists' consulting with experts in this field occasionally.

We are impressed by IFPRI's efforts to palliate the ills of over-specialization, especially by its successful encouragement of non-economists
to keep a firm base in their original disciplines. However, none of the above palliatives would be accepted by an economist in justification for, say, a decision by another CGIAR Centre to confine itself largely to one particular type of plant scientist. Neither would they justify IFPRI in confining its top-level staff for food policy analysis to a particular type of economist. We fully recognize the high quality of IFPRI's staff of economists and their readiness to learn from the approaches of other types. But we cannot escape the question posed in para. 255.
257. To judge whether the "narrow band" damages IFPRI's work, we looked at three issues: the central thrust, or policy research approach; the "six questions" meant to guide future research; and some specific projects.
258. The bulk of IFPRI's research output suggests the existence of an implicit central hypothesis. At the risk of some oversimplification, and without suggesting that all the staff would accept all the details, we would state that hypothesis is as follows:

> Research "drives" technical progress, which in turn is the main force behind growth of food production. Such growth creates incomes for farmers and laborers that - with appropriate infrastructure, incentives and other policies - tend to be spent locally on employment-intensive products and services. This improves poor people's nutrition, as well as diversifying and developing the economy.
259. IFPRI treats this as a hypothesis for testing, not as a dogma. Nevertheless, economists with different approaches would emphasize different variables in examining the progress of nutrition and food output. Economic structures of power - through labor-hiring systems, land distribution and tenure, control over credit, and links between landowners, bureaucrats, and laborers - greatly influence the types of output expansion, its employmentintensity, and hence its nutritional impact. The structural features sometimes influence the production and nutrition outcomes of innovation much more than do the research-infrastructure-expenditure-incentive variables on which IFPRI's approaches within economics mostly concentrate.
260. It is not suggested that IFPRI's approach is at all dogmatic or extreme. IFPRI's work on food subsidies, for example, shows that they usually bring clear net gains for the poor. For market-oriented economists, however, the"central hypothesis" would seem to underemphasize the role of changing consumer demands and factor scarcities in driving the demand for research. Economists at the other end of the spectrum would argue that the central hypothesis does omit organized group interests, including those of State functionaries, and economic power struggles. Economists who stand outside the "narrow band" could well correct this emphasis and hence improve policy analysis.
261. Moreover, the central hypothesis is economistic. This was probably right for IFPRI's early years; it made for clear, thrusting research. But, questions outside economics become increasingly hard to ignore. What are the effects, on policies for food output and consumption, of kinship groups, family structures, village norms, and felt pressures to cooperate or to compete, all variables analyzed by anthropologists? Where are the gains and losses to national and local policy makers and power brokers, and to the coalitions they form, all politicalscience variables, that often have similarly large effects? Where are the biological prospects of alternative research paths in different agro-climatic environments?
262. Just as IFPRI's approach to economics defined the central hypothesis, so has it mapped out the "six questions". We discuss these in detail elsewhere ( paras. 181-189). But to a top-ranking and quantitatively-oriented researcher outside the "narrow band", e.g. to an agricultural scientist, a social anthropologist, or even a structuralist economist, these questions would hardly seem to concentrate on the most important variables. For example, the assumption behind Question 3, that a "combination of farm producer incentives" is the aspect of food policy likeliest to affect the chances of achieving "growth and equity simultaneously", would be rejected by all the above spe-
cialists. Yet Q3 is not so formulated as to direct researchers' attention to agro-climatic, family-structural, or economic-power-based causes of growth, stagnation, equity or poverty. Researchers are led to look for a "combination of farm producer incentives" instead.
263. Our Report stresses the excellence of much of IFPRI's research. Nevertheless, it is not difficult to illustrate the damage done by the "narrow band" approach.
(a) The work on food output instability, while statistically rigorous and imaginative, has fallen into explanations in terms of "reduced genetic variability" that, in some cases, are biologically simplistic.
(b) A growing number of proposed Research Reports compare different remote countries' policy experiences in respect of, say, research organization, impact of technical changes on nutrition, and food/export-crop trade-offs. Such comparisons carry major dangers unless informed by analytical understanding of how social, political, and biological circumstances in any two countries differ, as some IFPRI staff are well aware.
(c) A program for "research on research" based heavily on comparisons among African research systems in very different social, political, and agroclimatic circumstances needs a first-rate organization theorist, together with an experienced biological researcher-cum-research-administrator, if it is to evolve productively.
264. IFPRI's role in the CGIAR system also suggests that its economics, and its disciplinary base, may need broadening. CGIAR economists look to IFPRI for workshops on topics of common interest. They can also hope to broaden and update analytical skills, and to apply what they learn to their own research design, by interchange with IFPRI staff. Yet there are many parts of economics where IFPRI cannot give such help, partly because it is small, and partly because its economists are so concentrated on a particular professional approach. Even less can CGIAR anthropologists look to the IFPRI core for support. Political science is hardly represented in the CGIAR system; should it not look to a policy research institute for support here?
265. In the light of the preceding considerations, we recommend that:
(a) During the next five years, IFPRI should make determined efforts to broaden the approach to economics amongst its staff, without loss of rigor.
(b) During the next two years, consideration should be given to appointing one senior social anthropologist and one senior political scientist to the core staff in Washington.
266. The role of biological sciences at IFPRI poses more difficult problems. As with the social sciences, the gap cannot be filled effectively by junior and/or non-Washington based staff; the gap is at the higher levels of project formulation, of "asking the questions". Unlike many social scientists, however, senior biological scientists - if they are active researchers - do not gladly detach themselves from experimental work, except for brief periods, which would not achieve the desired end. We doubt whether retired experts could keep IFPRI adequately abreast of the current state of applied biological research. A joint appointment with another CGIAR Centre could offer logistic difficulties and might convey a too-Centre-oriented view of the biological sciences.
267. In and near Washington, there are many able and experienced agriculturalists with considerable knowledge of the problems of developing countries and of the new opportunities arising from biological research. We therefore suggest that, as one possible step, a small advisory group, representing the main natural sciences working on tropical agriculture, be set up and invited to attend the initial and wind-up seminars on all IFPRI projects. Their comments on project design and on interpretation of results should also be obtained as appropriate.
268. We are impressed by the openness of IFPRI staff to other disciplines, and within economics to other views. The "narrow band" does not at all mean narrow minds! Also, it has helped to focus IFPRI's early work. But the time has come for IFPRI to cover a wider range of major variables related to food policy.

## B. The Issue of IFPRI's Size

269. As indicated in Chapter II (para. 31) the TAC mission of 1979 gave implicit support to the assertion of Director of IFPRI that the optimum size of the Institute, given its four programs and geographically wide ranging projects, is about 25 research workers. IFPRI's long-term plan clearly indicates that a staff of 25 senior researchers is the goal of the Institute.
270. The concept of 'optimum size' is bandied about rather freely within the CGIAR as if it were an objective characteristic rather than one which is highly dependent on management structure and style. In IFPRI's case, this matter of style is the crucial consideration. As has been indicated in Chapter VI (paras. 171/172), the present Director gives strong creative leadership and unity to the overall research program at IFPRI. We consider that this valuable feature should be preserved and protected, and we agree with the Director that it would be endangered were the research staff to grow to much more than 25 in number.
271. On the other hand, our discussions with policy analysts and policy makers in both developing countries and development agencies, and our own assessments of the yawning gaps in food policy research, left us in no doubt that there is a need and a demand for IFPRI to do far more work than could possibly be tackled by a research staff of 25 . The issues dealt with by IFPRI are seen as particularly significant and urgent by so many developing countries in so many regions, and their need for help in their analysis is so great, that a doubling of IFPRI's staff could readily be justified.
272. To set IFPRI's present size in context, our analysis of the Annual Reports of all the CGIAR Centres for 1982 indicates that of the total of 81 social scientists at the Centres (excluding post-doctoral fellows), IFPRI had about one quarter (22). For comparison, ILCA had 14 and currently plans to expand the activities of its Livestock Policy Unit into five areas, two of which clearly overlap with IFPRI's expertise, namely External Trade (African dairy imports) and Pricing Policies. The next largest group of social scientists (9) was at IRRI, with which IFPRI has excellent interactions and joint projects. Given that IFPRI has the primary mandate within the CGIAR System for agricultural and food policy analysis, and must work on many problems in many countries, we consider that the figures given above provide additional justification for raising the research staff of IFPRI to 25 as quickly as possible.
273. Within the total of 25 , we need to consider the desirable upper limit to the number on special project funding. Currently, special projects provide about $30 \%$ of IFPRI's funding and support 5 senior researchers. We have already indicated (Chapter VI, para. 178) that, in our opinion, this high proportion is not taking IFPRI outside its mandate. However, there are two other considerations which merit attention.
274. Firstly, special project support is very unevenly distributed among the four programs, by far the greatest part of it going to the Consumption program. (See Table). There are many reasons for this uneven distribution, which could distort the desirable balance between IFPRI's programs and could also make the Consumption program particularly vulnerable to shifting emphasis among donors.

## IFPRI 1984 BUDGET, CORE AND SPECIAL PROJECTS

|  | Core 1984 Budget (Includes Spec. <br> Project Transfers) <br> Sr. Research Staff |  | $\frac{\frac{1984}{} \text { Special Projects }}{\frac{\text { Sr. Research }}{\text { Staff }}}$ |  | Special Projects <br> as \% of total <br> Sr. Research Staff |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Trends | 4.25 | 406 | 0.50 | 168 | 10 | 29 |
| Production | 7.00 | 688 | 0.50 | 226 | 7 | 25 |
| Consumption | 3.55 | 366 | 1.90 | 771 | 35 | 69 |
| Trade | 3.00 | 322 | 0.30 | 135 | 9 | 30 |
| Support Services |  | 823 |  |  |  |  |
| Administrative | 3.00 | 744 |  |  |  |  |
| Office Operations |  | 343 |  |  |  |  |
| Other |  | 453 | 1.80 | 841 |  |  |
| Total | 20.80 | 4,145 | 5.00 | 2,141 | 24 | 34 |

275. Secondly, a high proportion of the primary data collection in developing countries by IFPRI is currently supported by special project funding, and is therefore vulnerable. Much of IFPRI's research on production and consumption policy issues, while focussed at the level of national policies, requires household level data, e.g. in the determination of linkages and nutritional aspects. Structured household surveys are expensive and IFPRI core funds have not been sufficient to cover the requisite survey work. Consequently, new surveys have
been undertaken only when special project funding could be obtained. All such surveys, irrespective of the degree and nature of IFPRI involvement, have been undertaken in collaboration with national institutions. Although we would not suggest that most of the IFPRI surveys should be supported by core funds, we do consider it imperative for the security of at least the longer term surveys and follow-up studies that some core funds should be available to reduce IFPRI's almost total dependence on special projects for primary data acquisition.
276. Other disadvantages for IFPRI of having to rely to the extent it does on special project funding include the stringent deadlines sometimes imposed, the lack of continuity in some lines of research, and the effort required of core staff both to initiate and to sustain special projects.
277. Clearly, we have no doubts whatever that there is a very strong case for raising IFPRI's senior research staff complement to 25 as quickly as possible. For the reasons given above, special project support should be limited to $20 \%$ or preferably less of the senior staff costs. Therefore, we strongly recommend that IFPRI's core senior research staff be increased to 21 (from 17) as soon as possible, with a proportionate increase in support funding. Given the many competing claims for additional core research capacity we have already identified in this report, we consider that the best way of deploying the additional resources should be left to the discretion of the Institute, but in our view the highest priorities, which are not mutually exclusive, are:
(a) To establish a separate program on Development Strategies, and to broaden the senior staff expertise in this area, as considered in para. 121.
(b) To broaden the disciplinary expertise of the IFPRI research staff not only within economics but also in anthropology and political science paras. 258 to 265).
(c) To allocate a few core positions for the long-term support of regional coordinators (para. 124).

## C. Computer Facilities and Word Processing

278. To serve the computer needs at IFPRI, two outside services are used, which are IBM (Dial Time) and Digital (Brookings Institution) based. This is apart from the computing needs for accounting. The computer expenditures have been rising rapidly from $\$ 100,000$ in 1980 to $\$ 300,000$ in 1983.
279. The computer centre at the Brookings Institution has developed a library of utilities which facilitates the tasks of handling incoming and outgoing data and converting them into a form that can be used on the computing facilities. For the ordinary statistical and econometric work, use is made of general purpose packages which require little or no familiarity with programming. Simulation, data base management and data editing involve considerable memory and computing time requirements and in-house programming.
280. The supporting staff has the capability to meet this need, but it is overworked. The use of two such different outside computer facilities must add considerably to the work load. Also, in view of the rapidly increasing costs, it is desirable that the feasibility of an in-house computer system be investi-
gated at this stage. The wide selection of available mini- and micro-computers and the diverse research and accounting needs of the Institute make selection difficult, even more so because access to an outside main-frame computer may continue to be needed. A considerable increase in in-house programming and operations staff would also be required.
281. To judge the cost effectiveness and other consequences of a change-over, external advice is being sought with the financial help of the Canadian International Development Research Centre (IDRC) and the World Bank. We commend this course of action and underline its urgency.
282. IFPRI relies for its output very much on publications that are made ready in-house for printing or other forms of multiplication. It therefore needs a well organized word processor capacity and capability. We doubt whether a solution where secretaries double as word-processors and vice versa is optimal in this situation.
283. Word processing is capital-intensive. Compared with most other CGIAR Centres, the capital budget of IFPRI is small, so that it may have considerably greater problems in meeting the cost of word-processing equipment. The alternative solution of financing this out of the recurrent budget by hiring or leasing is probably far too expensive. This problem requires further consideration on the basis of a feasibility study by IFPRI.

