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CGIAR - G-12 - IBPGR Documents 02 1976/1980

Consultative Group on International Agricultural Reseach

G 121

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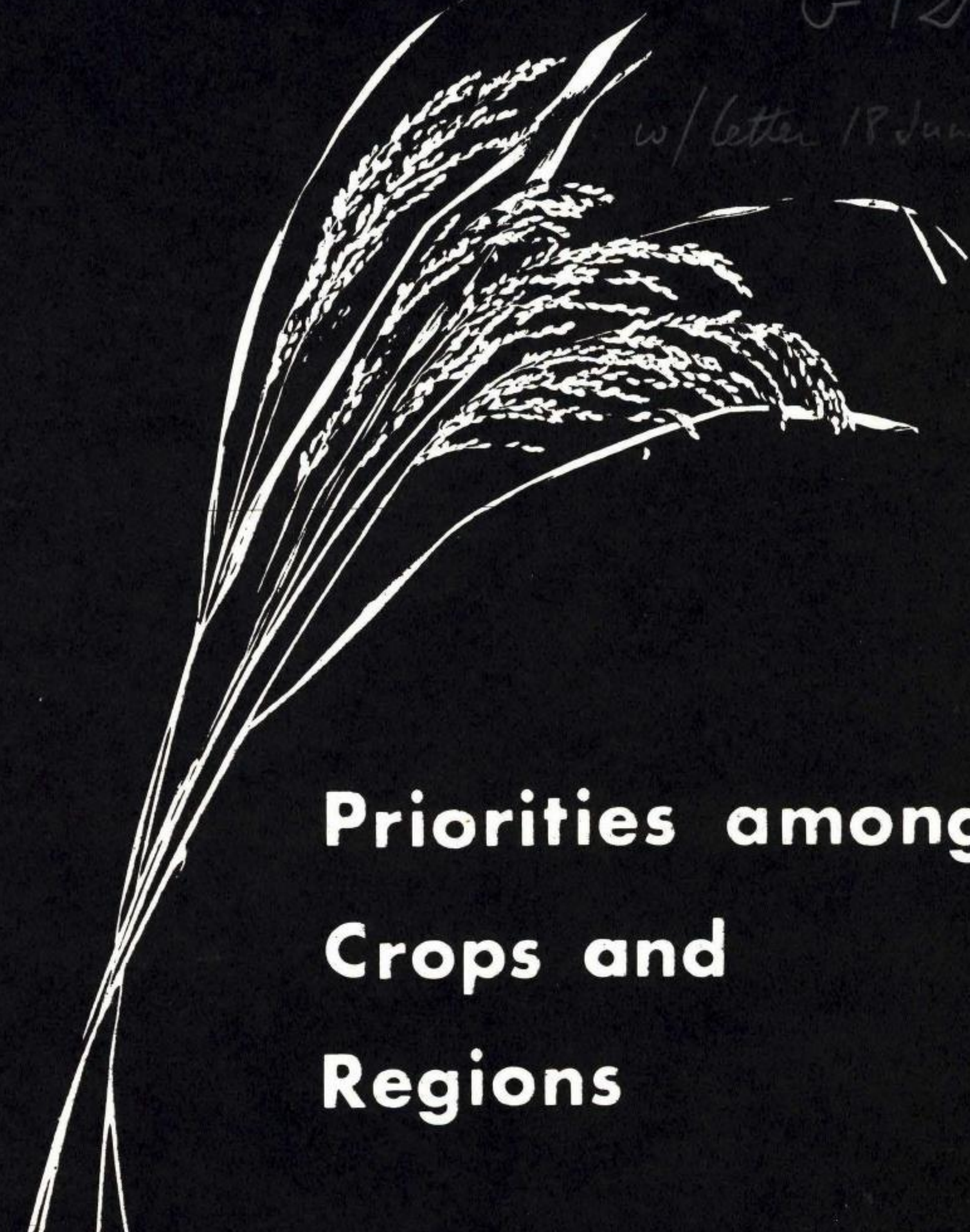

# Priorities among Crops and Regions

International Board for Plant Genetic Resources

AGPE : IBPGR/76/8
April 1976

CONSULTATIVE GROUP ON
INTERNATIONAL AGRICULTURAL RESEARCH

# PRIORITIES AMONG CROPS AND REGIONS

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES
Rome, 1976

IBPGR Secretariat
Crop Ecology and Genetic Resources Service
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, Rome 00100, Italy

To provide a general framework within which the Board can develop its programmes, certain priorities for plant exploration, collection and conservation have been determined with regard both to geographical regions and to the genetic diversity of the different crops within them. These priorities take into account previous recommendations by the 3rd (1969), 4th (1970) and 5th (1973) Sessions of the FAO Panel of Experts on Plant Exploration and Introduction; and the 3rd (1973) Session of the FAO Panel of Experts on Forest Gene Resources. The recommendations embodied in the Report of the TAC *ad hoc* Working Group held in Beltsville in 1972 have also been considered.

The Board will keep these priorities under review. It will use them in as flexible and sensitive a manner as is compatible with efficient use of limited resources of manpower, funds and facilities.

# PRIORITIES AMONG CROPS AND REGIONS

## INTRODUCTION

1. The Board was established by the Consultative Group on International Agricultural Research (CGIAR) to ensure that genetic variability in economic species of plants is conserved so that it can be used by plant breeders, and by research workers interested in the evolution of cultivated plants and of agriculture itself. To this end it is expected to develop international collaboration among the members of a global network of institutions active in the exploration, collection, conservation, documentation and use of plant genetic resources. It accepts that the volume and duration of its support will depend primarily on the practical and scientific results of its work.

## CRITERIA FOR PRIORITIES AMONG CROPS AND REGIONS

2. The criteria listed in paragraphs 3 and 5 are not set out in order of priority, but taken together they are intended to provide a coherent framework for decisions about priorities.

### Criteria for priorities among crops

3. Individual species or groups of species will be selected for attention and assigned priority according to the following criteria:

(a) the risk that genetically diverse materials of the species and their wild relatives will be lost in the future, particularly the near future, as a result of change and development in agriculture and land use including the introduction of new varieties. Since such changes are generally local, a species or group may have high priority in one country or region and lower priority elsewhere;

(b) the economic and social importance of the materials to be collected measured in terms of their present usefulness and importance (volume or value of production and trade, numbers of people depending on or using them), as well as their expected, intended or potential contributions to development (including the improvement of human diets and the income and well-being of farmers and other rural people) and to the economic and social progress of mankind;

(c) the recognized requirements of plant breeders and research workers, in both developing and developed countries, for genetically diverse materials (including advanced breeding lines), and the expected significance in economic and social development of the improved types and varieties of crops they will be able to produce with these materials; and

(d) the size, scope and quality, including documentation, of existing collections.

These criteria are intended to represent a general and pragmatic means of determining priorities in the initial stages of the Board's work. Many questions concerning exploration, conservation and use are strongly affected by local considerations and hence must necessarily be examined case-by-case (see para 25).

4. Species which are important for the purposes set out in 3(b) and 3(c) above would normally have priority over species from which it might be possible to develop new economic cultigens in the future, but the Board will consider proposals relating to wild plant materials which are or seem likely to be critically important for development and human welfare.

5. As the Board develops means of consultation with specialists in different crops, these priorities will be further developed and made more specific.

<u>Priorities among regions</u>

6. Regions will be selected for attention and assigned priority according to the following criteria:

(a) that they contain significant genetic diversity of one or more crops or species selected according to the criteria outlined in paragraph 3;

(b) that change and development in agriculture, and/or change in land use, are occurring in them at such a rate, that if nothing is done, genetically diverse materials are likely to be lost; and

(c) that widespread crop failures have occurred or are imminent, or reasonably to be expected, on such a scale that diverse materials are likely, if nothing is done, to be lost.

As the Board develops means of consultation in the different regions, with regional committees or programmes, these priorities will be further developed and made more specific.

BASIC CONSIDERATIONS FOR ACTION

7. For each species or group of species selected, the Board will ascertain who the leading scientific workers are (geneticists, breeders, crop botanists and others) and where they work, what activities or institutions relevant to germplasm resources (including germplasm committees) already exist, what collections exist, where the uncollected resources of genetically diverse materials are, and where the crop concerned is continuously able to out-cross with wild relatives. Next, it will have to arrange consultations among the scientists concerned to determine their needs. It will establish Crop Advisory Committees when necessary, to agree upon the descriptors to be used to characterize accessions, and to advise it on the priorities and tactics of collection and other activities relating to particular species or groups. These consultations among the leading workers will generate a framework for collaboration in the work of collection, conservation and use of genetic resources in the groups concerned. Since the systems of descriptors will have to be compatible with the computerized information storage and retrieval system which the Board is helping to develop, they will in each case be drawn up in consultation with the Genetic Resources Communication, Information and Documentation System (GR/CIDS) group. Where descriptors have already been accepted for particular crops, they will no doubt be used as fully as possible in the further development of genetic resources programmes in those crops.

8. For each region in which the Board supports action on genetic resources, it will seek to ensure that the appropriate national and international agricultural research and genetic resources institutions are associated in appropriate ways in the work of collection, and in the characterization of accessions, environments and adaptations, and that they share in the distribution of the materials collected. Where an international or regional centre undertakes genetic resources activities sponsored by the IBPGR, it will be expected, to the greatest practicable

extent, to organize those activities in cooperation with the appropriate national research institutes and to seek their fullest possible participation. Where it is necessary to do so, the Board will assist in the further development of these institutions, particularly at the national level, so that they can participate fully in the global network referred to in paragraph 1, and further discussed in paragraphs 22-24 below.

9. Although a region may be selected because it contains one or more important species, the fact that it is also an area of development may well mean that many other useful, though perhaps less important, species are also affected. Wherever practicable, the collecting programmes should attempt to include these species also.