## D. Location

284. Several possible locations for IFPRI were considered during the early discussions on the Institute within the CGIAR. In the absence of a clear consensus for IFPRI's admission to the CGIAR in 1974, the three sponsors of the Institute decided to proceed with its establishment in Washington, which they considered to be the best location.
285. The TAC mission to IFPRI in 1979 recommended that IFPRI's Board give serious consideration to relocating the Institute in a developing country, to "place its research staff in an environment which would be more relevant to the objectives of the Institute." This recommendation was supported by TAC as already indicated in Chapter II, para 30, but in adopting IFPRI into the CGIAR System, the chairman indicated that the Group appeared to have an open mind on the issue of location (para. 32).
286. As also indicated in Chapter II, (para. 34) the IFPRI Board appointed an independent consultant to consider the issue of location. The consultant, Mr. H. Schaaf, took into account the many reasons considered to favour Washington as the best location in the deliberations of the Institute's three original sponsors. He also took into account the reasons enumerated by TAC in favour of relocating IFPRI, and attempted to make an objective weighting of all these as well as other factors, such as the cost of moving and operating IFPRI at a range of possible locations. His conclusion was strongly in favour of the Institute remaining in Washington.
287. The Board of IFPRI gave detailed and critical consideration to Mr. Schaf's report, as indicated in a letter of 28 March, 1980 from its Chairman to the Chairman of the CGIAR. An Annex to Dr. Sen's letter presents a careful and balanced consideration of the whole issue. As a result of these deliberations,
the IFPRI Board recommended that the headquarters of the Institute should remain in Washington.
288. Because the advantages and disadvantages of relocation have already been traversed so fully by TAC, Mr. Schaaf, and the Board of IFPRI, we do not intend to reconsider them in detail here. We share the concern of TAC, as indeed does the Board of the Institute, that the staff of IFPRI should maintain a clear and up-to-date perception of the food and nutrition situation in the Third World, and of the broader policy issues related to that situation. However, we do not consider the Washington location to be, on balance, disadvantageous in that respect, for several reasons.
289. First among these is the highly international composition of both the research and the support staff, with a high proportion of the research staff coming from many different developing countries and retaining strong links with those countries. In fact, the understanding of the problems facing a wide range of Third World countries brought together in the IFPRI staff is one of its greatest assets. Moreover, IFPRI's emphasis on having many of its research projects based on active collaboration with their peers in various national systems serves to reinforce awareness of current problems. Washington is as convenient as any of the other proposed locations for travel to the full range of Third World countries.
290. The CGIAR is well aware of the possibility of its centres becoming particularly concerned with the problems of their host country. Were IFPRI to be located in a developing country, the Institute could be subject to similar pressures. But more importantly, it might also be constrained by pressures to which the biological centres are not subject, namely those arising from the socio-economic and political implications of its work.
291. We have argued above (Chapter III) that the major financial institutions are an important part of IFPRI's clientele. Further, it is highly desirable that IFPRI staff should be in a position to engage in policy dialogue with World Bank and IMF staff at many levels on issues arising out of IFPRI's collaborative work with developing countries. In this context, as in many others, location in Washington has many positive advantages. We found this view to be widely held by the people we met in developing countries, without dissent.
292. We therefore recommend that IFPRI continue to have its headquarters based in Washington, while recognizing that the issue is a complex one which merits on-going consideration by the Board as the nature of IFPRI's work continues to evolve.
293. Overall, we have been highly impressed by many features of IFPRI; by the calibre of its staff and of its leadership; by the quality and impact of its work; by its style of collaboration with developing countries; by its evident concern for the poorest and hungriest; and by the urgent need in many developing countries for the kind of research that has been done by IFPRI. All the critical comments and suggestions for change which we have made in the preceding chapters should be read against that background.
294. In this final chapter, which serves also as an extended summary, we recapitulate our main findings. Most of our suggestions for change, such as the many in Chapter $V$ dealing with the four programs, have not been given the status of recommendations, so that we can keep the list of these short - there are only 8 of them - in the hope of focussing discussion on their implementation. Like most review panels, we have recognized more areas in need of expansion than of contraction, but we have identified some elements in all four of IFPRI's research programs which should be reduced or phased out. In many of these cases, IFPRI is already shifting its emphasis to work of currently higher priority. Where we endorse IFPRI's current practice (e.g. the high standard of its Research Reports) or projected changes (e.g. in the geographic balance of its work), we have not seen any need to formulate recommendations, except on the question of location. Likewise, we have refrained from redrafting IFPRI's "six questions", which is properly the function of the Board. Finally, we have kept our comments on management and financial issues to a minimum, since they were being covered by the concurrent Management Review, and it seemed desirable to avoid overlap and the possibility of confusing differences of opinion. In fact, we worked throughout in close collaboration with the Management Review team.
295. In Chapter II of our report we discuss the origin and evolution of IFPRI in some detail, for two reasons. The first is to establish that although IFPRI was adopted by the CGIAR System only 5 years ago, the need for a concentrated effort on food policy analysis was recognized from the very outset by the CGIAR. The area was seen, in 1971, as a weak link in the CGIAR System. It is now a strong one, and we emerged from this review with no doubts that IFPRI is not only a crucial part of the CGIAR system, but stands to gain a great deal from the other Centres in the System.
296. Our other aim in Chapter II has been to show that both the mandate and the work of IFPRI have evolved to a considerable extent in the 10 years since the Institute was established, in response to changing perceptions of where the greatest need lay. Partly this has reflected improved understanding of the problems, partly a shift in emphasis from world surveillance to better nutrition of the poor in developing countries, and partly changes in the complementary work of other institutions. The major revision of IFPRI's mandate following the TAC review in 1979, took account of these changes. IFPRI's role was given "the precise objective of contributing to the reduction of hunger and malnutrition", but the mandate went on to state that this would require "analysis of underlying processes and extending beyond a narrowly defined food sector". We agree, on both counts (cf. para. 167).
297. In Chapter III, Who should IFPRI work for? we consider the important question of IFPRI's clientele. Two points merit recapitulation at this stage. IFPRI's primary clientele must be those responsible for food policies in developing countries. But who are they? They include both policy analysts and
policy makers, scattered through many agencies and at many levels in any one developing country. Effective contact with senior policy makers is important if IFPRI's work is to have its full impact, and we were impressed by the evidence of such contacts during our field visits. Nevertheless, we would attach at least as much importance to the policy analysts in developing countries, IFPRI's peers and collaborators, its "invisible college", because of the longer term significance of IFPRI's support for, and institution building potential of this group (paras. 40 to 45 ).
298. IFPRI's intermediate-clientele among many international and national financial and development agencies is also significant.
In particular, developing countries themselves see a very important role for IFPRI in enlarging the scope for policy dialogue between them and the major financial institutions such as the World Bank, and in independently analyzing the policies and conditionalities of these agencies. IFPRI should not act as advocate or apologist for developing countries, but should, through independent analysis, examine the complex, and often counter-intuitive, effects of aid policies and fashions. Such work could, at times, make IFPRI vulnerable in a way that other CGIAR Centres are not, and may require considerable understanding from donors (paras. 47 to 49).
299. In Chapter IV we try to formulate a framework for IFPRI's research against which to measure its actual research programs in the following chapter. We are not proposing an "ideal IFPRI", because even a short list of food policy areas and issues in need of research goes far beyond the capacity of a small institute based in Washington. Consequently IFPRI may always be exposed to criticism for the things it has not done, and we begin by considering some of the research IFPRI should not do, before discussing three criteria for helping it to decide what it should do. We then discuss some issues within the reach of IFPRI's four research programs and several which go beyond them. Among the many implications of these issues, one concerns the sorts of developing countries in which IFPRI's policy research should be carried out. Those in greatest need of it may often be unable or unwilling to make use of food policy research. Those with the capacity to use it, and with the requisite data systems for analysis, may have a less urgent need for IFPRI's help. Such countries were the focus of many of IFPRI's early analyses, and some work in them should continue. But as IFPRI shifts more of its attention to Africa and to developing countries nearer the other extreme, its approach will be forced to change, and especially to broaden (paras. 71 to 74).
300. Chapter V presents our assessments of IFPRI's four research programs, of what they have done and where they are going. The TAC review of 1979 saw the "Production" program, with its emphasis on new technology and the linked consequences of it, as central to IFPRI's research thrust, and suggested that the work on "Trends" and on "Trade" should be considered only as supporting activities. We take a very different view. In brief, because of "the precise objective" given in the mandate, we see the "Consumption" program, although smaller, as being of comparable importance to "Production". For reasons considered below, we also see the "Trade" program as a crucially important part of IFPRI's overall attack, no less than "Production" and "Consumption", and certainly not merely a supporting activity. As for the "Trends" program, while recognizing the important role it plays in support of the other programs, we also suggest an additional role and new name for the program. We also recommend the establishment of a new program, devoted to Development Strategies.
301. The Food Consumption and Nutrition Policy ("Consumption") program is a coherent, productive program, of high analytical calibre and closely focussed on the mandate's objective of contributing to the reduction of hunger and malnutrition. However, the current research program appears to be rather wide-ranging for so small a staff, and we suggest that its efforts should be concentrated on three areas, namely the consumption/nutrition impact of prices and subsidies, of technical change, and of shifts to cash crops. Work on the stucture of demand for food could be cut back but the exploratory work that has been done on another topic - the consumption/nutrition effects of fluctuations in food production, prices and rural incomes - is promising and should be developed. This may require additional resources, and we have argued (paras. 80 and 273 to 274) that the "Consumption" program is too heavily dependent on special project funding ( $69 \%$ ) and merits additional core funds.
302. The Food Production and Development Strategy ("Production") program is the largest of the four and covers a rather wide range of topics in its three sub-programs, which are only loosely interlinked. We suggest that these sub-programs be renamed as (i) Strategic production factors, (ii) Specific production policies, and (iii) Production linkages, to give each of them a clearer focus and to link them more closely together (paras. 105,110 and 114).
303. The first sub-program concentrates on three of the most important factors contributing to increase in crop yield per unit land area, namely irrigation, fertilizers and agricultural research. We suggest that IFPRI's work on irrigation policies should be broadened to consider the whole range of water control and should develop in active collaboration with IIMI as well as with IRRI: We sense an important and unique role for IFPRI to emphasize, rather more than it has in the past, its work on fertilizer policies, not only for irrigated areas but also for dryland crops (para. 107). There are many other production factors in need of policy analytical research by IFPRI, such as improved systems for seed production and distribution, and for the control of weeds, pests, diseases and rhizobial inoculation. IFPRI's work on labor constraints to production, for example, needs to consider ways in which herbicide use could relieve these, while the question of policies for the use of improved seeds cannot be left aside much longer.
304. As for IFPRI's research on agricultural research, we were of two minds. We recognize the need by developing countries for policy analysis on the question of the allocation of resources to research, but IFPRI's work in this area is also examining the organization of those resources; which we are not convinved makes the best use of IFPRI expertise, and might well be left to ISNAR. We therefore suggest that this work should be reviewed by 1986 (paras. 106 and 263).
305. We are also concerned that IFPRI's work on development strategy is confined too strongly to the area of production linkages, and does not embody enough work on other and intersectoral linkages, on structural and infrastructural issues, or on the effects of macroeconomic policies. We therefore recommend that IFPRI consider the establishment of a separate Development Strategies Program (para. 121). Besides encouraging IFPRI to develop a broader and more coherent approach to what the mandate recognizes as a central element in IFPRI'S role (paras. 119 to 120), this could result in stronger leadership and better linkages between programs in this area. The "Production" program could supply much of the expertise required to establish the new program, but a wider range of disciplinary coverage will be required, and is recommended below.
306. Three further comments should be made in connection with our recommendation. Firstly, we are not suggesting that IFPRI should evolve towards becoming a comprehensive institute of development studies. Its strong focus on food policy should be retained.
307. However, our proposal will, almost inevitably, draw IFPRI into research on some sensitive and controversial issues, e.g. structural issues such as tenure and property rights, which it has tended to avoid - though not entirely - but which may have to be addressed before production and consumption can improve in some situations. But here too the mandate is clearly supportive of such a change (para. 123).
308. Thirdly, the establishment of a Development Strategies Program should encourage IFPRI to concentrate some - not all, or even most - of its work in one or two locations where production, consumption, nutrition and trade aspects and interlinkages can be analysed more comprehensively. In this connection, we were impressed by the many advantages for IFPRI's work in S.E. Asia of having an outposted regional co-ordinator. We therefore recommend that core-funded positions be provided for two regional co-ordinators, to be based in S.E. Asia and Africa, to enhance the effectiveness and impact of major long term projects in these regions, and to promote a more comprehensive Institute-wide approach to them (para. 124).
309. The International Food Trade and Food Security ("Trade") program is, in our view, an essential and important component of IFPRI's research (para. 63). The Institute's work on food security has received wide recognition and has had considerable impact (paras. 128 to 132). But whereas food security is mentioned in IFPRI's "Six Questions", international trade is not. This does not mean that the Institute has not recognized the importance of trade issues to its mandate, but rather that it has been diffident about making this explicit, for a variety of reasons. Our assessment in Chapter $V$ (paras. 142 to 149) should make it clear that we regard the "Trade" program at IFPRI as an essential component of the Institue's overall research, in its own right, with many significant issues to be examined not only for trade between developing countries but also for the impact of developed country trade policies in the Third World. Additional research is needed on the impact of macro-economic policies on incentives in the food sector, and on national policies to achieve food security. On the other hand, the valuable work that has been done on international devices for food security and on the contribution of food aid to food security can probably now be reduced in scale.
310. The Food Trends Analysis ("Trends") program figured prominently in the research agenda originally proposed for IFPRI. However, as the trend analysis and projection work of other agencies, such as FAO, has become more sophisticated, so has the rationale for a major "Trends" program at IFPRI weakened. Nevertheless, the service provided to the other programs by "Trends" is greatly appreciated, and we recognize that it is desirable for IFPRI to maintain some in-house capacity in the area, particularly as the trends in world supplies may become more dynamic and complex in future. Also, we agree that food supplies and policies for one billion Chinese require sophisticated and continuing analysis.
311. As IFPRI's work shifts away from developing countries with relatively strong statistical and policy systems to countries where these are much weaker, as the tilt towards Africa will require, so will the need for better data become more acute. Consequently, we foresee an increasingly significant role for IFPRI in helping to improve the quality of food data systems. The work on China falls
within this context, and consideration has already been given within the program to the problems of African food data. We therefore recommend that the "Trends" program be renamed as the "Food Data Systems" program, its primary purpose being to conduct research on improving systems for gathering, evaluating and using foodrelated data for policy analysis, in association with developing countries and relevant agencies, especially FAO. The change in name should high1ight the proposed shift in emphasis for the program, and widen its scope (paras. 162 to 165 and 67).
312. Chapter VI begins by addressing the question of how IFPRI formulates its research and of whether there is an overall strategy. After examining the roles of the mandate, the Board, the Director, the research staff, the collaborators from developing countries, various international agencies and donors, we conclude that there is a well defined though evolving framework for IFPRI's research which many groups help to formulate, and which acts as a consensually agreed informal mandate within which individual researchers are allowed considerable initiative.
313. As for the integration of the research program, although we identify quite a few places where this could be better, it is, on the whole, excellent. The "six questions" put forward in 1982 in the context of IFPRI's long term plan could play an integrating role across programs, although this is not yet very apparent. The "six questions" may also be useful in giving donors a clearer idea than they can derive from the four program names of what IFPRI sees as the principal objectives of its research. We have therefore examined these questions in some detail (paras. 181 to 189), but refrain from reformulating them.
314. Chapter VI also includes an analysis of the geographic balance in IFPRI'S research. Our comparison of already completed studies with those ongoing or planned reveals several substantial shifts in emphasis. Work in Sub-Saharan Africa and in non-Indian Asia is increasing at the expense of Latin America, West Asia/North Africa and the early concentration on India (paras. 191 to 202). We endorse these trends, but with the hope that too great a dispersion of effort will be avoided, and that donors will recognize the far greater costs for IFPRI of working in Africa than in South and South East Asia or Latin America.
315. Chapter VII assesses IFPRI's output and impact. Given the many-stranded, multi-layered inputs into the food policy making process, and the fact that much of IFPRI's work is done in active collaboration with developing countries, the Institute's impact is difficult to assess. However, we were left in no doubt about the high opinion of the usefulness of IFPRI's work held by senior policy makers in the developing countries we visited: the research projects were regarded as highly relevant to their needs, IFPRI's collaborative approach was much appreciated, and the findings were being put to immediate use in policy making.
316. The impact of IFPRI's research on the policies of international development and financial agencies is also difficult to gauge, but its role in the creation of the IMF cereal import facility, and the active interest of the World Food Program in its research on food aid, are indicative of considerable impact.
317. The route to this impact varies greatly with the institution involved, whether via the Research Reports, IFPRI Abstracts, working papers, policy seminars, conferences, collaboration or informal discussions. IFPRI's reputation among policy analysts and policy makers in all sections of its clientele hinges on the quality of its series of Research Reports, and we strongly endorse