10. In some regions, physical facilities for storage and evaluation are unlikely to be available initially. Often, however, the programme will have to be mounted urgently based on whatever institutions may be available. Whether or not the programme includes the development of a new permanent national or regional genetic resources centre, will evidently depend on circumstances, needs, possibilities, costs and other constraints and will have to be determined separately in each case. Where an international institute already exists in the region, it may well be the appropriate base both for planning and organizing the field collecting and for arranging for the more permanent conservation and evaluation activities, at least for those crops for which it has been assigned global or regional research responsibility, within the system of International Agricultural Research Institutes, by the CGIAR. The Board will expect to be fully involved in decisions of this kind.

11. The materials collected should normally be shared between the appropriate local institutions, the appropriate regional and international institutes, and other appropriate institutions in other nations.

12. One of these international, regional or national institutions will normally be requested to accept primary responsibility for assembling and transmitting the information about the descriptors to the international data storage and retrieval system. At least two centres will have to be designated for medium- and long-term conservation of genetic resources materials.

CROP PRIORITIES

13. Priorities assigned are a guide to immediate action on the basis of the Board's best judgement. The priorities suggested in this section will have to be refined in the light of recommendations of such Crop Advisory Committees as may be set up (para 24) and appropriate specialists. In this way these priorities will be reviewed from time to time. In Table 1 a number of the world's more important crop species or groups of species are set out. For each, the priority assigned (in the light of the criteria set out above) is indicated. Four degrees of priority have been used:

| | |
|---|---|
| First priority | 1 |
| Second priority | 2 |
| Third priority | 3 |
| Lesser priority | 4 |

In addition, the Board may from time to time take emergency action in respect of a particular crop, usually in a restricted area, if rapid agricultural development, changes in land use, drought, disease or some other unforeseen event or calamity makes genetic conservation urgently necessary.

14. In addition, the Board wishes to study certain crops or groups of crops further before assigning a priority: these are designated 'S' in Table 1.

15. Only in part do these priorities reflect an assessment by the Board of the importance of the crop, now or in the future. They are substantially influenced by the amount and quality of existing genetic resources work on it, and the extent of the current risk that important genetic resources may soon be lost. This does not, however, exclude collection of wild species and related taxa of no immediate economic importance, where they seem likely to be important for crop improvement.

16. Of the 58 crops or groups of crops listed in Table 1, eight are assigned priority 1 at least in particular regions. The remainder have priorities 2, 3 or 4. Nine crops or groups of crops have been designated for further study (S category). This category includes coconut, tree fruits and nuts, vegetables, Linum (linseed, flax), grape, forage crops, Aleurites (tung and other seed oils), medicinal and drug plants and tree species.

## TABLE 1: PRIORITIES AMONG CROPS [1]

### CEREALS

PRIORITY 1

| | |
|---|---|
| Wheat | As farmers adopt 'high-yielding' varieties on a substantial scale, primitive cultivars are disappearing in many parts of the world. Moreover there are important gaps in the existing world collections of wheat germplasm. |
| Sorghum | Much of the world's sorghum is grown in the drier parts of the tropics where climatic fluctuations include sequences of dry years from time to time (like the recent experiences in the Sahel, Ethiopia and parts of India). In these periods a sequence of crop failures may so decrease the indigenous seed stock that the traditional varieties may become rare, or even disappear altogether and be replaced by introduced and often standard varieties. |
| *Pennisetum* millets | *Pennisetum* and other millets are grown on the drier side of the sorghum belt and as early-sown, early-maturing crops in the sorghum belt. The reasons for priority are similar to those for sorghum, but these millets have been less completely collected. *Pennisetum* millets have priority 1. Other millets (*Eleusine*, *Setaria*, *Panicum*, *Echinochloa*, *Digitaria* and others), though no less important in areas where they are staple foods, are assigned priority 2. |

[1] Including with the name of the crop, wild and cultivated genera and species

TABLE 1 continued

CEREALS
(continued)

PRIORITY 2

| | |
|---|---|
| Millets (other than Pennisetum) | See comments above. |
| Rice | Because of the outstanding work done in India, by IRRI and by Japanese institutions, priority 2 seems appropriate for rice in general but collections of O. glaberrima in West Africa, and O. indica and O. javanica in Southeast Asia and the tribal regions of India, have priority 1. |

PRIORITY 3

| | |
|---|---|
| Barley | The priority rating 1 applies to areas of Southwest Asia and North Africa especially where barley is grown in mixtures with wheat. |
| Maize | Maize, in general, has priority 3 because so much of the material from the main centres of diversity has already been collected and conserved. However, further work is needed in secondary centres of diversity which will have priority 2. |
| Oats | |
| Rye | |

TABLE 1 continued

## CEREALS
(continued)

### PRIORITY 4

| | |
|---|---|
| Grain amaranths (Amaranthus sp.) | Important in South Asia and certain other regions. |
| Quinoa (Chenopodium quinoa) | |
| Teff (Eragrostis tef) | An important crop in the Ethiopian region. |

## GRAIN LEGUMES

### PRIORITY 1

| | |
|---|---|
| Phaseolus beans | A broader range of genetic diversity is required for breeding programmes. In addition, agricultural land-use patterns are changing rapidly in Central and South America, which may lead to the disappearance of many traditional cultivars of Phaseolus. |

### PRIORITY 2

- Chickpea
- Cowpea (Vigna unguiculata)
- Groundnut
- Soyabean
- Asiatic Vigna sp.

TABLE 1 continued

GRAIN LEGUMES
(continued)

PRIORITY 3

| | |
|---|---|
| Pigeon pea (*Cajanus cajan*) | |
| *Pisum* sp. | |
| *Vicia faba* | |

PRIORITY 4

| | |
|---|---|
| Lablab (*Dolichos* sp.) | |
| Lentil | Extremely important in certain countries. |
| Lupin (*Lupinus* sp.) | |
| Velvet bean (*Mucuna* sp.) | |
| Wing bean (*Psophocarpus tetragonolobus*) | |

TABLE 1 continued

## ROOT AND TUBER CROPS

### PRIORITY 2

| | |
|---|---|
| Cassava | |
| Potato and tuber bearing Solanum sp. | Potatoes have a priority 2 because a large amount of material has already been collected and is conserved by CIP (Centro Internacional de la Papa). |
| Sweet potato | |

### PRIORITY 3

Yam

### PRIORITY 4

Minor South American and African tuber crops: oca (Oxalis tuberosa); Tropaeolum tuberosum; ulluco (Ullucus tuberosus) and Coleus sp.

Taro and other aroids

TABLE 1 continued

## STARCHY FRUITS

PRIORITY 2

Bananas including plantains

PRIORITY 4

Breadfruit and jack fruit (_Artocarpus_ sp.)

## FIBRE CROPS

PRIORITY 2

Cotton

PRIORITY 3

Jute

PRIORITY 4

Kenaf (_Hibiscus cannabinus_)

PRIORITY S

Flax and linseed

TABLE 1 continued

## OIL CROPS
(not including groundnut,
soyabean and linseed listed above)

PRIORITY 2

| | |
|---|---|
| Oil palm (*Elaeis melanococca*) | In restricted areas of South America. |

PRIORITY 3

Brassicas including rape

Oil palm (*Elaeis guineensis*)

Olive

Safflower

Sunflower

PRIORITY 4

Niger seed (*Guizotia abyssinica*)

Sesame

PRIORITY 5

Coconut
Tung and candlenut (*Aleurites* sp.)

TABLE 1 continued

## SUGAR CROPS

PRIORITY 2

| | |
|---|---|
| Sugar beet including other species and cultivars of Beta | As older cultivars of sugar beet are replaced by monogerm triploid types, important sources of resistance to virus and leaf diseases and to pests are likely to be lost if the older cultivars of sugar beet and related forms in the genus Beta are not collected and conserved. Moreover, as the cultivation of sugar beet spreads in Iran and other parts of Southwest Asia, new cultivars will be required which cannot be generated from the cultivars of Western Europe or North America. Beet, in general, has priority 2, and priority 1 is assigned to the genetic resources of Beta which are being lost rapidly in parts of Turkey and the Eastern Mediterranean. |
| Sugar cane | Especially wild Saccharum from tropical areas of South and Southeast Asia. |

## RUBBER

PRIORITY 2

| | |
|---|---|
| Rubber (Hevea brasilensis) | New germplasm is required to provide varieties resistant to South American leaf blight disease (SALB). With increased and improved communication between Latin American and Asian and African regions, spread of this disease is almost a certainty. Furthermore, fear of accidental introduction of SALB from the Brazilian forest regions into the main areas of production in Africa and Asia has to date limited plant exploration activity. |

TABLE 1 continued

## BEVERAGES

PRIORITY 1

| | |
|---|---|
| Coffee | New germplasm is needed of _Coffea_ _arabica_ because coffee berry disease is spreading and becoming more important in Africa and because coffee rust is becoming serious in Brazil. There is some resistance to these diseases in the wild populations in Western Ethiopia, which may be at risk as modern methods of coffee production spread and as forest areas are cleared for agricultural development. Clearing in West Africa may similarly lessen the availability of genetic diversity of _C_. _canephora_ in that region. |

PRIORITY 2

| | |
|---|---|
| Cocoa | The development of the Amazon region will reduce genetically diverse cocoa material which will be most useful in breeding for disease resistance and higher yields. Cocoa production is largely confined to West Africa where nearly 80% of the world's crop is produced. It is an important smallholders' crop for a major share of their export earnings. Intense research effort is still required in the control of swollen shoot virus disease. In general the priority is 2 but for Criollo varieties it is 1 because of the potential of this material. |

PRIORITY 4

| | |
|---|---|
| Tea | |

PRIORITY S

| | |
|---|---|
| Grape | |

TABLE 1 continued

## GROUPS OF OTHER CROPS

PRIORITY S

Tree fruits and nuts [1]

Vegetables [1]

Forage crops

Medicinal and drug plants including those producing chemicals of importance for population control

Trees, other than food trees, of importance in agricultural development, especially those used for fuel by farming populations and those used for environmental stabilization

[1] In these particular crops, tropical types are under study in the first instances

REGIONAL PRIORITIES

17. Fourteen regions are suggested instead of the 10 set out in the Beltsville report (PAB:IAR/72/11/4 April 1972). The developed countries of North America, Europe - other than the Mediterranean countries - the Central Asian Soviet Republics and Oceania, are not included in these regions, though many nations, institutes and breeders in them are cooperating in the Board's work.

18. The grouping of countries into 14 regions is based largely on logistic considerations. Though it might be valuable to organise field programmes on an ecological or phytogeographical basis, in practice most regions include a range of ecological zones. Since exploration and collection will always be conducted by or in cooperation with national governments, the regions listed below consist of groups of adjacent nations sharing very broadly similar geographical situations. The Board regards these groups as provisional and will consider them again after it has consulted the countries and studied the operational aspects further.

<u>Mediterranean</u> (Albania, Algeria, Cyprus, Egypt, Greece, Italy, Libya, Malta, Morocco, Portugal, Spain, Tunisia and Yugoslavia)

<u>Southwest Asia</u> (Iraq, Israel, Jordan, Lebanon, Syria, Turkey and the nations of the Arabian Peninsula)

<u>Central Asia</u> (Afghanistan, Iran, Pakistan and the Soviet Republics of Central Asia)

<u>South Asia</u> (Bangladesh, Burma, India including Nepal and Bhutan, and Sri Lanka)

<u>Southeast Asia</u> (Indonesia, Malaysia, Philippines, Singapore, Thailand, and the nations of Indochina)

<u>Pacific Islands</u>

<u>Far East</u> (China, Japan, Korea and Mongolia)

<u>Ethiopia</u>

Eastern Africa (Botswana, Burundi, Kenya, Lesotho, Malawi, Mozambique, Ruanda, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia and Malagasy Republic and other islands off Eastern Africa)

Western Africa (Angola, Benin, Cameroon, Central African Republic, Chad, Congo, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Spanish Sahara, Togo, Upper Volta and Zaire)

Meso-America (Central America including Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama; and Mexico, the Caribbean and the Guyanas)

Brazil

Andean Zone (Bolivia, Colombia, Ecuador, Peru and Venezuela)

Southern South America (Argentina, Chile, Paraguay and Uruguay)

19. Priorities have been assigned to these regions (Table 2) in accordance with the criteria set out in paragraph 6 of this paper.

TABLE 2: REGIONAL PRIORITIES

| Region | Priority | Crop priority within each region |
|---|---|---|
| Mediterranean: | 1 | 1: wheat, barley and sugar beet<br>2: chickpea<br>3: maize, oats, rye, _Pisum_ sp., _Vicia faba_, brassicas, olive and safflower |
| Southwest Asia: | 1 | 1: wheat, barley and coffee<br>2: chickpea and sugar beet<br>3: oats, rye, _Pisum_ sp., _Vicia faba_, brassicas, olive and safflower |
| South Asia: | 1 | 1: sorghum, millets and rice<br>2: chickpea, groundnut, _Vigna_ sp., cassava, bananas, cotton and sugar cane<br>3: maize, pigeon pea, _Vicia faba_, yam, jute, brassicas and safflower |
| Ethiopia: | 1 | 1: wheat, sorghum, millets and coffee<br>2: chickpea, cowpea, soyabean, bananas and cotton<br>3: barley, maize, _Pisum_ sp., _Vicia faba_ and sunflower |
| Meso-America: | 1 | 1: _Phaseolus_<br>2: groundnut, cassava, potato, sweet potato, cotton, South American oil palm and cocoa<br>3: maize, pigeon pea, yam and sunflower |
| Western Africa: | 2 | 1: sorghum, millets and rice (_O. glaberrima_)<br>2: cowpea, groundnut, cassava and cotton<br>3: maize, yam and African oil palm |
| Andean Zone: | 2 | 1: _Phaseolus_<br>2: groundnut, potato, sweet potato and cotton<br>3: maize |

TABLE 2 continued

| Region | Priority | Crop priority within each region |
|---|---|---|
| Central Asia: | 2 | 1: wheat<br>2: rice, chickpea, *Vigna* sp., cotton, sugar beet and sugar cane<br>3: barley, maize, oats, rye, *Pisum* sp., *Vicia faba*, safflower and sunflower |
| Southeast Asia: | 2 | 1: rice (*O. indica* and *O. javanica*)<br>2: soyabean, *Vigna* sp., cassava, sweet potato, bananas, cotton and sugar cane<br>3: maize, pigeon pea and yam |
| Brazil: | 2 | 2: groundnut, *Vigna* sp., cassava, sweet potato, cotton, South American oil palm, rubber and cocoa<br>3: maize and yam |
| Pacific Islands: | 3 | 2: sweet potato, sugar cane and bananas<br>3: yam |
| Far East: | 3 | 1: wheat, sorghum and millets<br>2: rice, groundnut, soyabean, *Vigna* sp., cassava, bananas, cotton and sugar cane<br>3: barley, maize, yam and brassicas |
| Eastern Africa: | 3 | 1: sorghum, millets and *Phaseolus*<br>2: rice, cowpea, groundnut, soyabean (*Glycine* sp.), cassava, bananas and cotton<br>3: maize, pigeon pea and yam |
| Southern South America: | 3 | 1: *Phaseolus*<br>2: groundnut, cassava, potato, sweet potato and cotton<br>3: maize |

## COMBINED CROP-REGION PRIORITIES

20. Table 3 brings together the priorities of the crops and retions discussed previously. It indicates the range of crops to be collected in each of the regions, and conversely the regions in which work on particular crops seems to be most urgent and most likely to be fruitful. Although it is necessary, in order to develop a practicable programme of work, to assign general priorities to both crops and regions, the Board recognizes that the priority appropriate to a particular crop or group of crops will vary from region to region. However, since it is not easy at this early stage in the Board's work to define this variation precisely, Table 3 does not attempt to set out comparative priorities for the majority of individual crops within or between regions. The Board will review this question from time to time as its programme develops.

## GENERAL COMMENTS

### The global network

21. The priorities among crops and regions lead directly to the two principal dimensions of the world-wide genetic resources network. The first of these genetic resources dimensions is geographical, based on genetic resources institutions and activities in individual nations, associated together in the most appropriate ways, in any one region, into a cooperative regional programme. Within such a cooperative programme, one centre (which may or may not be an International Agricultural Research Centre) might be assigned coordinating, storage, or other functions for one or more crops or groups of crops, and so become accepted as a regional centre. This whole dimension relates to the collection and conservation of material, to be evaluated and documented in collaboration with the main users of genetic resources.

22. These users are grouped together in the second dimension, which is based on crops or groups of crops. This dimension will link together, using existing links, such as EUCARPIA (European Association of Plant Breeders), wherever possible, the leading scientists and breeding or other institutions in the world concerned with each of the priority crops. The Crop Advisory Committees mentioned above will provide essential linkages in this dimension. The Board hopes that wherever an International Centre carries primary responsibility within the CGIAR system for a particular crop, it will also accept responsibility for co-sponsoring and convening the relevant crop committee. Where an International

Centre is not available, or is not willing to accept this responsibility, the Board will seek to designate some other appropriate institution for this purpose, or undertake the responsibility itself.

23. An important set of linkages between the two dimensions will be provided by the GR/CIDS, which, in cooperation with the Crop Advisory Committees, will help specialists on individual crops or groups of crops to reach international agreement on descriptors and on methods for storing and retrieving information. Moreover this work will assist those who collect and describe genetic resources material.

Flexibility

24. The Board intends to use the priorities established in this paper, for crops and for regions, as a set of general guidelines in its decisions about programmes of exploration and collection in the field, and about the development of a global network of genetic resources centres for crops and for geographical locations, countries or regions. It recognizes that within individual crops, the needs and possibilities will vary from region to region. It also recognizes that emergencies can arise, sometimes with little warning, and that, in a changing world, social, economic, agricultural and rural change can lead in no more than a few years to the replacement of old crops and cultivars by new ones over substantial areas. Changes in the needs of plant breeders, as as new objectives, new problems or new techniques arise, may also alter priorities, sometimes quite rapidly. The Board's Crop Advisory Committees are intended, inter alia, to keep the Board informed of such changes. For all these reasons, the Board will keep its priorities under review, and modify them as situations develop; it will also use them in as flexible and sensitive a manner as is compatible with efficient use of scarce resources of money, people, facilities and equipment.

Operations

25. This paper is about priorities, not about operations; it therefore does not deal with the practical actions necessary to proceed from the priorities set out above to field and other programmes. The Board will consider these separately in the normal course of its work. In this connection it will develop further criteria for appraising proposals, specifying the requirements to be met in field operations, in distributing, evaluating and describing the plant materials collected, and in making them available for use.