IFPRI's efforts to maintain the high standard of these reports (para. 214). The Abstracts of the reports will, however, be more widely accessible and read by policy makers, and we therefore suggest that IFPRI should undertake a study of their actual distribution and use with a view to maximizing their impact (para. 224).
318. From the very outset, it was envisaged that IFPRI would not provide a formal training program but concentrate on in-service training, at a high level, in collaborative projects (cf. paras. 19 and 25). We fully endorse this approach, and anticipate that IFPRI's "invisible college" of policy analysts throughout the Third World will grow with time into a compelling example of institution-building. The program of policy seminars, launched in 1982 , should strongly reinforce IFPRI's role in building the capacity for food policy analysis in developing countries.
319. IFPRI's research and experience has now reached the point where a regular perspective review of food policy issues by the Director could usefully complement the existing major reviews such as FAO's State of Food and Agriculture and the World Bank' 'Development Report'. We suggest that a suitable occasion for such a review might be provided by one of the co-sponsors of the CGIAR (para. 241). In addition, we recommend that the Director of IFPRI be invited to prepare a biennial review of agricultural and food policy, to be delivered at Centre's Week in the alternate years when IFPRI's program and budget are not due for presentation and discussion (para. 242).
320. Chapter VIII deals with IFPRI, the CGIAR and its Centres. We point out that, currently, the IFPRI Staff represent only about one quarter of the socioeconomists within the CGIAR system. On the whole there is a clear division of labour between the IFPRI and the Centre economists, and their work is complementary. However, a problem may be emerging as some other Centres wish to work in the arena of agricultural and food policy analysis, and we suggest that TAC should give thought to this (para. 245).
321. We examine some of the roles IFPRI could play within the CGIAR, noting that its research could help to define the framework within which CGIAR priorities and allocations are determined. However, for a number of reasons (given in para. 247) we recommend that IFPRI should not be directly involved in the processes determining the allocation of resources within the CGIAR system.
322. The greatest advantage of adopting IFPRI into the CGIAR system lay in the enhanced opportunities for interaction and collaboration with other Centres, and we believe that these opportunities are being seized as far as possible. The collaborative projects with IRRI on rice policies in S.E. Asia and with ICRISAT on coarse grains in SAT West Africa, both of which are joint projects with several developing country and other institutions, illustrate the mutual benefits of such collaborations. There is scope for far more interaction between IFPRI and the other Centres, but the small size of IFPRI's staff precludes the Institute from taking full advantage of these opportunities.
323. Chapter IX deals with staff composition, size, services and location. It opens with a plea for a wider range of approach by IFPRI to its mandate, both within and beyond the discipline of economics. We argue that the present staff constitute a rather narrow band - but not a narrow-minded one - within the desirable range of approaches and expertise needed to realize IFPRI's mission (paras. 254 to 264). In fact we recognize that, although we have referred in the previous Chapter to an "IFPRI approach", there is already within the

Institute a commendable heterogeneity of views and approaches on many issues. We nevertheless recommend that: (a) during the next five years, IFPRI should make determined efforts to broaden the approach to economics amongst its staff, without loss of rigour; and (b) during the next two years, consideration should be given to appointing one senior social anthropologist and one senior political scientist to the core staff in Washington (para. 265).
324. We also recognize a need for more direct inputs from the biological sciences into the formulation and interpretation of IFPRI's research, but without coming to a conclusive solution to the problem. For the time being, we suggest that IFPRI could draw on the wide range of relevant expertise and experience in the Washington area to establish a small advisory group to help in the design and interpretation of biological aspects of IFPRI's research (paras. 266 and 267).
325. The crucial consideration in determining an upper limit to IFPRI's size for the time being is the management style of the present Director. John Mellor gives strong creative leadership and unity to the overall research program at IFPRI, and we consider this a valuable feature that should be preserved and protected. We agree with the Director that this would be endangeredif the senior research staff grew to much more than 25 in number. But we have no doubts that there is a need and a demand for IFPRI to do far more work than it could tackle with a research staff of only 25 . Consequently, we consider that the requisite funding to raise the size of the senior research staff to 25 should be provided as soon as possible.
326. Of this 25 , we suggest that preferably less than $20 \%$ should be on special project funding, whereas at present $30 \%$ of overall research funds, and $69 \%$ of those for the "Consumption" program, come from special projects. We consider these proportions to be too high. Moreover, their uneven distribution could distort the desirable balance between IFPRI's programs, while the almost-total dependence of the Institute's primary data collection on special project funds makes it vulnerable and uncertain for longer term surveys and follow-up studies (paras. 273 to 276).
327. We therefore strongly recommend that IFPRI's core research staff be increased to 21 (from 17) as soon as possible, with a proportionate increase in support funding (para 277), and we indicate that, in our view, the highest priorities for the use of the additional resources are:
(1) to establish a separate Development Strategies program (Recommendation 1).
(2) to broaden the disciplinary expertise of IFPRI research staff not only within economics but also in anthropology and political science (Recommendation 6).
(3) to establish two core positions for regional co-ordinators (Recommendation 2).
328. In view of the recommendation of the previous TAC review that IFPRI should be located in a developing country, we have discussed the matter of location in the light of the long list of pros and cons already considered by TAC, the consultant and the IFPRI Board, as well as taking into account the opinions of IFPRI's partners in developing countries, the composition of the Institute's staff and the nature of its clientele. We recommend that IFPRI continues to have its headquarters based in Washington, while recognizing that the issue is a
complex one which merits on-going consideration by the Board as the nature of IFPRI's work continues to evolve (para. 292).
329. IFPRI has emerged from our review as a dynamic research institute of high quality, whose research is clearly focussed on the needs of developing countries, and of poor people in them. Its work is appreciated by those countries, as is its style of working with them. IFPRI has gained much from its admission to the CGIAR System and has much to contribute to it. We enthusiastically commend it to the donors for their continuing, indeed enhanced, support.

## 1. CHARGE

The Consultative Group on International Agricultural Research (CGIAR) has charged its Technical Advisory Committee (TAC) with the conduct of External Program Reviews of the value and effectiveness of its International Centres. 2/

## 2. PURPOSE AND SCOPE

The major objective of such reviews has been defined by TAC (in agreement with the Directors of the International Centres) and adopted by CGIAR as follows:
"on behalf of the Consultative Group, to assess the content, quality, impact and value of the overall program of the Centres and to examine whether the operations being funded are being carried out in line with declared policies and to acceptable standards of excellence."

It is hoped that the Review will inter alia assist the International Centres themselves in planning their programs and ensuring the validity of the research priorities recognized by the Boards of the Centres.

## 3. DETAILED ITEMS OF ENQUIRY

In pursuance of the main objectives, defined above, the Review Panel is requested to give particular attention to the following aspects:
(i) The mandate of the Centre, its appropriateness, internal consistency and interpretation with respect to:
(a) the immediate and long-term needs for improved food supply and human welfare in developing countries
(b) present and possible future areas of work.
(ii) The relevance, scope and objectives of the present program and budget of the Centre and its forward and long-term plans in relation to:

1/ This version was approved by TAC at its 31 st Meeting and adopted by the CGIAR in November 1983. It replaces all earlier versions

2/ "Centre" for the purpose of this document comprises the board, the director and staff of all CGIAR institutions, including Boards, Centres, Institutes, Programs and Services. The consultative process for External Program Reviews involves appropriate officials from Centre Management and/or Board as relevant to the issue in question. It is in such understanding that the term "Centre" is used herein.
(a) its mandate, and criteria for the allocation of resources as defined by TAC;
(b) the ongoing activities of other international institutes and organizations, and the relevant national institutes in cooperating countries and in others where the work of the institute has bearing;
(c) the policy, strategy and procedures adopted by the Centre in carrying out its mandate and the mechanisms for their formulation;
(d) the Centre's rationale for its present allocation of resources, its present and future overall size, and the composition and balance of the program in the fields of research, training, documentation, information exchange and related cooperative activities.
(iii) The content and quality of the scientific and related work of the Centre with particular reference to:
(a) the results of the Centre's research, particularly that done since the last Review;
(b) the current and planned research and the role of the scientific disciplines therein;
(c) the information exchange and training programs, their methologies, their specialization and decentralization, and the participation of the research staff therein;
(d) the adequacy of the research support and other facilities;
(e) the management of the scientific and financial resources of the Centre and the coordination of its activities. 1/
(iv) The impact and usefulness of the Centre's activities in relation to:
(a) agricultural production and the equity of distribution of benefits from increased production;
(b) the potential impact on women-specific occupations, especially on diversification of employment opportunities, generation of additional income and reduction of drudgery;
(c) its information exchange and training program;
(d) cooperation with other international institutes and organizations.

1/ The panel is not expected to institute a detailed management review which will be undertaken, usually concurrently, by a Panel especially commissioned by the CGIAR Secretariat for such purpose. The External Program Review is expected to cooperate closely with the Management Review Panel.
(v). The actions of the Centre with respect to recommendations of the previous review as approved by the TAC and the CGIAR.
(vi) Constraints on the Centre's activities which may be hindering the achievement of its objectives and the implementation of its programs, and possible means of reducing or eliminating such constraints.
(vii) Specific questions which concerned members of the CGIAR, cooperating institutions, the Centre's Director or its Board of Trustees, may request TAC to examine. The specific questions to be addressed in the External Program Review of IFPRI are given in the Appendix.

## 4. GENERAL CONSTRAINTS

In the early stages of a Centre's development, the External Program Reviews must be devoted to assessing the scientific reputation of the Centre, but with the passage of time, the scientific reputation of the Centre becomes widely known and Panels are expected to give more attention to the outcome and impact of the Centre's work and less to detailed comments on the research itself, which is reported elsewhere. Other aspects of paramount importance are the priorities within and between research programs, the balance among programs, the balance between headquarters and off-campus activities, and relationships with national programs.

## 5. REPORTING

On the basis of its review, the Panel will report to TAC on its views on:
(a) the Centre's effectiveness and impact;
(b) the relative importance of the various activities of the Centre;
(c) means of improving the efficiency of operations;
(d) the need for any changes in the basic objectives or orientation of the Centre's program elements; and
(e) proposals for overcoming any constraints.

The Review team should feel free to make any observations or recommendations it wishes, because the report is theirs alone. Equally, it should be clearly understood that the Panel cannot commit the CGIAR or TAC to any consequent action, and Centres should bear this in mind when considering implementation of the Panel!s recommendations before the report has been discussed by TAC and the CGIAR.

## EXTERNAL PROGRAM REVIEW OF IFPRI

## SPECIFIC QUESTIONS

1. Has IFPRI foolowed the recommendations made by the TAC in 1979? (Although the 1979 Review of IFPRI by a TAC Subcommittee cannot be fully equated with the usual TAC-commissioned independent External Program Review, it is deemed proper to use TAC's currently relevant comments on and conditions for admission of IFPRI into the CGIAR System as reference points for the present review.)
2. Is IFPRI keeping within the limitation to identification and analysis of alternative policies and to outlining strategies and emphasizing opportunities for policy action without, however, offering policy advice? Is this limitation viewed as a constraint in achieving impact?
3. Are IFPRI's priorities the six questions of the long-term plan? How were the priorities set and what dictates the nature and relative weight? Is a time frame provided for current priorities?
4. Do priorities (not projects or expertise) regulate program structure and activities? If so, how much shift is considered acceptable?
5. In formulation and adjustment of program, to what extent are the problems and issues planned to be addressed by IFPRI complementary to those which the CGIAR System as a whole considers for priority attention? What steps are taken to keep on top of evolving policy problems? Is use made of external critique of outputs (project documents, publications, field work)?
6. What is the clientele for IFPRI's research outputs? To what extent does it include the governmental institutions of LDCs, and how do IFPRI's outputs complement the work of these institutions?
7. Specifically, what support is given to strengthen national institutions of developing countries? What (kinds of) institutions are these? What is the distribution between more and less developed developing countries? What is the geographical distribution?
8. Have relations with CGIAR Centres developed in a proper and fruitful way? Do policies and strategies, for better ways to adopt technically useful research results emanating from IARCs, receive sufficient attention?
9. Does IFPRI see a role of transfer of policy research done by other organizations? A role of integration? Are there large areas still awaiting attention?
10. To what extent does IFPRI concentrate on production economics cum consumption economics so as to link up with the work of the IARCs and provide perspective to their micro-economic work? The production-consumption areas emphasized by TAC continue to suffer most from proposed cutbacks under IFPRI's "fallback" conditions. Is this appropriate?
11. Do IARC economic (and social) workers collaborate closely with IFPRI? What is the record of employment (staff) of non-economists? Are more needed, and from which disciplines?
12. What should be IFPRI's role in farming systems research? In socioeconomic including nutrition research? In the context of the CGIAR System? What is the significance and current direction of IFPRI's work on price policy?
13. How does IFPRI see its role in training? What would be covered? What will be the approach? Is the policy maker in developing countries the target? If so, is the training program adequate?
14. In its conclusions on macro-economic food policies and strategies, does IFPRI cover routinely the consequences (economic, social including nutritional) for resource poor producers and consumers? If yes, what weight is given? Is the potential for "bottom-up" initiative by these target groups explored in policy analyses and strategy designs?
15. What attention is given in IFPRI's policy/strategy analyses to OECD countries' policies and practices (production, surplus disposal, trade and tariff, subventions, food aid, prices) and their potential constraining effects on the planned development of national food policies?
16. Several special projects have no staff time component. What is the effect of special projects on core staff time?
17. What are the main categories and forms of research outputs which IFPRI provides or could provide?
18. How does IFPRI measure the impact of its research? If by (a) use of its policy analyses, (b) increased application of IARC promoted technology, (c) increased allocation of resources to national and/or international agricultural research, (d) higher standard of performance and higher standing of policy research institutions in developing countries, what have been the track records?
19. Is IFPRI's target in developing countries the policy maker or the policy research institution? To what extent are either in Ministries of Agriculture? Need they be?