TABLE 3: THE COMBINED PRIORIT
(priorities 1,

| CROP PRIORITIES | REGIONAL PRIORITIES | Wheat | Sorghum | Millets | Barley | Rice | Maize | Oats | Rye | Phaseolus | Chickpea | Groundnut | Soyabean | Cowpea | Asiatic Vigna sp. | Pigeonpea | Pisum sp. | Vicia faba |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 1 | 1&2 | 3 | 2 | 3 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| S.W. Asia | 1 | x | - | - | 1 | - | - | x | x | - | x | - | - | - | - | - | x | x |
| Mediterranean | 1 | x | - | - | 1 | - | x | x | x | - | x | - | - | - | - | - | x | x |
| Central Asia | 2 | x | - | - | x | x | x | x | x | - | x | - | - | x | x | - | x | x |
| South Asia | 1 | - | x | x | - | 1 | x | - | - | - | x | x | - | x | x | x | - | x |
| S.E. Asia | 2 | - | - | - | - | 1 | x | - | - | - | - | - | x | x | x | x | - | - |
| Pacific Islands | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Far East | 3 | x | x | x | x | x | x | - | - | - | - | x | x | x | x | - | - | - |
| Ethiopia | 1 | x | x | x | x | - | x | - | - | - | x | - | x | x | - | - | x | x |
| Eastern Africa | 3 | - | x | x | - | x | x | - | - | x | - | x | x | x | - | x | - | - |
| Western Africa | 2 | - | x | x | - | 1 | x | - | - | - | - | x | - | x | - | - | - | - |
| Meso-America | 1 | - | - | - | - | - | x | - | - | x | - | x | - | - | - | x | - | - |
| Brazil | 2 | - | - | - | - | - | x | - | - | - | - | x | - | - | x | - | - | - |
| Andean Zone | 2 | - | - | - | - | - | x | - | - | x | - | x | - | - | - | - | - | - |
| Southern S. America | 3 | - | - | - | - | - | x | - | - | x | - | x | - | - | - | - | - | - |
| NOTES (see page 24) | | | | (1) | | | | | | | | | (2) | (3) | (3) | | | |

IES FOR REGIONS AND CROPS
2 and 3 only)

| 2 Cassava | 2 Potato | 2 Sweet potato | 3 Yam | 2 Bananas | 2 Cotton | 3 Jute | 3 Brassicas | 3 Oilpalm, African | 2 Oilpalm, S. Amer. | 3 Olive | 3 Safflower | 3 Sunflower | 2 Sugar beet | 2 Sugar cane | 2 Rubber | 1 Coffee | 2 Cocoa |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | - | - | - | x | - | - | x | x | - | 1 | - | - | x | - |
| - | - | - | - | - | - | - | - | - | - | x | x | - | 1 | - | - | - | - |
| - | - | - | - | - | x | - | - | - | - | - | x | x | x | x | - | - | - |
| x | - | - | x | x | x | x | x | - | - | - | x | - | - | x | - | - | - |
| x | - | x | x | x | x | - | - | - | - | - | - | - | - | x | - | - | - |
| - | - | x | x | x | - | - | - | - | - | - | - | - | - | x | - | - | - |
| x | - | - | x | x | x | - | x | - | - | - | - | - | - | x | - | - | - |
| - | - | - | - | x | x | - | x | - | - | - | - | x | - | - | - | x | - |
| x | - | - | x | x | x | - | - | - | - | - | - | - | - | - | - | - | - |
| x | - | - | x | - | x | - | - | x | - | - | - | - | - | - | - | - | - |
| x | x | x | x | - | x | - | x | - | x | - | - | x | - | - | - | - | x |
| x | - | x | x | - | x | - | - | - | x | - | - | - | - | - | x | - | x |
| - | x | x | - | - | x | - | - | - | - | - | - | - | - | - | - | - | - |
| x | x | x | - | - | x | - | - | - | - | - | - | - | - | - | - | - | - |

(4)(5)

TABLE 3 (continued)

NOTES

(1) Pennisetum millets have priority 1, other millets priority 2.

(2) All the Asian cultivated grain legumes formerly assigned to Phaseolus are now regarded as members of the genus Vigna and the priorities in respect of them have been re-allocated to the Asian Vignas.

(3) For soyabean, East Africa and Ethiopia have been included because of the wild species of Glycine which occur there.

(4) Sugar beet and other species of Beta have priority 1 for the region of the centre of diversity; elsewhere they have priority 2.

(5) Special attention will be given to Saccharum spontaneum and S. robustum in areas of Asia.

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# international board for plant genetic resources

programme and budget
proposals for 1976

consultative group on international agricultural research

AGPE:IBPGR/75/20
30 May 1975

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

# PROGRAMME AND BUDGET PROPOSALS FOR 1976

IBPGR SECRETARIAT

Rome 1975

# PROGRAMME AND BUDGET PROPOSALS FOR 1976

## I. INTRODUCTION

The International Board for Plant Genetic Resources (IBPGR) had its second meeting in May 1975. Its Executive Committee met in September 1974 and April 1975 to review progress in the Board's pre-programming activities, to consider proposals submitted to the Board and, within the framework of the activities initiated in 1975 and referred to below, to formulate a budget for the Board's programme in 1976.

Understandably, in only the second year of the Board's operation, some of the programme activities are still in the development stage. Accordingly, the budget is cast in general terms to permit flexibility in the use of funds by the Board. The percentage of such funds devoted to the development of an international network of genetic resources activities will be progressively increased as the Board's medium- and long-term programmes develop. It is intended that such programmes will be closely integrated with the present and future programmes of the International Institutes and those of other centres, at national and regional level, with the objective of meeting the immediate priority needs, both for crops and particular regions.

IBPGR wishes to acknowledge, with thanks, the support it received in 1975 from the following members of the Consultative Group on International Agricultural Research (CGIAR): the Governments of Canada, Federal Republic of Germany, the Netherlands, Sweden, United Kingdom and the United States; the United Nations Environment Programme; and the Rockefeller Foundation (to fulfill a pledge made in 1974 for the initial operations of the Board).

The Board feels that the budget presented herein will enable the Board to continue to support initiatives taken in 1975 and to make further substantial progress during 1976 towards achieving its objectives.

## II. GENERAL POLICY OF THE BOARD

1. The principal objectives of the Board as defined by the Terms of Reference given to it by the Consultative Group for International Agricultural Research include:

" - To identify general and specific needs for exploration, collection, evaluation and conservation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities among them, and to ensure to the fullest possible extent that the materials conserved are made available for plant breeding and other scientific activities as required;

- To this end, inter alia, it is to develop a world-wide network of institutions, organizations and programmes able and willing to contribute to the above objectives."

Accordingly the Board has directed considerable attention, during 1975, to the priorities to be assigned to particular crops, or groups of crops, to particular regions of the earth, and to the design and establishment of a coordinated network of institutions and activities.

2. Priorities among crops[1/] : The Board will select individual species or groups of species for attention according to the following criteria:

(a) Economic and social importance measured in terms of their present, intended or potential contribution to development, including human diets, the income and well-being of farmers and other rural people, and the economic progress of mankind;[2/]

(b) The recognized requirements of plant breeders and research workers in developing and developed countries for genetically diverse materials (including advanced breeding lines) for their work, and the expected significance in economic and social development of the improved types and varieties of crops they will be able to produce with the help of these materials;

(c) The size, scope and quality, including documentation, of existing collections;

(d) The risk that genetically diverse materials of the species and their wild relatives will be lost in the future, particularly the near future, as a result of change and development in agriculture and land use.

Following these criteria, the Board is in the process of assigning provisional priority classifications to some 35 crops or groups of crops, of which less than 10 will be given highest priority and thus receive immediate attention from the Board, and the remainder of which will be given second or third priority. The Board will give continuing attention to the problem of crop priorities under the criteria above stated.

3. Priorities among regions: The Board further determined that regions should be selected for attention according to the following criteria:

(a) That they contain significant genetic diversity of one or more crops or species selected according to the criteria outlined in paragraph 2;

(b) That change and development in agriculture, and/or change in land use are occurring in them at such a rate, that if nothing is done, genetically diverse materials are likely to be lost;

(c) That widespread crop failures have occurred or are imminent, or reasonably to be expected, on such a scale that diverse indigenous materials are likely, if nothing is done, to be lost.

In accordance with these criteria, the Board has assigned highest priority to the following five regions: South Asia, Southeast Asia, Mediterranean, Ethiopia and the Central and South American tropical lowlands. In addition,

1/ The Board has not yet had an opportunity to consider the priority of forest genetic resources. This matter is scheduled for consideration at the Board's meeting in 1976.

2/ The Board believes that species which are important at present for the purposes set out in sub-paragraph (a) would normally have priority over species from which it might be possible to develop new economic cultigens in the future.

two other regions have been assigned highest priority with regard to particular crops: western Africa with regard to rice, and the Andean zone for potatoes and other tuber bearing Solanums. The Board will be giving further consideration during the coming year to the priorities of other regions of the earth.

4. Networks and coordination: The two sets of priorities lead directly to the two principal dimensions of the world-wide genetic resources network. The first of these genetic resources dimensions is geographical, based on genetic resources institutions and activities in individual nations, associated together in whatever ways are most appropriate, in any one region, into a cooperative regional programme. Within such a cooperative programme, one centre (which may or may not be at an International Agricultural Research Centre) might be assigned coordinating, storage, or other functions and so become accepted as a regional centre. This whole dimension relates to the collection and conservation of material, to be evaluated and documented in collaboration with the main users of genetic resources. These users are grouped together as the second dimension.

This second dimension is based on crops or groups of crops. This dimension will link together, using existing links (such as Eucarpia) wherever possible, the leading scientists and breeding or other institutions in the world concerned with each of the priority crops. For each crop or group of crops, the Board intends, in consultation with the leading specialists on it, worldwide, to establish a crop committee to advise it on the genetic resources programme so that the Board can ensure so far as possible that geographical priorities for collection are correctly defined, that the requirements of plant breeders and research workers are met, and that the collected and conserved materials are available for use in national, regional and international programmes. In addition, the Board hopes that wherever an international centre carries primary responsibility within the CGIAR system for a particular crop, it will also accept responsibility for cosponsoring and convening the relevant crop committee. Where an international centre is not available, or is not willing to accept this responsibility, the Board will seek to designate some other appropriate institution for this purpose.

The Board has collated lists of institutions, in the priority regions and the nations within them, which could cooperate in the geographical dimension of the network; similarly it is accumulating information about institutions which could cooperate in the crops dimension.

The Genetic Resources Communication, Information and Documentation System (GR/CIDS) is providing a most important means of bringing together specialists on particular crops or groups of crops and of moving towards international agreement on descriptors and methods for storing and retrieving information. In this way it provides an essential element of the crops dimension of the network and (through the consequent guidance it offers to those who collect and evaluate genetic resources material) an essential linkage with the geographical dimension of the network.

5. Basic principles: The Board adopted the following principles relating to the distribution and conservation of genetic materials collected with its support:

(a) Duplicates of all collections are to be deposited at appropriate institutions in the countries in which they are collected;

(b) Base collections are to be duplicated in at least two different institutions;

(c) Participants in the genetic resources network will be expected to exchange freely both genetic materials and information related to them.

## III. 1975 PROGRAMME OF IBPGR - STATEMENT OF PROGRESS UP TO 1 MAY 1975

Much of the work of the Board in 1975 has been directed to the evolution of the policy outlined above and to establishing contacts and collecting information related to its future activities and to the construction of the network. Work on the CIDS system has made substantial progress.

### 1. Field collections and associated activities

(a) Mediterranean: A portion of the UNEP grant to FAO for emergency exploration was used for an expedition from the Germplasm Laboratory, Bari, Italy, in certain North African countries to collect traditional sorts of wheat, barley and perhaps other crops which are being displaced by the spread of new varieties (largely from the CIMMYT programme). The Bari Laboratory is willing to act as a focal point for genetic resources work in the central and western Mediterranean region. The Board is discussing with the Italian National Research Council the possible future relation between the Italian Government, the Bari Laboratory, and the Board for these purposes. At the same time, appropriate links are being developed between nations of the Mediterranean region, the Laboratory and the Board.

(b) Near East: Genetic resources work based in Menemen in Turkey continues under the Regional Project on Exploration and Conservation of Plant Germplasm in the Near East. A number of countries in the region have already begun to develop national genetic resources programmes. SIDA will continue to support the programme in the region until mid-1976. The Board will endeavour to ensure that the programme continues to develop after that date, taking account of the progress of the national activities and of the development of the International Centre which it is proposed to establish in the region (ICARDA).

(c) West Africa: The Board provided $31,500 for the first six months of a programme to be conducted by IITA on genetic resources in food legumes and root crops in tropical Africa.

(d) Latin America: Under certain conditions, the Board has allocated $50,000 in 1975 to CIAT to support the first six months of a three-year programme on the systematic collection, conservation and evaluation of selected tropical forage legumes and grass genera in Latin America. The Board asked CIAT to collaborate closely with the Division of Tropical Agronomy of CSIRO (Australia) as well as national institutions in Latin America. The Board has received other proposals for genetic resources activities in Latin America. They include the collection, study and maintenance of maize; collection of peanut germplasm; and a request for continuing support to the potato gene bank in Argentina. The relevant International Centres, CIMMYT, ICRISAT, and CIP, have been asked to coordinate reviews of these proposals so that the Board may be advised of their priority and the amount of financial support required.

2. Links with the International Centres

The Board made substantial progress in 1975 in developing associations with the crops institutes in the Consultative Group system. The Chairman and a member of the Board attended the meeting of Directors of Centres at IITA in March, and offered a presentation. At that meeting and in correspondence, the mutual relation between the Board and the Centres was explored. So far as possible, the Board proposes to call on the help of the Centres in developing the international linkages in particular crops and groups of crops which will constitute the crops dimension of the international genetic resources network; and it may well be that several of the Centres will be asked to assume continuing coordinating roles in the network for those crops for which they have global responsibility within the system of International Centres.

3. Studies and missions

(a) Central America: In April 1975, the Board sent a mission to Turrialba to review the action programme of the CATIE institute. It is anticipated that, with Costa Rican Government financing assured, staff recruitment for this centre will start after the contract is signed for the bilateral support of this centre by the Government of the Federal Republic of Germany.

(b) Ethiopia: The amount of Board support, if any, needed for this centre in 1976 is not known, since plans for the centre are not yet fully developed, and negotiations between the Federal Republic of Germany and the Ethiopian authorities have not been completed.

(c) Southeast and South Asia: In 1975, missions were sent to IRRI, ICRISAT, IARI, Thailand, Malaysia and Indonesia. In March 1975 the Board was represented at the South East Asian Plant Genetic Resources Symposium, the first such Symposium in this region, which was held, with support from SEAMEO, LBN-LIPI, and FAO/UNEP, at Bogor, Indonesia.

The Board agreed that the present arrangement for handling and long-term storage of rice genetic stocks at IRRI was not ideal and should be substantially improved. In 1976, the Board hopes to support the expansion of collecting activities based at IRRI, to be undertaken in close liaison with national research institutions in the countries concerned. IRRI will be asked to assume major regional and global responsibility for *indica* and *javanica* rice, possibly in close liaison with a centre in Japan which may be requested to accept responsibility for stocks of *japonica* rice.

Better communication and exchanges of information are required among the institutions and scientists of countries in South and Southeast Asia. Provision has been made in the budget for the initial development of a regional programme through the establishment of a regional advisory committee on genetic resources which, assisted by a regional coordinating officer, will review programmes and identify priority needs.

Additional support may be required in 1976 from Board funds for exploration activities in the region, possibly for several crops, including coconuts and tropical fruits, and the improvement of storage facilities at institutes in the region for the long-term conservation of genetic stocks.

4. Crop symposia

Wheat: In order to formulate a world programme for the genetic resources of wheat, a symposium sponsored by the IBPGR will be held in Leningrad in July 1975, at the invitation of the Director of the N.I. Vavilov All-Union Scientific Research Institute of Plant Industry. The symposium will have as the main programme topics: (a) collection and (b) documentation of wheat germplasm; and (c) conservation, introduction and exchange of germplasm.

Peanut: A symposium on peanuts, jointly sponsored by the Board, the Rockefeller Foundation and the University of Florida, is to be held at Gainesville, Florida, USA, in July 1975. The Board hopes that this symposium will produce some guidance on a global programme for peanut germplasm activities.

Maize: Initial discussions have taken place with CIMMYT and the GR/CIDS Colorado team with a view to holding a workshop in 1976, on maize genetic resources.

5. Communication, Information and Documentation System (CIDS): Work has been continued by a team at the University of Colorado, under FAO auspices, on the development of a computer-based system for the storage, retrieval and analysis of all relevant data on genetic resources. Substantial progress has been made towards the development of a comprehensive, portable and adaptable system sufficiently flexible to meet the needs of individual plant breeders and compatible with the computer facilities of genetic resources centres. Installation of the system in several centres is proceeding and interest in and enthusiasm for the system are steadily growing.

(a) Description of characters: A list of types of descriptors for wheat and maize has been agreed as a result of workshops on these crops held at the University of Colorado in February 1975. It is intended that the descriptors agreed will permit maximum flexibility in the description of characters and yet be useful and widely accepted by breeders of these crops.

(b) Following consultations at CIMMYT, IRRI, IITA, ICRISAT and CIP, and at 15 national centres, the system was introduced at several centres for the documentation and management of their genetic resources data. Following these consultations, some centres submitted data for processing. It is expected that operations at CIMMYT will be used as a model for similar work at other centres.

(c) In addition, data have been obtained from FAO on the genetic resources materials that presently exist in collections at various centres in different countries; and from the genetic resources centre at Izmir, Turkey. Much of the information on 12 major crops has now been converted into machine-readable form.

(d) The means by which the CIDS team can provide assistance to International Centres has been discussed. For example, this will include the preparation of catalogues and inventories, in some cases comprising data from collaborating national centres.

(e) A draft training manual for the specific needs of documentation specialists at genetic resources centres has been prepared.

(f) The CIDS team participated in the first Symposium on South East Asian Plant Genetic Resources, held in Bogor, Indonesia, in March 1975.

6. <u>Training of personnel</u>: A short field training course was held with support provided from several sources at Bogor. In addition, SIDA and UNEP support has enabled several students from Near East countries to obtain training at the University of Birmingham, U.K.

Following a mission to Birmingham in November 1974, the Board has agreed, subject to certain qualifications, to provide some support to the University of Birmingham to help it to increase the number of student places in the M.Sc. course in genetic resources at that University from 10 to 20 per annum by 1978.

The CIDS training manual for genetic resources documentation has been mentioned above. A discussion paper was prepared on "Manpower needs for exploration, collection, description and conservation of plant genetic resources" (AGPE:IBPGR/75/5).

7. <u>Requests for funding</u>: Including the proposals which have resulted from some Board missions, 13 funding requests have so far been submitted to the Board. In addition, a proposal for a Global Programme on Forest Genetic Resources, submitted by FAO, has been reviewed and will be considered by the Board at its meeting in 1976.

8. <u>Plant health and quarantine</u>: In response to requests to the Secretariat, arrangements have been made to convene a working group to prepare a technical paper on plant health problems arising in international transfers of genetic resources material.

9. <u>Genetic resources bibliography</u>: Preliminary discussions have also been undertaken with a view to preparing a comprehensive bibliography of genetic resources references and publications.

10. <u>Information</u>: In order to publicize the objectives and activities of the Board, a brochure has been prepared which is being widely distributed. A form of application has been prepared which will be applicable to those organizations which intend to request Board support for exploration missions. An information bulletin on Board policy will also be prepared for circulation to governments.

11. <u>Other matters</u>: The Board has agreed with FAO to amend the Trust Fund agreement so that it will remain effective indefinitely, unless and until terminated either by the Board or FAO.

The Board invited the Chairman of the FAO Panel of Experts on Plant Exploration and Introduction, Sir Otto Frankel, to participate, as observer, in the Board's second meeting in May 1975. The Board benefitted from Sir Otto's participation and decided to maintain close liaison with the Panel of Experts. It also decided to invite the Chairman of the FAO Panel of Experts on Forest Gene Resources to attend, as observer, the Board's third meeting in 1976.

The Board's Terms of Reference have been revised by the CGIAR to include an amendment on the disposal of the Board's assets in the event of the dissolution of the Board.

## IV. SUMMARY OF 1976 BUDGET

| | | | |
|---|---|---|---|
| **1. Genetic Resources Communication, Information and Documentation System (GR/CIDS)** | | | |
| - Services to be contracted to the University of Colorado under FAO/IBPGR Trust Fund to cover: | | | |
| - Project executive/planning | 49,000 | | |
| - Staff heads | 38,000 | | |
| - Staff personnel | 142,500 | | |
| - Support costs | 99,000 | | |
| - Personnel benefits | 7,500 | | |
| - Indirect (overhead) charges | 16,500 | 352,500 | |
| - Steering Committee | | 7,500 | 360,000 |
| **2. Support of germplasm activities at genetic resources centres** | | | |
| 2.1 International Centres: | | | |
| - CIAT: Tropical forage legumes[1] | | 65,000[2] | |
| - IRRI: Collections of rice in Indonesia, Bangladesh, etc.[1] | | 50,000 | 115,000 |
| 2.2 Regional programmes: | | | |
| - Mediterranean region - Germplasm Laboratory, Bari: Collection of cereals, especially wheat, in North Africa. | | 68,000 | |
| - Near East region - Izmir and/or ICARDA: Collections of wheat, other cereals, food legumes and tree fruits. | | 100,000[3] | |
| - South and Southeast Asia region: Initial development of a regional programme. | | 50,000 | 218,000 |
| 2.3 Other activities: | | | |
| - To cover the costs of exploration and collection activities of different priority crops in various regions and of improving storage facilities at centres within the international network (conservation in base collections)[4] | | | 250,000 |

[1] If possible these funds should be transferred to the core budgets of CIAT and IRRI respectively.