For discussion relevant to these questions in this Report see:

Q1. - paras. $29 / 30,33 / 34,419 / 426$
Q2. - paras. 75, 173, 217
Q3. - paras. $86,192 / 198,262,315 / 323$
Q4. - Chapter VI, especially paras. 300/308
Q5. - Chapters VI and VIII, and paras. 167, 221/222, 301, 380
Q6. - Chapters III, paras. 39/45
Q7. - Chapter III and paras. 40/45, 71/72, 324/335
Q8. - Chapter VIII and para. 50
Q9. - not answered
Q10. - Chapter V
Q11. - Chapter VIII, and paras. 50, 379, $387 / 401$
Q12. - Chapters V and VII, and para. 74

Q13. - paras. 25, 232/238
Q14. - Chapters IV and VI, and para. 175
Q15. - paras. 141,170
Q16. - Chapter IX, paras. $407 / 410$
Q17. - Chapter VII
Q18. - Chapter VII
Q19. - Chapter III, paras. 39/45

## EXTERNAL PROGRAM REVIEW OF IFPRI

List of Persons Met

## (a) PHILTPPINES ${ }^{\underline{1} /}$

## 6 February 1984

## IRRI Staff:

```
Dr. M. S. Swaminathan, Director General
Dr. J. C. Flinn, Director, Agr. Econ. Program
Dr. L. A. Gonzalez, Joint IFPRI-IRRI Appointee, Rice Policy
    S.E. Asia Project
    Dr. L. J. Unnevehr, (Trade) Agr. Econ. Program, Rice Policy
        S.E. Asia Project
    Dr. C. David, (Food Policy) Agr. Econ. Program, Rice Policy
        S.E. Asia Project
    Dr. S. Bhuiyan, Irrigation Engineer
    Dr. A. Polak, Anthropologist, Agr. Econ. Program
```

IFPRI Staff: 2/

Dr. L. A. Gonzalez (see above)
Dr. M. W. Rosegrant, Supervisor, Rice Policy S.E. Asia Project
Dr. L. A. Paulino, Director, Trends Program
Dr. R. Bautista (recently joined IFPRI staff)

## University of the Philippines at Los Banos:

Dr. E. Q. Javier, Chancellor \& Minister of Science \& Technology
Dr. R. L. Nasol, Director, Center for Policy \& Development Studies
Dr. T. B. Paris, Assoc. Prof. \& Chairman, Dept. of Economics
Dr. P. Intal Jr., Asst. Prof., College of Development Services \& Management
Dr. L. S. Cabinilla (Livestock) Economist, Food/Rice Policy S.E. Asia Project

Dr. J. F. Sison (Irrigation) Economist, Food/Rice Policy S.E. Asia Project

[^17]
## Philippine Council for Agriculture \& Resources Research \& Development (PCARRD):

Dr. R. V. Valmayor, Executive Director
Dr. Aida R. Librero, Director, Socio-Economic Research Dept.

## 7 February 1984

National Nutrition Council (NNC):
Mrs. D. Aguillon, Executive Director
Mr. M. Garcia, Coordinator IFPRI-NNC Project (Food Discount Project)

## Ministry of Agriculture:

Dr. A. R. Tanco, Minister of Agriculture
Dr. O. Sacay, Deputy Minister of Agriculture
Dr. J. C. Alix, Director, Bureau of Agricultural Economics
Dr. E. Quisumbing, Deputy Director, National Food \& Agric. Council

Development Academy of the Philippines (DAP):
Dr. M. Mangahas, Manager, Research Department

National Irrigation Authority (NIA):
Mr. C. Tech, Administrator
Mr. J. B. Del Rosario, Asst. Administrator for Operations
Mr. O. Cablayan, Corporate Planning Staff

## National Economic Development Authority (NEDA):

Dr. V. Valdepenas Jr., Director-General \& Minister of Economic Development
Dr. E. G. Corpuz, Assistant Director-General
Dr. R. Pante Jr., Assistant Director-General
Dr. J. M. Lawas, Assistant Director-General
Dr. Marietta S. Adriano, Director, Agriculture Staff
Mr. Salezar, Director, External Staff
Mr. W. Nugnie, Director, Research Planning Staff
Mr. C. Soprepena, Director, Policy Coordination Staff

Asian Development Bank (ADB):
Dr. K. Takase, Director, Irrigation \& Rural Development Dept.
Mr. Z. Azam, Deputy Director, Irrigation \& Rural Devel. Dept.
Dr. E. F. Tacke, Deputy Director, Agriculture Department

Office of the Prime Minister:
Dr. C. Virata, Prime Minister
Dr. R. K. Katigbak, Director for Policy
(b) BANGKOK - BOARD OF TRUSTEES MEETING 1/

10-11 February 1984

IFPRI Board of Trustees:

```
Dr. Eliseu Alves
Dr. Yahia Bakour
Dr. Ralph Kirby Davidson
Dr. Lowell S. Hardin
Ms. Anne de Lattre
Prof. James R. McWilliam
Dr. Saburo Okita
Dr. S.R. Sen, Chairman
Dr. Snoh Unakul
Prof. T. Ajibola Taylor
Dr. Dick de Zeeuw
Dr. John W. Mellor (ex officio)
```


## IFPRI Staff:

Mr. J.S. Gorgulho
Dr. Raisuddin Ahmed
Dr. Per Pinstrup-Andersen
Dr. J.S. Sarma
Dr. Ammar Siamwalla
Dr. Joachim von Braun
Mrs. L. Halsey
(c) ZAMBIA 2/

Chipata

14 February 1984
IFPRI Staff:
Mr. John Mellor, Director
Dr. Shubh Kumar

1/ Review Panel involved: L.T. Evans (Chairman) Y. Hayami, A.M. Khusro, M. Lipton (Members), R.W. Herdt (CGIAR Secretariat), K.O. Herz (TAC Secretariat)

2/ Review Panel involved: L.T. Evans (Chairman), M. Lipton (Member), Y. Hayami (Member), R.W. Herdt (CGIAR Secretariat), K.O. Herz (TAC Secretariat - except Chipata).

## National Food and Nutrition Commission (NFNC):

Mr. A. P. Vamoer, Executive Director
Mr. H. N. Siulanda

```
Mr. S. Atkins, Project Manager, Eastern Province
    Agricultural Development Project (IBRD/SIDA)
Provincial Deputy Permanent Secretary (Eastern Province)
Regional Agricultural Officer (Eastern Province, Bellimo)
Manager, Eastern Province Cooperative Union
```


## Farmers Met:

Christon Mwanza
John Brown Zimba
Abel Lungu (and wife)
John Mwanza

Lusaka (Dinner)

## 15 February 1984

## IFPRI Staff:

Dr. John W. Mellor, Director
Dr. S. Kumar, IFPRI Chipata Project

Others:

```
Mr. S. Kean, National Coordinator, A.R.P.T., Ministry of
    Agriculture and Water Development (MAWD), Lusaka
Mr. M. Bussink, Food Sector Strategies, Netherlands Aid
    Agency, Zambia
Mr. R. F. C. Boermans, Royal Netherlands Embassy, Lusaka
```

Dr. John W. Mellor, Director
Dr. Shubh Kumar

Ministry of Agriculture and Water Development, Lusaka:
Mr. N. E. Mumba, Director of Agriculture
Mr. F. M. Mbewe, Director of Planning
Ms. R. K. Chungu, Assistant Director - Research

## National Commission for Development Planning:

Mr. M. E. Lungu, Acting Director, Regional Planning
Ms. Dorothy Muntemba, Nutritionist
Mr. M. A. Sikabanze, Economist, Regional Planning
(mainly) National Food and Nutrition Commission (NFNC)
Dr. M. M. Nalumango, Chairman NFNC
Mr. A. P. Vamoer, Executive Director
Mr. C. Y. Chikamba, Assistant Executive Director
Mr. H. N. Siulanda
Prof. Lifanu, Acting Director, Institute of African Studies and Human Relations, University of Zambia, Lusaka

Rural Development Studies Bureau, University of Zambia:
Dr. J. T. Milimo, Director
Staff: Mr. Schula, Mr. Maleka, Ms. Kanyangwa
(d) NAIROBI (KENYA) 1/

## 17 February 1984

```
Mr. Philip Ndegwa, Governor, Central Bank of Kenya (IFPRI
    Board Member)
Mr. Harris Mule, Permanent Secretary, Ministry of Finance
Mr. I. K. Matuku, Ministry of Finance
```

Review Panel involved: M. Liptom (Member), Y. Hayami (Member), R.W. Herdt (CGIAR Secretariat), K.O. Herz (Secretary), accompanied by Dr. J.W. Mellor, Director of IFPRI.
(e) EGYPT $1 /$

## 19 February 1984

A. Handley, Deputy Director, USAID
R. Fraenkel, Program Officer, USAID
D. Dodd, Program Officer, USAID

Ann Lesh, Ford Foundation, Deputy Head - Egypt

## 20 February 1984

All visits made accompanied by Dr. Sakr Ahmed Sakr, Minufia University (IFPRI collaborator during project. Dr. Sakr then was with the Institute of National Planning), and by IFPRI staff: Dr. J. W. Mellor, Director, Dr. P. Pinstrup-Andersen, Dr. Joachim von Braun.

## General Authorities for Flour Mills, Silos and Bakeries:

Dr. Ahmed Abdel Ghaffar, Chairman (during IFPRI project was First Undersecretary, Ministry of Supply)

## Ministry of Irrigation:

Dr. Ismail Badawy, Deputy Minister (during IFPRI project was Deputy Minister of Economy)

## Ministry of Economy:

Dr. Moustafa El-Said, Minister of Economy

1/ Review Panel involved: M. Lipton (Member), Y. Hayami (Member), R. W. Herdt (CGIAR Secretariat), K. O. Herz (Secretary)

## Ministry of Finance:

Dr. Wagih Shindi, Minister for Investment and Economic Cooperation
Dr. Attef Agwah
Dr. Dudge

Others:

```
Dr. Ahmed Gouelli, University of Zazgazig and Senior Advisor
to Minister of Agriculture
(f) WASHINGTON, D.C. USA
```


## 23-30 March 1984

(Note: Countries indicate citizenship of staff member)
DIRECTOR'S OFFICE
J. Mellor, Director, U.S.A.
R. Adams, Specialist Assistant, U.S.A.

Pat Critchlow, Administrative Assistant, U.S.A.
Mai Phung, Secretary, Viet Nam
Irene Pereira, Secretary, Tanzania

## RESEARCH

## Food Trends Analysis Program

L. Paulino, Program Director, Philippines
N. Khaldi, Research Fellow, U.S.A.
J.S. Sarma, Research Fellow, India
B. Stone, Research Fellow, U.S.A.
T. Haseyyama, Visiting Research Fellow, U.S.A.
D. Chesser, Research Assistant, U.S.A.

Darunee Kunchai, Research Assistant Thailand
Mary McFadden, Research Assistant, U.S.A.

## Food Production Policy and Development Strategy Program

R. Ahmed, Program Director, Bangladesh
C. Delgado, Research Fellow, U.S.A.
P. Hazell, Research Fellow, United Kingdom
D. Jha, Research Fellow, India
C. Ranade, Research Fellow, India
M. Rosegrant, Research Fellow, U.S.A.
S. Wanmali, Research Fellow, India
R. Yadav, Visiting Research Fellow,Nepal

Anuradha Deolalikar, Post-Doctoral Fellow, India
N. Bliven, Research Assistant, U.S.A.

Cornelia Miller, Research Assistant, U.S.A.
R.Olsson, Research Assistant, U.S.A. M.Strudler, Research Assistant, U.S.A.

## Food Consumption and Nutrition Policy Program

P. Pinstrup-Andersen, Program Director, Denmark
H. Alderman, Research Fellow, U.S.A.
J. von Braun, Research Fellow, Federal Republic of Germany
N. Edirisinghe, Research Fellow, Sri Lanka
E. Kennedy, Research Fellow, U.S.A.

Shubh Kumar, Research Fellow, India

Don Cox, Research Assistant, U.S.A.
J. Gilmartin, Research Assistant, U.S.A.

Carol Levin, Research Assistant, U.S.A.
Z. Primor, Research Assistant, U.S.A.

Thongjit Uy, Research Assistant, Thailand
Roxie Duffin, Secretary, U.S.A.
Wendy Merrill, Secretary, U.S.A.

## International Food Trade and Food Security Program

A. Valdes, Program Director, Chile
R. Bautista, Research Fellow, Philippines
U. Koester, Visiting Research Fellow, Federal Republic of Germany
M. Petit, Visiting Research Fellow, France
A. Siamwalla, Research Fellow, Thailand
Suzanne Gnaegy, Research Assistant, U.S.A.

Cindy Patterson, Secretary, U.S.A.

## Administration

Loraine Halsey, Associate Director for Finance and Administration, U.S.A. Jackie Gilpin, Personnel/Office Manager, U.S.A.
M. DeVol, Senior Accountant, U.S.A.

```
Theresa Moore, Accounting Assistant, U.S.A.
Jean Hsu, Bookkeeper, Taiwan
Debbie Thullen, Office Services Co-
    ordinator/Secretary, U.S.A.
Marsha Turner, Administrative
    Assistant, U.S.A.
Zarmina Emam, Receptionist,
    Afghanistan
G. Briscoe, Clerical Assistant,
    U.S.A.
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Wendy Silliphant, Information
Assistant, U.S.A.
Marian Cole, Word Processor, U.S.A.
Lucy McCoy, Typesetter, U.S.A.

## Policy Seminars Program

R. Bordonaro, Head, U.S.A.

Laurie Goldberg, Administrative Assistant, U.S.A.

## Library

Tricia Klosky, Librarian, U.S.A.

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## Extracts from:

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## WBG ARCHIVES

DDDR:IAR/74/24 Restricted June 1974

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH TECHNICAL ADVISORY COMMITTEE

Eighth Meeting, Washington, D.C., 24 July - 2 August 1974

PROPOSAL FOR A WORLD FOOD POLICY INSTITUTE

Report of TAC Sub-Committee
(Agenda Item 6)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

ROME, 1974

## (Extracts: Paragraphs 7,8,9)

7. It was apparent from this exchange of views that there was a broad measure of coincidence concerning the need for strengthened inter-disciplinary research on policy issues of world or inter-country significance bearing on agricultural development with particular reference to matters affecting world food production, consumption and trade. Because such research could involve highly sensitive inter-relationships between countries, and ought to be conducted without political impediment it was also recommended both by Mr. Wells and by FAO, that it be undertaken at a newly created institute with a basis of independent funding and governance. For reasons of economy and working efficiency, however, there was a consensus that any such institute should be located in close proximity to a major agricultural agency with broad-based expertise, good contacts with developing countries, and modern library, data compilation, information, and computer facilities. Rome was suggested as the most convenient location, with a close association between the proposed Institute and FAO.
8. The Sub-Committee concurred with these ideas and unanimously supported the proposal for the establishment of a new Institute to study global problems affecting agricultural development. It felt, however, that no single institute could cope effectively with the entire field of socio-economic research covering all aspects of agricultural and rural development as originally proposed by FAO, and, in view of the likelihood of continuing uncertainty and difficulty over the world food situation, it recommended that the mandate of the institute now being considered should be circumscribed to research and related activities concerned primarily with world food policy. It might in fact be named the "World Food Policy Institute".
9. Within this general mandate it should be given terms of reference broad enough to enable it both to keep in view the current problems and policies of major producing and consuming nations and their probable impact on the shortterm food situation in the world with particular reference to the outlook for developing countries, and, through analysis of selected key policy issues, to offer guidance to national and international planners on the measures required to improve the management of agricultural production resources to increase world food supplies, and to achieve a more equitable distribution of available food.

## INTERNATIONAL DEVELOPMENT RESEARCH CENTRE

CENTRE DE RECHERCHES POUR LE DEVELOPPEMENT INTERNATIONAL

Box 8500, Ottawa, Canada, K1G 3H9. Telephone (613) 996-2321.
Cable: RECENTRE. Telex: 053-3753

```
Mr. Warren C. Baum
Chairman
Consultative Group on International
    Agricultural Research
The World Bank
1818 'H' Street, N.W.
Washington, D.C. }2043
U.S.A.
```

Dear Mr. Chairman:
This letter is written by the three members of the Consultative Group on International Agricultural Research (CGIAR) that have been founders and supporters of the International Food Policy Research Institute (IFPRI). We write at the request, and on behalf, of the Board of Trustees of the Institute. It is our purpose to report on the progress of the Institute thus far, and to ask that the Group resume its consideration of including IFPRI in the CG system.

## History

You will recall that the establishment of a food policy research institute was recommended to the CG by the Technical Advisory Committee (TAC) at the Group's meeting in July, 1974. Relevant excerpts from the minutes of that meeting are attached as Annex I. It will be noted that several members supported the proposal; others expressed skepticism, especially in view of the uncertain outcome of the then forthcoming World Food Conference; no consensus was reached. During the discussion, it was suggested that the Institute might be established and supported during an experimental period by non-governmental organizations which are members of the Consultative Group.

The TAC proposal was considered further at the CG meeting in October, 1974. Relevant excerpts from the minutes of that meeting are attached as Annex II. It will be noted that the Chairman of the TAC reported that the International Development Research Centre (IDRC) and the Ford and Rockefeller Foundations were willing to accept initial responsibility for financing a food policy research institute. After discussions, the Chairman of the CG noted the continuing absence of a clear consensus in the Group on the necessity for establishing an institute or on how to relate it to the Group, at least until the outcome of the World Food Conference was known. He suggested, and the Group agreed, "that the Group should take no further action at this time; that it would understand that the 'private' sponsors might wish to consider what action to take with respect to the proposal in the light of the World Food Conference; that the Group would like to be kept informed on the thinking of the 'private' sponsors; in the event that they should decide to establish a center that the Group would wish to establish an effective communications link with it; and that recognizing it to be a pioneering activity, the Group would be prepared to reconsider the question of sponsorship at some future date."

The IDRC and the two Foundations considered what action to take following the World Food Conference in November, 1974. They agreed that the organizations established as a result of the Conference did not meet the need for an international food policy research institute, and, indeed, that those organizations would themselves need to draw upon the services of such an institute. Accordingly, they decided to establish such an institute, with each of the three sponsoring agencies undertaking to share the costs for the first five years, in a proportion of $3-1-1$, up to $\$ 1$ million per year. After additional detailed planning, the Institute was incorporated March 5, 1975, with its headquarters in Washington, D.C. The first staff joined August 1, 1975. The initial members of the Board of Trustees have been: Ojetunji Aboyade, David E. Bell, Norman E. Borlaug, Sir John Crawford, Ralph Kirby Davidson, Mohamed El-Khash, Nurul Islam, Affonso C. Pastore, Lucio G. Reca, Roger Savary, Sir Andrew Shonfield, Puey Ungphakorn, V. S. Vyas, and Ruth Zagorin. The first Director was Dale E. Hathaway.

Since its establishment, a staff of 21 professionals has been assembled, a majority of whom are nationals of developing countries, a research program has been undertaken, and a number of initial research reports have been produced. In accordance with the understanding reached at the CG meeting in October, 1974, the Director of IFPRI has reported on the work of the Institute to the Group at "Centers' Week" each year. The first Director resigned in February, 1977 (to accept a key position in the U.S. Government concerned with agricultural policy), and has been replaced by John Mellor. Annex III presents a summary account of IFPRI's research activities, product, and plans; Annex IV summarizes its financial record to date.

## Present Position

The three sponsoring members, and the Institute's Board, believe that the record to date supports the views of those who proposed establishing IFPRI. We note, in particular, the following points:

1. In proposing IFPRI, TAC emphasized the need to keep the global food and agricultural situation under continuous independent review and analysis with respect to such matters as supply and demand, stocks, supply of inputs, price and trade developments and prospects. In a world where food supplies and demands remain in precarious balance, this need is clearly undiminished, and IFPRI has responded to it. Drawing on primary data gathered by the FAO, the World Bank, the U.S. Department of Agriculture, and others, IFPRI has already produced summary data and projections of supplies and demands for food in developing countries which have been widely accepted as unbiased and reliable. (Research Report No. 1, "Meeting Food Needs in the Developing World: The Location and Magnitude of the Task in the Next Decade", February, 1976; and Research Report No. 3, "Food Needs of Developing Countries: Projections of Production and Consumption to 1990", December 1977.) The Second Asian Agricultural Survey, sponsored by the Asian Development Bank, drew heavily on these studies. In carrying forward this work, IFPRI is engaged in close consultation with FAO in its efforts to refine its basic data and to reduce discrepancies of estimation with other reporting agencies. IFPRI is continuing to build its capacity to exercise independent judgment in the interpretation of data from a great variety of sources.
2. In proposing IFPRI, TAC emphasized the need to undertake analysis of key policy issues from an international point of view. This need is clearly undiminished, and IFPRI has begun to respond. An example is the work IFPRI has done on an insurance approach to international food stocks. ("Food Security: An Insurance Approach", 1978). This work has already received wide notice and will be the centerpice for an international conference on food security to be sponsored jointly by IFPRI and CIMMYT in November 1978. Such studies clearly help national planners -especially those in developing countries who may have fewer analytical resources at their disposal -- to assess the possible impact on their own economies of conditions arising outside their countries and to formulate appropriate policies. Moreover, because of its character, IFPRI is able to address international
food policy issues free from national political pressures and therefore to focus on ways of achieving the most effective results for all concerned.
3. In proposing IFPRI, TAC emphasized the need to make analyses of specific food policy issues of priority concern to the governments of developing countries. This need is clearly undiminished, and IFPRI has begun to respond. In addition to the kinds of research reports referred to above, which are of general benefit to developing countries, IFPRI is working on problems of specific countries. For example, IFPRI joined with the World Bank in sending a good policy advisory mission to Bangladesh in 1977, and is undertaking with IRRI a research program intended to improve the basis for food policy decisions in several Southeast Asian countries. Preliminary discussions are underway as to how IFPRI can work with Nigerian analysts in collaborative efforts and exchange of professional staff. IFPRI intends to increase this kind of "outreach" activities as budget and staffing permit.
4. IFPRI is providing research and analysis of value to the TAC and the Consultative Group, as was anticipated by those proposing its establishment. For example, IFPRI produced a basic paper for the current review by TAC of priorities for international agricultural research ("Criteria and Approaches to the Analysis of Priorities for International Agricultural Research", February, 1978). IFPRI also prepared an overview paper for the CG discussion of training requirements for agricultural research in the fall of 1977. ("Training Requirements for Research and Its Application An Overview", May, 1977).
5. From the beginning of the Group's existence, CG members have emphasized the essential interrelationship between technological improvements and socio-economic policies if food needs are to be met; for this reason IFPRI's work is a crucial complement to the work of the existing centers in the CG system. IFPRI is developing the kind of close working relations with the other Centers which were foreseen as necessary to maximize the capacity of the CG system to help alleviate the food, nutrition and poverty problems in developing countries. The IFPRI-CIMMYT conference on food security has already been referred to, as has been the collaborative program by IFPRI and IRRI to address a set of trade, food consumption and production policy issues in several Southeast Asian countries. This program will involve research activities in national institutes of those countries as well as in IFPRI and IRRI, and will not only produce research results but also assist in building national analytical capacities in those countries.
6. In 1974, there was concern whether the need for IFPRI would be superseded by organizations established by the World Food Conference. As events turned out, neither of the principal organizations established by the Conference has undertaken the kinds of research and analysis produced by IFPRI. In fact, both the World Food Council and the Consultative Group on Food Production and Investment (while it existed) have drawn on IFPRI's research capacity and output. ("Investment Requirements to Increase Food Production", June, 1978).
7. In 1974, there was concern that IFPRI would duplicate the work of other organizations. In fact, it has become clear that IFPRI is playing an essential complementary role. IFPRI complements the work of FAO both by exercising an independent judgement in the interpretation of data and by undertaking independent policy analysis. IFPRI complements the World Bank's work by undertaking independent policy research oriented especially to the needs of the developing countries, including (prospectively) analyses of the effectiveness of international assistance policies aimed at increased food production and consumption. There are several strong national centers of research on food policy located in advanced countries; none offers IFPRI's special combination of international approach and primary concern for the developing countries. The various centers in the CG system have socioeconomic staffs, but they are limited to the crops and functions of those centers and need the benefit of IFPRI's broader concerns with issues of food production, trade, and consumption. Thus in logic, and on the evidence of experience to date, IFPRI is a valuable complement to other important organizations concerned with the world's food problems. IFPRI's work can thus be expected to raise the effectiveness of national and international efforts to respond to the world's problems of hunger and nutrition.
8. IFPRI is well established as international in its Board and staff composition. The Board of 14 includes members from 10 nations; 7 board members are from developing countries. The research staff of 21 includes 14 nationalities; 15 staff members are from developing nations. IFPRI has made substantial progress toward acquiring the spread of geographic and functional staff specializations needed for integrated research on complex food policy issues and for a leadership role in the global research community concerned with national and international food policy problems.

For these reasons, the conclusion drawn originally in 1974 by the IDRC and the Rockefeller and Ford Foundations seems to stand with increasing firmness; the more the world attempts seriously to grapple
with internatinal food policy issues, the more it will need the kind of research intended to be provided by IFPRI -- independent research of the highest professional quality, produced under international auspices, and focussed primarily on the needs of the developing countries.

We believe the case for IFPRI is stronger today -- because initial results can be shown -- than when it was originally proposed four years ago. The experience to date is necessarily limited, but it is now timely and necessary to bring the issue of IFPRI's future before the CG. The three sponsors undertook to support IFPRI for an initial five-year period of which 1978 is the third year. Already, important questions about IFPRI's future program and staffing are beginning to arise, the answers to which depend on knowing what support IFPRI can expect beyond the initial five-year period. While IFPRI's costs are quite small compared to those of the biologically-based centers, the effects of inflation and the demonstrated need for a somewhat larger core staff than originally contemplated have led to projections of a budget for the fifth year in the order of $\$ 2.5$ million. During a second five-year period its core budget, supporting a senior research staff of 25 persons, would probably be between $\$ 3$ million and $\$ 4$ million annually. It has been clear from the outset that these are sums which the three original sponsors could not meet.

The present position may be summarized as follows: The intention of the three oiriginal sponsors was to follow the recommendations of the TAC and to give IFPRI a start. We have done so. IFPRI has begun to demonstrate the valuable results anticipated by the TAC, and can be expected to grow substantially in value over the next few years. The initial five-year period is half over, and a basis needs to be laid for planning and financing the organization thereafter. In our view, and the view of IFPRI's Board of Trustees, the logical course is for the CG to accept IFPRI as a member of the system of centers sponsored by the Group.

Accordingly, we request that the Group resume its consideration of IFPRI, with a view to reaching a decision on IFPRI's membership in the CG system at the earliest convenient date. The three sponsors, and the Board of IFPRI, stand ready to assist in whatever way will be most useful.

Yours sincerely,

## Ivan L. Head <br> President

McGeorge Bundy
President
Ford Foundation

John H. Knowles
President
Rockefeller Foundation

Encls: 4 Annexes (not reproduced)

## TAC CONCLUSIONS AND RECOMMENDATIONS

## ON THE INCLUSION OF IFPRI IN THE CGIAR SYSTEM


#### Abstract

At its last meeting in November 1978, the CGIAR requested the advice of TAC on the candidature of IFPRI for inclusion in the CGIAR Sytem. A mission was mounted by TAC to visit IFPRI in January 1979 (9-12) after consultations with the members of the CGIAR and TAC on the terms of reference and the list of questions to be addressed by the mission. The findings and recommendations of the mission were reported to TAC at its 21 st Meeting (13-20 February 1979). The Director of the Institute, Dr. J. Mellor, participated in the discussions of the Committee in open session and gave the views of the Institute on the report of the mission, generally agreeing with its findings and recommendations.


TAC then formulated its conclusions and recommendations in two stages. It first considered the rationale and the conditions for the inclusion of IFPRI in the CGIAR System and then, having generally agreed on a favourable recommendation, it considered the relative priority of this CGIAR initiative as compared to others which were examined by TAC concurrently.
(1) As to the rationale and the conditions for the inclusion of IFPRI in the CGIAR System, TAC generally endorsed the findings and recommendations of its mission panel and requested that the report of the mission be transmitted to the CGIAR. The mission report (AGD/TAC:IAR/79/5) is attached to this note. The comments and recommendations of the TAC on this report are recorded as part of the minutes of the 21 st Meeting.

The TAC wishes to call particular attention to the following:
(i) TAC recognized that the mandate of IFPRI in its present formulation was very broad and could be read and interpreted in many different ways. The way this mandate was translated in actual programmes was of crucial importance in determining the degree of concurrence of objectives between the CGIAR and IFPRI. TAC recommended that, from the point of view of CGIAR support, the mandate of the Institute should give its principal emphasis to the problems of developing

[^18]countries and that the central tasks in its programme should be concerned with the linkages and inter-relationships between the micro-level problems of the adoption of new technologies and the wider economic and socio-economic aspects of agricultural development. Thus the work on trends analysis and international food trade should be considered only as supporting activities to the main research programme. The Committee also considered that more emphasis should be given to the collaboration with national institutes in developing countries and to the possibilities of useful interaction with ISNAR. The Committee therefore recommended that IFPRI re-examine its mandate in the light of the above considerations.