[2] Does not include overhead charges.

[3] Should this allocation prove inadequate the Board intends to ensure that the project continues by making an additional allocation out of other items of this budget.

[4] The Board expects that any major capital expenditures at the International Centres will be included within the Centres' core budgets.

| | | | |
|---|---|---|---|
| 3. | Support of activities related to specific crops | | |
| | - Support for the development of crop committees, workshops and the preparation of situation papers to enable the Board to prepare programmes for specific crops | | 60,000 |
| 4. | Quarantine problems[1/] | | |
| | - Expert meeting to formulate recommendations on the problems of quarantine | | 10,000 |
| 5. | Support of training programmes in genetic resources | | |
| | - University of Birmingham, U.K. to support recommended increase in size of training course | 25,000 | |
| | - Evaluation of present training facilities in various countries | 10,000 | 35,000 |
| 6. | Board meetings and missions | | |
| | - Meetings of Board and Executive Committee | 90,000 | |
| | - Missions to genetic resources centres | 20,000 | |
| | - Publication of Board documents including Annual Report and Programme and Budget Proposals | 15,000 | |
| | - Assignments undertaken by Chairman and Board members | 5,000 | 130,000 |
| 7. | Secretariat expenses | | |
| | - Travel | 20,000 | |
| | - Personnel services | 30,000 | |
| | - Miscellaneous: postage, stationery, cables, duplication costs and telephone calls | 10,000 | 60,000 |
| 8. | Contingencies | | 100,000 |
| | Total | | 1,338,000 |
| | Less: Estimated carry over from 1975 | | 250,000 |
| | New funds needed for 1976 | | $1,088,000 |

[1/] This is a continuation of work started in 1975, and for which a provision of $10,000 was made in the 1975 budget.

**Support of the following activities to be financed by other sources is also endorsed by the Board:**

| | Approximate[1] cost US$ |
|---|---|
| - Establishment and development of Genetic Resources Centre for Central America at Turrialba, Costa Rice (Possible donor: Federal Republic of Germany) | 336,134 |
| - Establishment of regional Genetic Resources Centre in Ethiopia (Possible donor: Federal Republic of Germany) | 420,168 |
| - Conservation facility for seed storage at IARI, India (Possible donor: Federal Republic of Germany) | N.A. |
| - Conservation facility for seed storage at IRRI (Possible donor: United Kingdom) | 1,000,000 |
| - Training: The University of Birmingham - capital facilities $15,000; fellowships (5) $25,000 (Possible donor: United Kingdom) | 40,000 |
| - Support for the Regional Project for the Near East at Izmir (until 1 July 1976) (Donor: Sweden - SIDA) | 310,000 |
| - Food legume and possible root crop programme (IITA core budget) | 150,000 |

[1] The figures in this column were furnished to, but not investigated by, the Board, and are included only as indications of magnitude.

MR/H0418/E/7.75/1/350

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w/ letter 18 June 76

IBPGR ADVISORY COMMITTEE ON THE GENETIC RESOURCES COMMUNICATION, INFORMATION AND DOCUMENTATION SYSTEM (GR/CIDS)

First Report

**International Board for Plant Genetic Resources**

AGPE:IBPGR/76/7
June 1976

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

# First Report of the Advisory Committee on the Genetic Resources Communication, Information and Documentation System (GR/CIDS)

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

Rome, 1976

IBPGR Secretariat
Crop Ecology and Genetic Resources Service
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, Rome 00100, Italy

CONTENTS

INTRODUCTION

1. At its third meeting (17-20 February 1976) the International Board for Plant Genetic Resources (IBPGR) approved the membership and terms of reference, proposed by its Executive Committee, of an Advisory Committee on the Genetic Resources Communication, Information and Documentation System (GR/CIDS) which is being developed in the Taximetrics Laboratory of the University of Colorado, Boulder, as an essential part of the global genetic resources network which it is the Board's task to establish. These terms of reference are as follows:

"The Advisory Committee will be responsible to the International Board for Plant Genetic Resources (IBPGR) and will report periodically to the IBPGR, recommending whatever actions the Committee believes to be necessary or desirable in connection with the Communication, Information and Documentation System (GR/CIDS) for the assembly, storage and retrieval of information on plant genetic resources which is being developed by the Taximetrics Laboratory of the University of Colorado at Boulder, Colorado, USA. Specifically, the Committee will:

i. Evaluate the technical quality of the System for the purposes of classification of and exchange of information on crop germplasm resources.

ii. Evaluate the specific priorities and targets of the GR/CIDS programme in the light of the goals and objectives of the IBPGR.

iii. Evaluate the plans and resources of the Taximetrics Laboratory as against the objectives of the GR/CIDS project, and advise on the time period and manpower and financial resources likely to be required to achieve those objectives.

iv. Consider the present and future computer software and hardware requirements of the System and advise on (a) whether these appear reasonable in relation to the objectives of the IBPGR programme and the staff and computing facilities likely to be available to prospective users of the System, and (b) whether there are practicable means by which the operational requirements of the System might be simplified.

v. Advise on the long-term aspects of genetic resources data management, including whether there is need for a central point in the international network to monitor and assist in both computer-related work and use of the gathered data, and if there is believed to be such a need, on how it can most effectively be met.

vi. Advise on any other matters with regard to the System or the GR/CIDS programme (a) which the Advisory Committee believes to be important with respect to the effectiveness of the System, and to the duration and amount of financial support by the IBPGR for the GR/CIDS programme, or (b) on which the advice of the Committee is specifically requested by either the Director of the Taximetrics Laboratory of the University of Colorado, the IBPGR or the Technical Advisory Committee of the Consultative Group on International Agricultural Research."

2. The members appointed by the Board to the Advisory Committee are:

Dr. L.M. Branscomb, Vice-President and Chief Scientist, IBM Corporation, Armonk, New York, 10504, U.S.A.

Dr. A.H. Bunting, Professor of Agricultural Development Overseas, University of Reading, England, U.K. (a member of IBPGR and of its Executive Committee) (Chairman)

Mr. J.L. Fyfe, formerly Deputy Director, Scottish Plant Breeding Station, Pentlandfield, Roslin, Midlothian, Scotland, U.K.

Dr. K.W. Finlay, Deputy Director General, Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT), Apartado Postal 6-641, Londres 40, Mexico, 6, D.F., Mexico, and

Dr. W. Salhuana, Director, Centro Estadistico Procesamiento de Datos, Universidad Nacional Agraria, Apartado 456, La Molina, Lima, Peru.

3. The first meeting of the Advisory Committee was held in the Taximetrics Laboratory, University of Colorado, Boulder, from 12 to 15 April 1976. This paper is the report of that meeting, at which all members were present. In addition, Mr. Richard H. Demuth, Chairman of IBPGR, and Dr. J. Trevor Williams, Consultant attached to the Crop Ecology and Genetic Resources Service of FAO, participated in the meeting. Professor David J. Rogers, Director of the Taximetrics Laboratory, and members of the staff, were present at all sessions.

4. The International Board for Plant Genetic Resources was established by the Consultative Group on International Agricultural Research (paragraph 5) in 1974. In summary, its terms of reference require it to develop an international network of genetic resources centres which will ensure that the genetic resources of cultivated plants are explored, collected, conserved, evaluated, documented and made available for use by plant breeders and scholars. The Chief of the Crop Ecology and Genetic Resources Service of FAO is Secretary of the Board and the Service provides the Secretariat.

5. The Consultative Group for International Agricultural Research (CGIAR) is an association of international and national donors through which funding for eight International Agricultural Research Centres, as well as for the IBPGR, is arranged. The Centres are the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) in Mexico, the International Rice Research Institute (IRRI) in the Philippines, the Centro Internacional de Agricultura Tropical (CIAT) in Colombia, the International Institute of Tropical Agriculture (IITA) in Nigeria, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India, the Centro Internacional de la Papa (CIP) in Peru, the International Livestock Centre for Africa (ILCA) in Ethiopia, and the International Laboratory for Animal Diseases (ILRAD) in Kenya. A ninth institute, the International Centre for Agricultural Research in Dry Areas (ICARDA) is being developed for areas of very small rainfall on the poleward sides of the mid-latitude deserts (particularly western Asia and North Africa), and a tenth, for tropical fruits and vegetables, is being considered. The West African Rice Development Association (WARDA) also receives some of its funding under the auspices of the CGIAR.

6. The CGIAR includes as members the International Bank for Reconstruction and Development (World Bank), the United Nations Development Programme (UNDP) and the Food and Agriculture Organization of the United Nations (FAO), which jointly sponsor CGIAR; the African, Asian and Inter-American Development Banks; 10 developing country Governments representing five regional areas; 18 donor Governments; and three private foundations (the Ford, Rockefeller and Kellogg Foundations). Its Secretariat is provided by the World Bank in Washington, and it is advised by an international Technical Advisory Committee (TAC) whose Secretariat is provided by FAO in Rome.

## THE INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

7. The International Board for Plant Genetic Resources has its origins, in part, in the work of FAO, which has been concerned from its inception with the genetic resources of cultivated plants. Initially FAO's main concern was to assemble information on the material held in existing collections, and to organize exchanges of needed materials from them, but from the early sixties, as new and more productive crop varieties began to spread rapidly in many developing countries, increasing attention had evidently to be given to the collection and conservation of the traditional varieties which were likely to be displaced and so lost. The Crop Ecology and Genetic Resources Unit (now Service) of FAO, and two Panels of Experts, concerned with the genetic resources of crop plants and of forest species respectively, were established to advance this endeavour. An initiative of the Panel of Experts on Plant Exploration and Introduction ultimately led the CGIAR, in 1974, to establish IBPGR.