(ii) The relationships between IFPRI and other international institutions were also considered by TAC. There is a potential conflict between the role of IFPRI as a research organization and as a servicing institution. Many organizations, the CGIAR in particular, are likely to expect IFPRI to respond to their special needs and demands. A more secure funding would certainly help IFPRI to respond to these demands in a more selective and independent manner, keeping in mind the priorities and the integration of its activities. TAC invited IFPRI to pursue its efforts in defining its complementarity to many other institutions such as FAO, World Bank, WFC, GATT, UNCTAD, OECD, particularly in regard to its work on trend analysis. It was suggested that after consultations IFPRI may establish agreements or memoranda of understanding with some of these institutions so as to define better their respective roles and their cooperation.

IFPRI was also invited to pursue similar consultations for its cooperation with the IARCs and with ISNAR. IFPRI could certainly be of great help to the CGIAR, TAC and the IARCs in tackling some complex problems such as those of equity in distribution of research benefits and providing broader perspective analysis which could have an important bearing on the overall priorities for and approaches to international research. IFPRI also could play an important role in helping ISNAR to analyze the food and agriculture problems of a country as a basis for planning and strengthening agricultural research in the country.

It was suggested that a large part of the above cooperative work of IFPRI with other institutions should continue to be carried out on a selective, contractual basis.
(iii) TAC also discussed the question of the location of IFPRI Headquarters. The panel had recommended that IFPRI give serious attention to the need to move the site of the Institute to a developing country
for four main reasons. The first one was that an LDC environment was considered more appropriate for a research staff working on the problems of food shortage and hunger. The second reason was the need for IFPRI not to be considered as having a privileged status in the CGIAR System because of its present location. The third point in favour of a location in an LDC was to protect the Institute from undue influences of donors and to avoid that its work be perceived by others as being subject to these influences. The need for the Institute to avoid being used as a policy advisory body of international institutions, such as the CGIAR and the World Bank, was seen by the panel as the fourth reason justifying a location in a developing country.

TAC also heard the views of the Director of IFPRI that a precipitous move would be detrimental to the continuity of the work of the Institute. It would result in a staff turnover which could reflect upon the quality of the research carried out by the Institute in the near-term future. Moreover, a change in the directorship (a year ago) should not be followed immediately by a change of location. The Director, therefore, would prefer that this transfer take place in three to four years from now, by which time he would have firmly established priorities, programmes, methods of work of the Institute and its cooperation with other Institutions.

The Committee endorsed the recommendation of the panel that IFPRI should be located in a developing country. The Committee realized that this transfer cannot be implemented immediately, but its importance justified a recommendation that the Consultative Group when granting its financial support to IFPRI should have a sufficient assurance from the Board that it would be actually effected and this as soon as possible.
(iv) Assuming that the Board of the Institute would be ready to examine favourably these recommendations and make them effective, the Committee strongly recommended a favourable consideration by the Group of the inclusion of IFPRI in the CGIAR System.
(2) In a second stage, TAC considered the relative priority of a CGIAR initiative in support of IFPRI as compared to other demands placed on the resources made available by the Group regarding ongoing activities and other new initiatives to fill other important gaps in international agricultural research. The following extracts of the revised document of TAC on priorities for international support to agricultural research in developing countries, indicate the position taken by the Committee in this respect.
(i) "TAC recommends that CGIAR resources be directed first towards assuring the continued support of the IARCs and other related activities* already established by the group..."
(ii) "Subject to the fulfillment of the above requirements, TAC recommends that additional resources be directed by the CGIAR towards selected new initiatives or activities which fill the most important gaps in the established priority framework. Five subject areas have been identified in this category. These are in order of priority: tropical vegetable research; water management research; aquaculture research. New initiatives in these areas would call generally for activities which are distinct from those of the existing IARCs and therefore require the addition of new institutions to the CGIAR system. These institutions have been identified by TAC for two of the above five topics: tropical vegetable research and food policy research, for which TAC has elaborated specific proposals for consideration by the Group. The other three topics have been identified only in terms of the importance of the research gaps to be filled. TAC intends to pursue its examination of the institutional mechanisms required for CGIAR support in these three subject areas."

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## IFPRI MANDATE APPROVED BY

BOARD OF TRUSTEES

February 1980

## MANDATE

1. The International Food Policy Research Institute was established to identify and analyze alternative national and international strategies and policies for meeting food needs in the world, with particular emphasis on low-income countries and on the poorer groups in those countries. While the research effort is geared to the precise objective of contributing to the reduction of hunger and malnutrition, the factors involved are many and wide-ranging, requiring analysis of underlying processes and extending beyond a narrowly defined food sector. IFPRI's research program is to reflect worldwide interaction with policymakers, administrators, and others concerned with increasing food production and with improving the equity of its distribution.
2. Within its mandate, IFPRI's criteria for program development are to emphasize the importance of the problem, the potential for comparative analysis, the need for improved conceptualization, the complementarity among components of IFPRI's research, and above all the opportunity for policy action.
3. IFPRI's policy oriented research is to stress alternative development strategies from the viewpoint of their implications for food production and consumption; food production processes, particularly the role of technological change in agriculture; food consumption issues, particularly as they relate to lowincome groups; and international food trade, aid, and food security. Where practical, this research will emphasize comparative analysis among countries and the international implications of national food policies.
4. A portion of IFPRI's research is to be oriented to defining the size, composition, and dynamics of the world food problem both at present and for various periods in the future. This activity builds on the data base and related work of other international and national organizations. Through this work, IFPRI is to search out the lacunae in the understanding of world food problems, with the specific objective of defining the needs for further policy research and drawing these to the attention of policymakers and the research community.
5. IFPRI is to be highly selective in its choice of topics for research. It cannot hope to review the food policies of every country, nor can it attempt to take on agricultural sector analyses or long-term perspective studies on a service basis. On the other hand, carefully selected comparative studies of development experiences and the lessons to be drawn therefrom are to be part of the Institute's work. Such analyses will assist IFPRI's investigations of crucial problems involving policy decisions of world significance for future food supply whereas the more specific objective will be to identify common elements affecting countries widely dispersed geographically. Similarly, IFPRI will occasionally do an in-depth analysis of food strategy for a particular country to forward understanding of interaction among component parts of food policy and to shed light on particularly important food policy cases.
6. As much as possible IFPRI research is to be carried out in collaboration with national research organizations pursuing similar lines of enquiry. Through such collaboration IFPRI will develop interaction with developing country national research systems which will lead to effective problem identification, data collection and analysis, and to the eventual dissemination of IFPRI research results to those most likely to find them useful. Similar working relationships with appropriate international organizations will not only further expand IFPRI's data base, but will also assist it to formulate research projects relevant to international policy needs. IFPRI is likewise to work closely with the production science institutions in the CGIAR system, given the common concern with the role of new agricultural technology as it affects food production and distribution policies.
7. The IFPRI research program is to draw upon and complement rather than to duplicate the work of organizations such as FAO, the IBRD, and similar multilateral agencies with major programs in food and agricultural policy analysis or socioeconomic research related to agriculture. IFPRI is to be alert to important research and information gaps, paying special attention to the need for objective analysis of controversial politically sensitive issues which IFPRI is in a particularly favorable position to approach.
8. IFPRI is to disseminate its research results to a wide public, particularly to officials, administrators, and others charged with or influential in the making of national and international food and agriculture policy. This it will do informally through direct working relationships established between its senior staffmembers and leading members of the public, and through collaborative relationships with national and international agencies involved in food matters. More formal outreach methods include publications, conferences, seminars, and workshops, arranged in cooperation with concerned national and international agencies, to discuss topics of mutual interest, and to provide interaction between researchers and policymakers in substantive areas in which IFPRI has completed research. IFPRI research reports and other publications are to be distributed free of charge to a worldwide audience of those known to be concerned with or interested in food policy.
9. Training through participation in research both at headquarters and in the field is to be an important part of the Institute's effort. Interaction among IFPRI's research staff and between its researchers and those from other institutions will provide valuable informal training opportunities in addition to more formal arrangements through internships at IFPRI.

## LIST OF PUBLICATIONS

## OF THE INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE (IFPRI)

## RESEARCH REPORTS

The main vehicle for reporting IFPRI research results is its Research Report series. The reports, which range from 30 to 180 pages, present the data, analysis, and findings of completed research projects.

1. Meeting Food Needs in the Developing World: Location and Magnitude of the Task in the Next Decade. February 1976,64 pp. ISBN No. 0-89629-000-X. This first report attempts to indicate where food deficits are likely to occur in developing market economies and to predict the size of the deficits to 1985/86.
2. Recent and Prospective Developments in Food Consumption: Some Policy Issues. July $1977,61 \mathrm{pp}$. ISBN No. $0-89629-002-6$. This report est imates the number of people who are underfed in developing market economies and the amount of foodgrains that would be needed to bring them up to the basic caloric standard.
3. Food Needs of Developing Countries: Projections of Production and Consumption to 1990. December 1977, 157 pp. ISBN No. 0-89629-004-2. The data in Research Report 1 are updated and widened in scope, and the projections are extended to 1990.
4. Food Security: An Insurance Approach, by Panos Konandreas, Barbara Huddleston, and Virabongsa Ramangkura. September 1978, 96 pp. ISBN No. 0-89629-005-2. Two insurance schemes designed to assist food-deficit developing countries in stabilizing cereal consumption are evaluated.
5. Impact of Subsidized Rice on Food Consumption and Nutrition in Kerala, by Shubh K. Kumar. January 1979, 45 pp . ISBN No. 0-89629-006-2. The contribution of subsidized "ration" rice to the nutrition of a sample of low-income families of rural Kerala state in India is analyzed.
6. Intersectoral Factor Mobility and Agricultural Growth, by Yair Mundlak. February 1979, 137 pp . ISBN No. 0-89629-007-7. An econometric approach is applied to a study of Japanese agriculture that takes account of the interdependence of agriculture and the rest of the economy. Mundlak's work is based on the assumption that factor returns are not equal across sectors, which leads to a flow of factors from one sector to another. This is the basis of resource allocation.
7. Public Distribution of Foodgrain in Kerala--Income Distribution Implications and Effectiveness, by P. S. George. March 1979, 67 pp . ISBN No. $0-89629-008-5$. This study examines the operation and cost of the ration and procurement systems for rice in the Indian state of Kerala during the past 25 years.
8. Foodgrain Supply, Distribution, and Consumption Policies within a Dual Pri-
 81 pp . ISBN No. 0-89629-009-3. This report provides a framework for analysis of food policy issues as demonstrated by the foodgrain distribution system of Bangladesh. It shows that public foodgrain distribution is primarily urban oriented, although the urban poor are often better fed than their rural counterparts.
9. Brazil's Minimum Price Policy and the Agricultural Sector of Northeast Bra$\frac{\text { zil }}{\mathrm{min}}$, by Roger Fox. June 1979, 117 pp . ISBN No. $\frac{0}{0-89629-010-7 \text {. Brazil's }}$ minimum price and storage loan programs for corn, rice, beans, and cotton are analyzed.
10. Investment and Input Requirements for Accelerating Food Production in LowIncome Countries by 1990 , by Peter Oram, Juan Zapata, George Alibaruho, and Shyamal Roy. September 1979, 178 pp. ISBN No. 0-89629-011-5. This study, begun in 1977, estimates the level and comparison of investment required during the next 15 years to close specified food gaps in 36 low-income, food-deficit developing market economy countries.
11. Rapid Food Production Growth in Selected Developing Countries: A Comparative Analysis of Underlying Trends, 1961-76, by Kenneth L. Bachman and Leonardo A. Paulino. October 1979, 97 pp. ISBN No. 0-89629-012-3. This analysis, based on published data, compares the major components of increased food intake in 16 countries in an attempt to shed light on the causes of their relatively high growth rates in agricultural production.
12. Two Analyses of Indian Foodgrain Production and Consumption Data, by J. S. Sarma and Shyamal Roy, and by P. S. George. November 1979, 81 pp. ISBN No. 0-89629-013-1. The two studies in this report, "Foodgrain Production and Consumption Behavior in India, 1960-77," by Sarma and Roy, and "Aspects of the Structure of Consumer Foodgrain Demand in India, $1961 / 62$ to 1973/74," by George, explain why in a time of record production, per capita consumption in India was declining.
13. The $\frac{\text { Impact }}{\text { in }} \frac{\text { of }}{\text { Sri Lablic }} \frac{\text { Foodgrain }}{\text { by James }}$ Disution on Food Consumption and Welfare $\frac{\text { in }}{19} 79,54 \frac{\text { Sri }}{\text { Lanka }}$, by James D. Gavan and Indrani Sri Chandrasekera. December $\overline{19} 79,54 \mathrm{pp}$. ISBN No. 0-89629-014-X. This report analyzes Sri Lanka's comprehensive public food distribution scheme and its contribution to the comparatively satisfactory living standards achieved in that country.
14. Developed-Country Agricultural Policies and Developing-Country Supplies: The Case of Wheat, by Timothy Josling. March 1980, 66 pp . ISBN No. $0-89629-015-8$. This study makes a quantitative assessment of the effect of developed-country policies on the world wheat market and their contribution to the instability of trade and prices.
15. Food Production in the People's Republic of China, by Anthony M. Tang and Bruce Stone. May $1980,178 \mathrm{pp}$. ISBN No. 0-89629-016-6. Two studies are included in this report: "Food and Agriculture in China: Trends and Projections, 1952-77 and 2000," by Tang, and "China's 1985 Foodgrain Production Target: Issues and Prospects," by Stone. The former reviews development strategy, analyzes the historical experience of agricultural growth in the People's Republic of China, and projects the aggregate food supply/demand balance for the year 2000. The latter analyzes China's foodgrain production target in the light of past performance, production and input growth, and current policies.