8. The world-wide network of genetic resources centres to be developed by IBPGR will consist of two principal dimensions - a crop specific dimension, based on institutions which specialize in particular crops, and a geographical dimension based on regions of the earth in which genetic diversity in crop varieties and their wild and weedy relatives is believed to be particularly significant and/or particularly likely to be lost as a result of changes in agriculture or land use, or of fluctuations in weather and climate.

9. For each major crop, the Board will be guided by a crop germplasm advisory committee, which will be expected, inter alia, to present to the Board the consensus of world-wide professional opinion on priorities for exploration and collection, and on the ways in which accessions are to be described.

10. Similarly, in each region, the Board will be guided by a regional committee, which will be expected to present to the Board the consensus of opinion in the nations of the region about priorities for exploration and collection, about leading institutions and individuals, and about facilities which are needed to enable the nations of the region to build up their individual and collective capabilities for genetic resources work, including the use of genetic resource materials in crop improvement.

## INFORMATION IN GENETIC RESOURCES WORK

11. Information about crop genetic resources is both generated and required at every stage in the processes of exploration, collection, conservation, evaluation, documentation and utilization. Unfortunately, the history of exploration and collection is littered with collections which have been made with insufficient field information, assembled with incomplete documentation, cursorily evaluated for characteristics of current importance, and then set on one side or even abandoned. Even where the collections themselves have been maintained the data about accessions are all too often confused or inaccurate.

Consequently, valuable scientific information is lost or cannot be used for breeding or research, and as a result a good deal of the very heavy costs of making and maintaining collections is wasted. Collections are only as good as the use that can be made of them, and without information they can hardly be used at all.

12. Different collections of the same species have been made by different people and for different purposes, and so they have been described in dissimilar ways. Only to the extent that the information about their contents can be systematically arranged and communicated, can they be useful to workers other than those who have collected or assembled them. As crop research, and particularly crop improvement, become increasingly international, an internationally accepted system for the description and documentation of genetic resources, and for the management and communication of the information becomes increasingly essential.

13. A further difficulty arises from the sheer volume of this information. To take an example, there are some hundreds of thousands of accessions in the wheat collections of the world. About each of these there may be anything from 10 to 50 items of information, any or all of which may be important for the use or evaluation of the accession. (The key word which describes each of these items of information is a 'descriptor' (location, origin, species, height, grain size, grain colour and so on), and each 'descriptor' will have a set of mutually exclusive states (including 'unknown') only one of which can apply to each accession in the collection. In this report, the word 'descriptor' implies at the same time the associated sets of 'descriptor states'.) Such volumes of information are far too large to be handled in practice by manual procedures, and this has naturally led to the search for suitable computer procedures for storing and classifying the data - for example, to identify accessions which have particular morphological, adaptive, quality or resistance characteristics.

14. An internationally-accepted system to collect, record, classify, analyse and communicate information about accessions, and to correct it and keep it up to date, is therefore essential for an international genetic resources programme. Accordingly, when FAO began to work on plant genetic resources, one of its first objectives was to develop such a System. To do this it enlisted the cooperation of Dr. David J. Rogers, Professor of Botany in the University of Colorado, Boulder, whose work on the classification and relationships of wild and cultivated cassavas and other cultivated plants had led, in 1967, to the computer-based TAXIR (Taxonomic Information Retrieval) System.

15. In 1974-5 Professor Rogers was employed by FAO, first as a Consultant and then as a staff member (1 May 1974 to 31 December 1975). He and two of his colleagues (who were engaged as Consultants by FAO in 1974) worked to develop a computer-based system, the Genetic Resources Communication, Information and Documentation System (GR/CIDS), which was intended to enable FAO to assemble information about crop germplasm and provide information about them for plant breeders and others. In the event it turned out to be more practicable for the work to be continued in the Taximetrics Laboratory of the University of Colorado at Boulder. Early in 1974 IBPGR was established, and since then it has paid for the greater part of the Laboratory's work in developing GR/CIDS.

16. When it is fully developed, GR/CIDS should encompass the whole of the information component, including documentation and the flow of information, of genetic resources work, from the initial collection of data about traditional materials in the field to the performance of improved varieties derived from them.

17. It will be evident that the development of GR/CIDS is an essential element in the Board's work. The crop germplasm committees will produce lists of agreed descriptors and descriptor states (which will become part of GR/CIDS), and the regional committees will help the Board to ensure that these lists are used by field collectors. GR/CIDS will in fact hold together these two primary dimensions of the Board's work, and it will be an essential component of the process by which genetic resource materials become available to plant breeders and other users.

COMPUTERS IN GENETIC RESOURCES WORK: THE HISTORY OF TAXIR-EXIR-EXIS

18. TAXIR (paragraph 14) can be applied in principle to any body of information that can be arranged in a two-way table - for example a list of accessions for each of which information about a number of descriptors has been recorded. It can arrange, rearrange and present this information in many ways so that, for example, varieties with different types of ear, or from different countries, or of different heights, are listed together.

19. However, the initial version of TAXIR was limited, because it was designed for relatively small data banks (for example 3000-6000 items and 30 to 50 descriptors per item). In TAXIR, the items and their descriptors have to be stored in the central storage capacity (the 'memory') of the computer while responses are being arranged to questions that require considerable manipulation of the data, because it does not use magnetic discs or files. Consequently, the amount of information it can handle is limited by the size of the random access memory available. In early versions of TAXIR the user could not readily isolate and arrange parts of the data at will (in more formal words, it was a batch and not an interactive system).

20. In a series of modifications since the initial version was designed, some shortcomings have been remedied or lessened. Because many changes have been made, and because new ways of managing the data were introduced in 1973, the name of the system was changed from from TAXIR to EXIR (Executive Information Retrieval). EXIR uses files and can consequently handle very much larger quantities of information. For example, it has dealt with the data from a collection of nearly 33,000 wheat accessions, each characterized in respect of 13 descriptors, a total of 425,000 individual items of information. EXIR operates in interactive as well as batch mode. In principle, however, EXIR is an improved TAXIR; in general it does the same sorts of work. A restricted version of EXIR can be used on a so-called mini-computer with a capacity, in technical language, of 32,000 words each of 16 bits.

21. However, most people who have to handle taxonomic or genetic resources information wish to do more than rearrange it. For example, they may wish to classify it, using correlation, clustering or other methods of multivariate analysis; to plot geographical distributions on a map; to operate a storekeeping system for their own holdings; to analyse the results of formal experiments such as variety trials; to follow the performance of particular accessions in breeding programmes; or to study the variation in expression of particular attributes (including yield) in different environments. For such purposes, additional computer procedures can be devised, and the Taximetrics Laboratory

has already produced several. EXIR produces direct access files which are immediately suitable for use in those additional procedures. EXIR plus these additional procedures make up the system EXIS (Executive Information System), which is therefore a very convenient means of pursuing further analyses. However, since these additions are modular, EXIR can be used without them.

EXIR/EXIS AND GR/CIDS

22. An institution participating in GR/CIDS may not have access to a computer, and if it does, it may prefer to use other methods than EXIR/EXIS. In other words GR/CIDS does not necessarily include EXIR/EXIS, though where it can be used, EXIR/EXIS is likely to make genetic resources information easier both to handle and to communicate. Moreover, EXIR/EXIS is not tied to any particular make of computer. There is no reason why some version of EXIR should not be adapted to most makes of computing machine so long as they have (as a rough guide) memories of 32,000 words capacity or more. We return to this matter in paragraph 35. Where no suitable computer is immediately accessible, many workers may find it sufficient to arrange for data to be processed at some other centre, from which the required printouts can be transmitted by post.

QUESTIONS AND QUERIES

23. Though the Taximetrics Laboratory has achieved a great deal in bringing GR/CIDS and its associated computer procedures to their present state, its work is less well known and understood than we believe it should be. This has led to a number of questions and queries, set out in the following paragraphs.

24. To some observers, including some members of IBPGR, the differences and distinctions between GR/CIDS, TAXIR, EXIR and EXIS have not been clear; while some users or would-be users of the computer programmes have felt that they have become too complex, or too difficult, or that they are changed too frequently. Others have encountered difficulties in installing EXIR on the computing machines to which they have access. We hope that paragraphs 18-21 above have dealt with the first two of these difficulties; to the third we shall return (paragraph 35).

25. A number of plant breeders have felt that they do not get enough help from Boulder, from GR/CIDS in general, and from EXIR/EXIS in particular, in managing and analysing their breeding programmes. This tends to be coupled with suggestions that the Boulder group is in some way isolated and set apart, perhaps in some academic ivory tower, from the day to day efforts of collectors and plant breeders. To these matters we return in paragraph 40.

26. Some members of IBPGR have not found it easy to discern a coherent programme, moving towards clearly defined conclusions, in the presentations of the Taximetrics Laboratory to the Board and its Executive Committee. This is in part due to the nature of the job, in which, as in much innovative scientific work, both ideas and opportunities have to be seized as they come along, so that they do not readily fall neatly into the rows and columns of a plan; for the rest, we return to this difficulty in paragraph 51.

27. Questions have been asked about the size of the Board's financial support for GR/CIDS. For 1976 the Board and FAO together have allocated \$409,000 to the work of the Taximetrics Laboratory on GR/CIDS. The Board's share of this total (about \$350,000) is the largest single item in its budget, so that it is inevitably the first item to be queried. We discuss this question also in paragraph 51.