16. A Review of Chinese Agricultural Statistics, 1949-79, by Bruce Stone. (Not yet available.) ISBN No. 0-89629-017-4. This compilation of updated historical data on the population and foodgrain economy of the People's Republic of China brings together and compares a number of scattered statistical series generated by China analysts from partial official series and fragmentary information contained in official pronouncements in news media.
17. Agricultural Research Policy in Nigeria, by Francis Sulemanu Idachaba. August 1980, 69 pp . ISBN No. $0-89629-018-2$. This study reviews the evolution of agricultural research in Nigeria and examines the relative emphasis of research efforts on export and import crops; livestock, forestry, and fisheries; rainfed and irrigated agriculture; and agricultural production and inputs. It identifies political and economic policies that affect the efficiency of the agricultural research system and makes recommendations.
18. The Economics of the International Stockholding of Wheat, by Daniel T. Morrow. September $1980,45 \mathrm{pp}$. ISBN No. $0-89 \overline{629}-0190$. This report describes the behavior of stockholding in the world wheat economy since 1960, predicts stockholding behavior for the near future, and considers possible benefits from an international agreement to increase stockholding above the predicted level.
19. A Comparative Study of FAO and USDA Data on Production, Area, and Trade of Major Food Staples, by Leonardo A. Paulino and Shen Sheng Tseng. October 1980, 77 pp . ISBN No. 0-89629-020-4. The differences between FAO and USDA statistics on production and area of the major staple food crops and those on cereal trade are examined. The study identifies the commodities and major countries for which wide data differences exist and measures the differences among countries, regions, economic groups, and world totals.
20. Impact of Irrigation and Labor Availability on Multiple Cropping: A Case Study of India, by Dharm Narain and Shyamal Roy. November 1980, 34 pp. ISBN No. 0-89629-021-2. This report examines the differences in multiple cropping within and between states in India and indicates the extent to which irrigation can have an impact on agricultural growth by expanding multiple cropping.
21. Agricultural Protection in OECD Countries: Its Cost to Less-Developed Countries, by Alberto Valdes and Joachim Zietz. December 1980, 57 pp. ISBN No. 0-89629-022-0. This study examines the costs of agricultural protection to developing countries based on a hypothetical 50 percent reduction for 100 agricultural commodities in 19 Organization for Economic Cooperation and Development (OECD) countries.
22. Estimates of Soviet Grain Imports in 1980-85: Alternative Approaches, by Padma Desai. February 1981, 47 pp . ISBN No. 0-89629-023-9. The Soviet Union's massive imports of grain beginning in the l970s contribute to instability in the international market, thus making it important to foretell their size. This study uses three different methods to predict the difference between Soviet supplies and requirements: estimates of domestic production based on past trends, estimates based on production functions, and regression estimates of import demand functions.
23. Government Expenditures on Agriculture in Latin America, by Victor J. E1ias. May $1981,67 \mathrm{pp}$. ISBN No. $0-89629-024-7$. This is a descriptive report analyzing data assembled on government spending on the rural sectors of nine Latin American countries from 1950 to 1978. It identifies expenditures in the budgets of central and state governments and decentralized government agencies in addition to departments of agriculture.
24. The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia: 1953-1978, by Jorge Garcia Garcia. June 1981, 88 pp. ISBN No. 0-89629-025-5. This report traces the effects on Colombian agriculture and trade of tariffs, severe import restrictions, overvaluation of the peso, and export subsidies.
25. Instability in Indian Agriculture in the Context of the New Technology, by Shakuntla Mehra. July 1981, 55 pp. ISBN No. 0-89629026-3. Although the use of new seed-fertilizer technology in India has led to unprecedented production growth, yield variability has also increased. This report examines the causes of yield fluctuations and the possible role of new technology in accentuating them.
26. Food Security in the Sahel: Variable Import Levy, Grain Reserves, and Foreign Exchange Assistance, by John McIntire. September 1981, 70 pp. ISBN No. $0-89629-027-1$. This report studies the costs and benefits of various proposed trade/storage policies for the Sahel. It argues that increased storage of grain reserves would be expensive and, in most cases, not as effective as measures to liberalize trade or the establishment of a food insurance or compensatory financing scheme.
27. Agricultural Price Policies Under Complex Socioeconomic and Natural Constraints: The Case of Bangladesh, by Raisuddin Ahmed. October 1981,78 pp. ISBN No. $0-89629-028-X$. This report examines the production response of small family farms in Bangladesh to price incentives, as well as the issues underlying the impact of prices on land resources, labor, modern inputs, consumption, export crop production, demand linkages, and welfare.
28. Growth and Equity: Policies and Implementation in Indian Agriculture, by J. S. Sarma. November 1981, 76 pp. ISBN No. 0-89629-029-8. The agricultural policies and strategies that evolved in India after Independence are examined and their effects on agricultural growth and on interpersonal and interregional disparities are analyzed. This report also includes commentaries on the growth and equity experiences of Europe by Ester Boserup, Japan by S. Hirashima, and the United States by Olaf F. Larson.
29. Government Policy and Food Imports: The Case of Wheat in Egypt, by Grant M. Scobie. December 1981, 88 pp . ISBN No. $0-89629-0301$. This report analyzes the relationship between food imports and government subsidies in Egypt, which has a longstanding and extensive policy of providing subsidies to the people, particularly of wheat.
30. Instability in Indian Foodgrain Production, by Peter B. R. Hazell. May 1982, 60 pp . ISBN No. 0-89629-031-X. In this report, statistical decomposition analysis is applied to determine how much of the increase in yield variability accompanying the rise in India's foodgrain production is the result of new technologies.
31. Sustaining Rapid Growth in India's Fertilizer Consumption: A Perspective $\frac{\text { Based }}{\text { on }}$ Composition of Use, by Gunvant M. Desai. August $1982,72 \mathrm{pp}$. $\overline{\text { ISBN }}$ No. 0-89629-032-8. Utilizing large sample surveys, this report identifies crops, varieties, and irrigated and unirrigated areas associated with India's growth in fertilizer use since the 1950 s and discusses policies to sustain rapid growth in fertilizer use during the 1980 s.
32. Food Consumption Parameters for Brazil and Their Application to Food Policy, by Cheryl Williamson Gray. September $1982,78 \mathrm{pp}$. ISBN No. 0-89629-033-6. Income and price elasticities of cereals, other foods, and total caloric intake are measured for both the malnourished and the adequately nourished and for different income groups in Brazil. The report also shows how consumption parameters can be applied to two policy problems: policies to increase caloric consumption through subsidies and the government's program to produce alcohol from crops.
33. Agricultural Growth and Industrial Performance in India: A Study of Inter$\frac{\text { dependence, }}{0-89629-034-4}$ by $\frac{\text { Rangarajan. }}{\text { October }} \frac{19}{1982,40} \frac{1}{\text { pp. }} \frac{\text { ISBN No. }}{\text { IS }}$ 0-89629-034-4. This report examines the production, demand, and savings and investment linkages between agriculture and industry in India, using a microeconomic model to determine the effects of agricultural growth on industry.
34. Egypt's Food Subsidy and Rationing System: $\frac{\text { A Description, by Harold Alder- }}{\text { man }} \frac{\text { Doachim }}{\text { Von }}$ Braun man, Joachim von Braun, and Sakr Ahmed Sakr. $\frac{\text { October 1982, } 80 \mathrm{pp} \text {. ISBN }}{\text { An }}$ No. 0-89629-035-2. The institutional arrangements and regulations that make up Egypt's extensive food distribution network are described in
detail.
35. Policy Options for the Grain Economy of the European Community: Implications for Developing Countries, by Ulrich Koester. November 1982, 90 pp . ISBN No. 0-89629-036-0. This report analyzes how four policy options of the European Community (EC) would affect world grain markets, developing countries, and the EC itself. They include the continuation of past grain policy, a policy to eliminate EC grain tariffs, and two options aimed at reducing instability in the world grain market.
36. Agriculture and Economic Growth in an Open Economy: The Case of Argentina, by Domingo Cavallo and Yair Mundlak. December 1982, 162 pp. ISBN No. 0-89629-037-9. A model consisting of a number of behavioral equations is used to explain the pattern of Argentine sectoral growth during 1940-72. The differential growth in sectoral inputs and productivities is related to differences in factor remuneration, which reflect the taxation of agricultural exports and protection of the nonagricultural sector.
37. Service Provision and Rural Development in India: A Study of Miryalguda Taluka, by Sudhir Wanmali. February 1983, 62 pp . ISBN No. 0-89629-038-7. This report documents the development of rural services since the introduction of irrigation in Miryalguda, a small section of Andhra Pradish, in 1968. It attempts to measure catalytic effects of government location policies on the growth of private enterprise in both the dry and irrigated portions of the study area.
38. Policy Modeling of a Dual Grain Market: The Case of Wheat in India, by Raj Krishna and Ajay Chhibber. May 1983, 74 pp. ISBN No. 0-89629-039-5. This report stresses the interaction of prices and quantities in the commercial and concessional wheat markets of India. It projects purchases, sales, imports, and stocks for 1979-92 and determines their least-cost values.
39. The World Rice Market: Structure, Conduct, and Performance, by Ammar Siamwalla and Stephen Haykin. June 1983, 79 pp. ISBN No. 0-89629-040-9. According to this report, technological changes in rice production have favored importing countries more than exporting countries, and policies of individual countries have contributed to the market's thinness and volatility. The workings of the rice market are examined with an eye to reducing its inefficiencies.
40. Food Subsidies: Their Impact on Foreign Exchange and Trade in Egypt, by Grant M. Scobie. August 1983, 67 pp. ISBN No. 0-89629-041-7. Using historical evidence, this report examines the impact of Egyptian subsidy expenditures on domestic inflation, the balance of payments, and foreign exchange.

Rural Growth Linkages: Household Expenditure Patterns in Malaysia and Nigeria, by Peter B.R. Hazell and Ailsa Roell. September 1983, 64 pp . ISBN No. 0-89629-042-5. This report examines the linkages between agricultural growth and growth in nonfarm incomes and employment in the Muda area of Malaysia and the Gusau area of Nigeria.
42. The Effects of Food Price and Subsidy Policies on Egyptian Agriculture, by Joachim von Braun and Hartwig de Haen, November 1983, 93 pp . ISBN No. 0-89629-043-3. This report analyzes how the policies of the Egyptian government have affected agriculture and asks if increases in food subsidies have reduced government support for agriculture.
43. Closing the Cereals Gap with Trade and Food Aid, by Barbara Huddleston. January 1984. ISBN No. 0-89629-044-1. A comprehensive series of food aid data is developed in this study and used to analyze the trends food aid has followed in the past and to project the requirements for it in the future.

## OTHER SERIES

IFPRI Abstract. A series of four-page publications that summarizes and highlights the policy implications of each research report published by IFPRI, beginning with Research Report 16.

IFPRI Report. A four-page newsletter published three times a year, in January, May, and September. Each issue contains a commentary on a specific food policy issue written by a member (or members) of IFPRI's senior research staff, and reports on completed and soon-to-be completed research.

ANNUAL REPORT. The annual report summarizes the year's work in each of the Institute's four major programs: food trends analysis, food production and development strategy, food consumption and nutrition, and food trade and security, as well as in collaborative regional projects. To date they include: IFPRI Report 1976-78, $40 \mathrm{pp}$. ; IFPRI Report 1979, $36 \mathrm{pp}$. ; IFPRI Report 1980,48 pp.; IFPRI Report $1981,55 \mathrm{pp}$. ; and IFPRI Report $1982,70 \mathrm{pp}$.

## WORKING PAPERS

Rice Policies in Southeast Asia Project Working Papers: This is a project shared with the International Rice Research Institute (IRRI) and the International Fertilizer Development Center (IFDC). Nine working papers have been published:

1. An Economic Analysis of Irrigation Development in Malaysia by Donald C. Taylor, Kusairi Mohd. Noh, and Mohd. Ariff Hussein, 83 pages, 1981. This working paper reviews the status and performance of irrigation in Malaysia.
2. Rice Buffer Stocks for Indonesia: A First Approximation by Douglas D. Hedley, 41 pages, 1981. Hedley reviews the history of the rice stock and import program, presents a demand model for cereals, projects domestic consumption, and defines the variability of rice production in light of a rice reserve stock.
3. Irrigation and Rice Production in the Philippines: Status and Projections by Pat S. Ongkingco, Jose A. Galvez, and Mark W. Rosegrant, 37 pages, February 1982. Rice yields in the Philippines grew steadily in the past decade although the area harvested did not expand appreciably and has declined since 1975/76. Growth in yield and irrigation are explored.
4. Status and Performance of Irrigation in Indonesia and the Prospects to 1990 and 2000 by Albert J. Nyberg and Dibyo Prabowo, 56 pages, February 1982. Following a period of relative neglect, irrigation became a government priority in the late 1960s. Beginning in 1969 , the government undertook an extensive program of rehabilitation and, in the 1970s, it began a program of expansion.
5. Staple Food Consumption in the Philippines by Ma. Eugenia C. Bennagen, 39 pages, February 1982. Bennagen examines the data from various Philippine food demand studies and learns that rice accounts for about 75 percent of the staples consumed and that consumption of corn depends substantially on the availability of rice. Government wheat import policy has kept the price of wheat high relative to the price of rice.
6. Food Consumption Patterns and Related Demand Parameters in Indonesia: A Review of Available Evidence by John A. Dixon, 51 pages, June 1982 . Although rice is the principle staple food, corn, cassava, and sweet potatoes comprise more than half of what low-income. Indonesians eat. Dixon finds that lower income persons diversity their staple food diets more than higher income groups, which consume mostly rice, even though the richer groups consume a greater variety of foods overall.
7. An Economic Analysis of a Reserve Stock Program for Rice in the Philippines by Amanda Te, 33 pages, July 1982 . Te models $\frac{\text { the }}{\text { the }} \frac{\text { Rhilipe }}{\text { in }} \frac{\text { the }}{\text { me }}$ rice economy and uses her models to simulate reserve stock management strategies involving different degrees of dependence on foreign trade.
8. Status and Performance of Irrigation in Thailand by Dow Mongkolsmai, 44 pages, June 1983. Irrigation has been an important tool for food production in Thailand for centuries. Mongkolsmai examines past, current, and future irrigation efforts and their effects on rice production output.
9. The Effect and Cost of Philippine Government Intervention in Rice Markets by Laurian J. Unnevehr, December $\frac{1983 \text {. This paper reassesses the rice }}{\text { market intervention strategy }}$ market intervention strategy of the Philippine government and looks at ways of maintaining producer incentives.

OTHER PUBLICATIONS

Commodity Trade Issues in International Negotiations, by Barbara Huddleston. Occasional Paper 1, January 1977, 47 pp . This paper focuses on various proposals for improving commodity trade prospects for developing countries in an attempt to show how these proposals could influence formulating world food strategies.

Potential of Agricultural Exports to Finance Increased Food Imports in Selected Developing Countries, by Alberto Valdes and Barbara Huddle ston. Occasional Paper 2, August 1977, 72 pp. This paper describes the aggregate trade and payments scenarios of the developing countries and of a representative sample of developing countries. It then examines the ability of these selected countries to use agricultural exports to meet food needs.

## 1981

Food Security for Developing Countries, ed. Alberto Valdes (Boulder, Colo.: Westview Press, 1981). This book attempts to clarify the issue of food security, to identify sources of insecurity, to assess the magnitude of the problem in specific country situations, and to explore possible solutions both nationally and multilaterally.

Food Policy Issues and Concerns in Sub-Saharan Africa. February 1981. 175 pages. Papers presented by researchers at IFPRI and discussed with colleagues in Ibadan, Nigeria, February 9-11, 1981. Topics include an assessment of the food situation, production potentials, nutritional concerns, pricing policy, fertilizer use, expansion of food consumption, and food security.

Some Commentaries on Food, prepared by IFPRI researchers for World Food Day, October 16, 1981. October 1981. 20 pp. Commentaries by the IFPRI research staff deal with food security, food subsidies, accelerating production, food problems in Africa, fertilizer supplies, an international food financing facility, energy cropping, and crop insurance.

Resource Allocations to National Agricultural Research. Trends in the 1970s (A Review of Third World Systems) by Peter A. Oram and Vishva Bindlish. November 1981. 104 pages. This study assesses recent progress on the development of the agricultural research systems in the Third World and identifies issues for further study. Published jointly with the International Service for National Agricultural Research.

Looking Ahead: The Development Plan for the International Food Policy Research Institute. June 1982. 20 pp . This piece describes IFPRI's growth and its future research and financial considerations. It identifies six major food policy questions for the 1980 s.

IFPRI Research and the Creation of the IMF Cereal Import Facility by Richard H. Adams, Jr. August 1982. 10 pages. Using the role IFPRI's research played in the creation of the IMF Cereal Facility as an example, this piece highlights the important contribution careful and timely research can make to public policymaking.

Food and the Structure of Economic Growth: Its Relevance to North-South Relations by John W. Mellor. October 1982. 12+ pages. Paper presented at the Symposium on the World Food Problem and Japan, sponsored by the Japan FAO Association on the occasion of World Food Day, October 16, 1982.

## 1983

Nutrition-related Policies and Programs: Past Performance and Research Needs by Eileen T. Kennedy and Per Pinstrup-Andersen. February 1983. 104 pages. This paper reviews the success of various government interventions aimed at improving human nutrition and proposes nutrition-related research to help policymakers plan and implement effective programs for reducing malnutrition.

Contingency Planning for Famines and Other Acute Food Shortages: A Brief Review by J. S. Sarma. April 1983. 28 pages. This paper reviews the roles and functions of international agencies dealing with acute food shortages caused by droughts, cyclones, floods, etc. It suggests area of research that various national and international agencies might undertake.
"Confronting World Hunger" by Barbara Huddleston. CARE BRIEFS on Development Issues 3. October 1983. 8 pages. Published by CARE in cooperation with the Overseas Development Council and IFPRI. This piece, distributed for World Food Day 1983, examineds the right to food, the prevalence of hunger, and policies for alleviating hunger.

## IFPRI REPRINTS

IFPRI has reprinted about 50 articles that were written by IFPRI researchers and published in journals or books, or were addresses for conferences or testimony before congress. They were issued by IFPRI in this chronological sequence:

## 1978

"Occupational Migration Out of Agriculture -- A Cross-Country Analysis" by Yair Mundlak. Reprinted from The Review of Economics and Statistics, Vol. LX, No. 3, August 1978.
"Occupation Migration Out of Agriculture in Japan" by Yair Mundlak and John Strauss. Reprinted from the Journal of Development Economics 5 (1978), North-Holland Publishing Company.
"Research Directions in Income Distribution, Nutrition, and the Economics of Food" by Lance Taylor. Reprinted from the Food Research Institute Studies, Vol. XVI, No. 2, 1977.
"Welfare Implications of Grain Price Stabilization: Some Empirical Evidence for the United States" by Panos A. Konandreas and Andrew Schmitz. Reprinted from the American Journal of Agricultural Economics, April 1978.

## 1979

"Growth Potential of the Beef Sector in Latin America -- Survey of Issues and Policies" by Alberto Valdes and Gustavo Nores. Paper presented at the IV World Conference on Animal Production, Buenos Aires, August 1978.
"Three Issues of Development Strategy -- Food, Population, Trade" by John W. Mellor. Two conference papers. Testimony presented to the United States House of Representatives Select Committee on Population.
"Agricultural and Food Policy Issues Analysis: Some Thoughts from an International Perspective" by Alex F. McCalla. Prepared under a 1975-1977 grant to Alex F. McCalla from The Ford Foundation.
"World Food Strategy for the 1980s -- Context, Objectives, and Approach" by John W. Mellor. Paper presented at the International Conference on Agricultural Production: Research and Development Strategies for the 1980s, 8-12 October, 1979, Bonn, Federal Republic of Germany, sponsored by the Food and Agriculture Development Centre of the German Foundation for International Development (DSE), the Rockefeller Foundation (RF), and the German Agency for Technical Cooperation (GTZ).
"Analysis of Trade Flows in the International Wheat Market" by Panos Konandreas and Herman Hertado. Reprinted from the Canadian Journal of Agricultural Economics, Vol. 26 (3), 1978.
"Food Price Policy and Income Distribution in Low-Income Countries" by John W. Mellor. Reprinted from Economic Development and Cultural Change, Vol. 27, No. 1, October 1978.
"India -- A Drive Towards Self-Sufficiency in Food Grains" by J. S. Sarma. Reprinted from the American Journal of Agricultural Economics, Vol. 60, No. 5, December 1978.

## 1980

"Measuring the Indirect Effects of an Agricultural Investment Project on Its Surrounding Region" by C. L. G. Bell and P. B. R, Hazell. Reprinted from the American Journal of Agricultural Economics, Vol. 62, No. 1, February 1980.
"Data Systems for Rural Development" by J. S. Sarma. Reprinted from the Agricultural Situation in India, Vol. 35, No. 3, June 1980.
"Food Insecurity in Developing Countries" by Ammar Siamwalla and Alberto Valdes. Reprinted from Food Policy, Vol. 5, No. 4, November 1980.
"Food Aid and Nutrition" by John W. Mellor. Reprinted from the American Journal of Agricultural Economics, Vol. 62, No. 5, December 1980, Proceedings Issue.
"A General View of the World Food Situation" by Leonardo Paulino. Reprinted from Food Situation and Potential in the Asian and Pacific Region. Taipei, Taiwan: Food and Fertilizer Technology Center, June 1980.
"E1 Impacto de un Aumento en la Oferta de Alimentos sobre la Nutricion Humana: Implicaciones para el Establecimiento de Productos Prioritarios en la Investigacion y Politica Agricolas" by Per PinstrupAndersen, Norha Ruiz de Londono, and Edward Hoover. Reprinted from Revista de Planeacion y Desarollo, Volumen 12, No. 3, SeptiembreDiciembre 1980.
"El Impacto Potencial de Cambios en la Distribucion del Ingreso sobre la Demanda de Alimentos y la Nutricion Humana" by Per PinstrupAndersen and Elizabeth Caicedo. Reprinted from Revista de Planeacion $\mathbf{y}$ Desarollo, Volumen 12, No. 3, Septiembre-Diciembre 1980
"Market Intervention Policies for Increasing the Consumption of Nutrients by Low Income Households" by Richard K. Perrin and Grant M. Scobie. Reprinted from the American Journal of Agricultural Economics, Vol. 63, No. 1, February 1981.
"The State of Agricultural Economics and Sector Policy Formulation in the Philippines," by Leonardo A. Gonzales. Reprinted from the Journal of Agricultural Economics and Development, Vol. 9, No. 2, July 1979.
"Energy Cropping" by Per Pinstrup-Andersen. Reprinted from Mazingira, Vol. 5, No. 1, pp. 60-69, 1981.
"Economic Theory Needed in Studying the Economics of Getting Poorer While Redistributing" by Per Pinstrup-Andersen. Reprinted with permission from Rural Change: The Challenge of Agricultural Economists (ed. Glenn Johnson and Allen Maunder), A1dershot, Hants: Gower, 1981. © International Association of Agricultural Economists, 1981.
"Evaluating Price Stabilization Schemes with Mathematical Programming" by Peter B. R. Hazell and Carlos Pomareda. Reprinted from the American Journal of Agricultural Economics, Vol. 63, No. 3, August 1981.
"Un Esquema para el Analisis de la Distribucion de Beneficios de Proyectos de Riego" by Juan Antonio Zapata and Ammar Siamwalla. Reprinted from the Cuadernos de Economia, No. 53, Ano 18, 1981.
"Technological Change, Distributive Bias and Labor Transfer in a Two Sector Economy," by Uma Lele and John W. Mellor. Reprinted from the Oxford Economic Papers, Vol. 33, No. 3, November 1981.
"Simulating the Impacts of Credit Policy and Fertilizer Subsidy on Central Luzon Rice Farms, the Philippines," by Mark W. Rosegrant and Robert W. Herdt. Reprinted from the American Journal of Agricultural Economics, Vol. 63, No. 4, November 1981.

1982
"Variablé Parameters Models Applied to Agricultural Production Functions" by Victor J. Elias. Reprinted from Contributed Papers of the 43rd Session of the International Statistical Institute, Buenos Aires, Argentina, November 30 -December 11, 1981.
"Evaluating Trade-Offs and Complementarities among Public Investments in the Rice Sectors of Asian Countries" by Howarth Bouis and Robert W. Herdt. Reprinted with permission from Food Security: Theory, Policy, and Perspectives from Asia and the Pacific Rim (ed. Anthony H. Chisholm and Rodney Tyers), Lexington, Massachusetts: Lexington Books, 1982.
"World Food Security and Alternatives to a New International Wheat Agreement" by Barbara Huddleston. Reprinted from New International Realities, Vol. 6, No. 2, March 1982.
"A Case Study in Human Ecology: The Amazon Indians" by Thomas Quinlivan. Reprinted from Ceres, Vol. 15, No. 2, March-April 1982.
"Constraints on Oxen Cultivation in the Sahel" by Christopher L. Delgado and John McIntire. Reprinted from the American Journal of Agricultural Economics, Vol. 64, No. 2, May 1982.
"MAAGAP: The ADAM National Model of the Philippines" by Leonardo A. Gonzales, David E. Kunkel, and Jesus C. Alix. Reprinted with permission from Agricultural Sector Analysis in Asia (ed. Max R. Langham and Ralph H. Retzlaff), Bangkok, Thailand: Singapore University Press, 1982. ©1982 Agricultural Development Council.
"Application of Risk Preference Estimates in Firm-Household and Agricultural Sector Models" by Peter B. R. Hazell. Reprinted from the American Journal of Agricultural Economics, Vol. 64, No. 2, May 1982.
"Third World Development: Food, Employment, and Growth Interactions" by John W. Mellor. Reprinted from the American Journal of Agricultural Economics, Vol. 64, No. 2, May 1982.
"A Quantitative Model of the International Rice Market and Analysis of the National Rice Policies, with Special Reference to Thailand, Indonesia, Japan, and the United States" by Hiroshi Tsujii. Reprinted with permission from Agricultural Sector Analysis in Asia (ed. Max R. Langham and Ralph H. Retzlaff), Bangkok, Thailand: Singapore University Press, 1982. ©1982 Agricultural Development Council.
"Agricultural Protectionism: The Impact on LDCs" by Alberto Valdes. Reprinted from Ceres, Vol. 15, No. 6, November-December 1982.
"Modelacion de Politica Gubernamental: El Caso de las Importaciones de Alimentos, Politica de Precios y la Balanza de Pagos en Egipto" by Grant M. Scobie and Alberto Valdes. Reprinted from Cuadernos de Economia, Vol. 19, No. 58, December 1982.
"The EC Sugar Market Policy and Developing Countries" by Ulrich Koester and Peter Michael Schmitz. Reprinted from the European Review of Agricultural Economics, Vo1. 9, No. 2, 1982.
"The Food Security Challenge" by Richard Gilmore and Barbara Huddleston. Reprinted from Food Policy, Vol. 8, No. 1, February 1983.
"Comparison of Rice Policies Between Thailand, Taiwan, and Japan -- An Evolutional Model and Current Policies" by Hiroshi Tsujii. Reprinted from A Comparative Study of Food Policy in Rice Countries -- Taiwan, Thailand, and Japan (ed. Hiroshi Tsujii), Kyoto, Japan: Kyoto University, 1982.
"Export Crop Production and Malnutrition" by Per Pinstrup-Andersen. Reprinted with permission from The Institute of Nutrition, The University of North Carolina, Occasional Paper Series, Vol. 11, No. 10, February 1983.
"Risk in Market Equilibrium Models for Agriculture" by Peter B. R. Hazell and Pasquale L. Scandizzo. Reprinted with permission from The Book of CHAC: Programming Studies for Mexican Agriculture (ed. Roger D. Norton and Leopoldo Solis M.), The Johns Hopkins University Press: Baltimore, Md., 1983. ©International Bank for Reconstruction and Development, 1983.
"The Importance of Risk in Agricultural Planning Models" by Peter B. R. Hazell, Roger D. Norton, Malathi Parthasarathy, and Carlos Pomareda. Reprinted with permission from The Book of CHAC: Programming Studies for Mexican Agriculture (ed. Roger D. Norton and Leopoldo Solis M.), The Johns Hopkins University Press: Baltimore, Md., 1983. OInternational Bank for Reconstruction and Development, 1983.
"Food Prospects for the Developing Countries" by John W. Mellor. Reprinted from the American Economic Review, Vol. 73, No. 2, May 1983.
"The Chang Jiang Diversion Project: An Overview of Economic and Environmental Issues" by Bruce Stone. Reprinted with permission from Long-Distance Water Transfer: A Chinese Case Study and International Experiences, Water Resources Series, Vol. 3, edited by Asit K. Biswas, Zuo Dakang, James E. Nickum, Liu Changming (Dublin: Tycooly International Publishing Limited, 1983). ©United Nations University, 1983.
"The Role of Research in Policy Development: The Creation of the IMF Cereal Import Facility" by Richard H. Adams, Jr. Reprinted from World Development, Vol. 11, No. 7, 1983.

[^20]
## GLOSSARY OF ACRONYMS



| TAC | Technical Advisory Committee |
| :--- | :--- |
| UNCTAD | United Nations Conference on Trade and Development |
| UNDP | United Nations Development Program |
| UNRISD | United Nations Research Institute for Social Development |
| USAID | United States Agency for International Development |
| USDA | United States Department of Agriculture |
| WFC | World Food Council |
| WFP | World Food Program |


[^0]:    * Presentation by John W. Mellor, Director, IFPRI, at the CGIAR International Centers Week, November 9, 1982.

[^1]:    5/The figures quoted for Europe are new, unpublished data, for which we are indebted to Robert Evenson of Yale; those for the United States come from the Congressional Office of Technology Assessment. They do not include private sector agricultural research.

[^2]:    10/CGIAR. Future Resource Requirements and their Funding. Secretariat Paper ICW/82/6. April 9, 1982.
    11/Food and Agriculture Organization. Programme of Work and Budget 1982-83 (Appendix E).

[^3]:    "When it is remembered that according to the latest available figures [1970] a total of more than 1.5 billion dollars was being spent on agricultural research all over the world and that in 1973 less than 24 million dollars was being spent on the international centres, it is apparent that a substantial increase in their financial resources would not place an undue strain on the donor countries."

[^4]:    1/ Memorandum of Understanding for Collaboration in Cassava Germplasm Exchange, Research and Training Between CIAT and IITA.

[^5]:    1/ "Objectives, Strategy and Mandate." Background Papers, Vol. 1, 2) External Program Review, CIAT, 1984. Suggested change in wording is underlined.

[^6]:    1/ For definitions of "optimum", "minimum", and "minimum net" core positions, refer to "Summary Modifications to Long Range Plan," CIAT, January 1984, p.2.

[^7]:    1/ AGD/TAC: IAR/82/9.

[^8]:    1/ CIAT in the 1980s, A Long Range Plan, p. 110.

[^9]:    1/ The Panel is not expected to institute a detailed management review which will be undertaken, usually concurrently, by a Panel especially commissioned by the CGIAR Secretariat for such purpose. The External Program Review Panel is expected to cooperate closely with the Management Review Panel.

    2/ Questions relating to the Center under review will be collated and, when approved, will appear in this subsection.

[^10]:    1/ CAEHUI $=$ Centro Agricola Experimental Huimanguillo

[^11]:    1/
    APROBE: Asociación de Productores de Betulia.

[^12]:    $\frac{1 /}{2 /}$
    ICA: Instituto Colombiano Agropecuario.
    DRI: Desarrollo Rural Integrado.
    CECORA: Central de Cooperativas de la Reforma Agraria.

[^13]:    *As outlined in "Guidelines for the Conduct of Management Reviews of the International Agricultural Research Centers," CGIAR Secretariat, July 1983.

[^14]:    * Designates CGIAR appointee to Board
    ** Designates host government appointee to Board

[^15]:    * R. Chambers, R. Longhurst and A. Pacey (eds), Seasonal Effects of Rural

[^16]:    * Derived from J.S. Sarma,'Geographic Distribution of IFPRI's Research', and discussion with IFPRI staff. Special studies without regional limitations, and comparisons of several countries across more than one continent, are counted as global. Of the country studies, one each completed in S/SE Asia and Sub-Saharan Africa is counted as a "half", shared with a country in another continent; of ongoing or planned studies, the respective "halves" are 3 and 4, plus 2 in Latin America and one in an industrialized country.

[^17]:    1/ Review Panel involved: L. T. Evans (Chairman), M. Lipton (Member), K. O. Herz (Secretary), M. Arnold (Management Review).

    2/ IFPRI staff accompanied the Panel on all visits in the Philippines.

[^18]:    1/ These covered also a review of earlier discussions by TAC and the CGIAR on IFPRI. See Report of the 21 st TAC meeting, agenda item 8.

[^19]:    * IBPGR, WARDA, ISNAR

[^20]:    "Seasonal Rice Price Variation in the Philippines: Measuring the Effects of Government Intervention" by Howarth E. Bouis. Reprinted from Food Research Institute Studies, Vol. XIX, No. 1, 1983.