## COMMENTS AND RECOMMENDATIONS ON THE WORK OF THE TAXIMETRICS LABORATORY [1]

### General

28. For Professor Rogers and his colleagues, their work on GR/CIDS and on the associated computer procedures is part of a wider perspective. For some of them, it is related to a more general endeavour in systematic economic botany, specifically linked to the food and nutrition of mankind. For others, it is part of a general interest in the management of information. These are eminently suitable fields for multidisciplinary study in a university environment, which is presumably why the University of Colorado has continued to support and encourage the Taximetrics Laboratory, even though virtually all (perhaps 99%) of its work is related to the practical operational purposes of GR/CIDS and development has of necessity been far more prominent in its recent work than research. For this broad understanding the Board, and the world community of persons concerned with the study, conservation and use of plant genetic resources, owe the University a substantial and continuing debt of gratitude.

29. We are fully satisfied with the content and (with the exception outlined in paragraph 30) the balance of the work of the Taximetrics Laboratory, with its intellectual and technical standard, and with its relevance to the work of IBPGR. We are also impressed with the quality of the equipment and the staff of the Laboratory, and (though we have not had time to analyse this as fully as we shall hope to do in future) with the way in which it uses its financial resources.

30. A notable weakness of the Laboratory is in written communication. As we see it, this is due, at least in part, to the somewhat cumbersome style in which its reports are written.

### EXIR/EXIS

31. Though the staff of the Laboratory, during the past year particularly, have certainly worked hard to extend the use of EXIR/EXIS (which have already been used in a large number of institutions (see Appendix I)), it seems to us that they have given first priority to perfecting and strengthening those programmes; and we believe that this balance should now be adjusted.

32. We feel that EXIR has now advanced far enough to be supplied, even if only as a first version, to a wide range of would-be users, many of whom are already waiting impatiently for it. <u>We recommend therefore that during the coming year the Laboratory should seek to promote the use of EXIR in as many centres as possible</u>.

33. This seems to require five principal measures. First, <u>a general account of EXIR, directed to non-technical readers, should be prepared and circulated widely</u>, perhaps as a brochure published jointly by the Board and the University of Colorado.

34. Second, <u>the existing draft user's manual should be completed, edited to ensure that the inexperienced can readily understand it, and published</u>. It should be issued not only in English but also in Spanish (and perhaps as demand arises, in other languages also).

[1] In the remainder of this report, recommendations and items of advice are underlined.

35. Third, would-be users will need help to adapt EXIR (and perhaps the EXIS modules also) to the computing machines to which they have access. EXIR has already been adapted to various machines, large and small including the so-called mini-computers. In general, the Advisory Committee believes that the difficulties of transferring EXIR to different sorts of computers have been over-emphasised, and that given competent assistance in systems programming they should be fairly easily overcome. A technical account of EXIR (and of EXIS also, in due course), intended for systems programmers, should be prepared and made available.

36. The fourth measure relates to advice to users on the selection of computer equipment. The Laboratory should be prepared to advise would-be users and computer consultant firms on the general specifications of computer systems which can perform the work the users wish to do with EXIR/EXIS. However, this is a delicate matter, since the Laboratory must clearly not advise on the choice of specific computer equipment, or on the total computer requirements of a laboratory or institute. Associated with these matters is the question of responsibility for telling users about developments and improvements in EXIR/EXIS, particularly those which may require alterations in the programming of their equipment. The Advisory Committee proposes to make a special study of this group of problems, and to this end invites Professor Rogers and his colleagues to prepare a working paper to be circulated in advance and discussed at the next meeting of the Committee.

37. The fifth group of measures concerns training, both of users and of the applications programmers, whose task it will be to help them to use EXIR (and perhaps EXIS also) on their own machines. The Laboratory should consider providing training courses, of perhaps 3 to 4 weeks each, for selected users and programmers. It could perhaps also develop a modest internship programme, in which strategically-based users or programmers could spend longer periods in the Laboratory. Finally more experienced users at appropriate international and other centres could be encouraged and helped to provide short training courses for intending users. We believe that users or donors will be ready to meet the costs of training in many cases, but in others the Board itself will, we hope, be able to offer support.

38. For these purposes, as well as for providing data-handling services to genetic resources workers who do not have access to computers, an informal 'club' of EXIR users might be useful, not only to help them to use EXIR more effectively but also to strengthen the global network of IBPGR. We have asked the Laboratory to prepare a report for our next meeting on questions related to training.

The future development of the EXIS modules

39. The appropriate priorities for further development of the EXIS modules are not clear, at this stage, to the Advisory Committee. Among others the inventory control module, which can help managers of collections to handle their stocks and plan their multiplication programmes, seems likely to be widely used, but perhaps it would be well, at least for the next year or so, to allow the priority for new modules to be determined by the expressed needs of EXIR users.

40. Among these is the need of plant breeders, to which we have already referred, for better ways of managing information. The Laboratory has cooperated, particularly with CIMMYT, in work on the development and application of procedures to retrieve information from its international series of variety trials, and on other aspects of the management of plant breeding programmes, including the analysis of genotype x environment interactions.

We welcome this development. The work is important, the Laboratory is well-placed to do it, and it is relevant to GR/CIDS, but it is not within the Board's terms of reference as we understand them. It has therefore been paid for by the institutions concerned or by other agencies, and we think this is appropriate. However, the Advisory Committee feels that the role of the Taximetrics Laboratory in these directions should in general be limited to the development of demonstration modules of EXIS for the management and analysis of breeding programmes. These demonstration modules should encourage the workers in crop improvement programmes to develop for themselves modules of their own to meet their particular needs.

The management of existing collections

41. The Laboratory has helped at least 18 national and international institutions to assemble and organize the information about the accessions in their collections into systematic data bases, and a number of these data bases have in fact been compiled in the Laboratory itself (see Appendices II and III). This work has helped the Laboratory to understand better the objectives, needs, methods and difficulties of collectors and users of genetic resources, and of the managers of collections, and the relation of GR/CIDS and of IBPGR to these matters. In these senses we believe the substantial effort involved has been justified, but we do not feel that it would be appropriate for the Laboratory to provide services of this sort on any substantial scale except in cases where the work would also benefit the Laboratory and the Board and help to make GR/CIDS more effective. In some at least of these cases the costs should be borne or shared by the users. However the work has illuminated one general problem which we feel we should bring to the Board's notice. Hitherto much of IBPGR's attention has been directed towards the collection and conservation of genetic resource materials, mostly in traditional agriculture, which are in danger of being lost. Our own experience, as well as that of the Taximetrics Laboratory, suggests to us that it is at least as important to put into order the information about existing collections, many of which contain irreplaceable materials brought together by collectors over many years. To breeders, the diversity in these existing collections is as important as the diversity remaining to be collected and described; but it is in danger of being lost unless it is satisfactorily ordered and recorded. We suggest that the Board will win valuable support for genetic resources work from breeders, and from other agricultural research workers, if it can help them to use their existing collections more effectively.

Library of genetic resources information

42. Through its cooperation with other institutions already mentioned in paragraphs 31 and 41, the Laboratory has acquired a considerable library of information about their collections. The 18 institutions referred to in paragraph 41 (see Appendix III) have provided descriptor information about more than 80,000 accessions of 12 crops; the numbers of descriptors per crop range from 13 to 78. In every case, of course, the information used and held at Boulder is a duplicate of the institution's own records. By allowing the Laboratory to hold such a duplicate, it should go without saying that the institution does not lose, and the Laboratory does not acquire, any control over the collections themselves. Indeed we recommend that the Laboratory should build up a world-wide collection of such duplicate information. This will enable it to direct enquirers to appropriate sources of material, and will also permit (providing the institutions concerned agree that their data may be used for this purpose) the development of some important lines of relevant investigation (paragraph 49). A second set of duplicates may well be valuable to FAO also, provided the original holding institutions agree that it may be made available and the costs of doing so can be met.

## PROPOSALS FOR THE NEXT PHASE

### Increasing demands

43. The demands on the Taximetrics Laboratory from research workers and institutions concerned with genetic resources, taxonomy and other topics have increased, are increasing, and are likely to continue to increase. While we were at Boulder, the United States Department of Agriculture informally advised Professor Rogers that it proposed to request the Laboratory to undertake a study of the data management system for the USDA's very large genetic resources programme and collections, referring particularly to the need to develop the system so that it will be compatible with the international system. The Laboratory is also helping the Plant Breeding Institute, Cambridge, U. K., and other institutions in Britain and Europe, to develop systems for managing information about crop varieties on a European scale.

44. As the Board's programme advances, as crop and regional committees are organized, and as current plans for regional programmes develop, further demands on the Laboratory will emerge. The regional plans are bound to lead to the development of national genetic resources systems, especially in some of the less-developed countries; and all of these will require information management systems, though not all will require computers on the spot.

45. Wider interests in the use of EXIR/EXIS are emerging. EXIR is already used, in and around Boulder, for many purposes other than genetic resources work. The Ministry of Agriculture, Fisheries and Food for England and Wales believes it could be used for monitoring the complex organization of agricultural research in Britain. Such developments are to be encouraged, particularly as a vehicle for testing the System, so long as they do not divert the attention of the Laboratory's small leading group, which already appears to us to be overworked, from the GR/CIDS programme.

### The development of GR/CIDS and the future of the Taximetrics Laboratory

46. We see the Laboratory as both a development and a research organization. In respect of its development work on GR/CIDS, it has to ensure that the procedures and technology it develops and tests are always a few years ahead of the customers' needs. Its task is to develop this technology to the point at which it can be delivered to users, and to provide the necessary delivery and transfer services, including manuals, technical specifications, the training of users and trainers, and some technical assistance. But it should not become a production or service organization, except in special cases where there is some significant gain or return for the Laboratory, GR/CIDS or the Board's programme, and then only within limits carefully prescribed in advance.

47. As this work develops, the Laboratory is bound to become increasingly a leading intellectual centre for scientists and technologists of many kinds, many of whom will wish to visit and work in it. To fulfill its own purposes, both as a contractor to the Board and as a University institution, it will have to go on accumulating information and knowledge, and using it for research, teaching, and advice. As a leading centre, it will seek to stimulate corresponding or complementary activities in other institutions, and it will no doubt be meticulous in referring enquirers to these institutions, where it is appropriate to do so, and in encouraging collaborators at other centres to publish and gain credit from their own work. It will, we hope, continue to work actively with national organizations.

48. Increasingly, the Laboratory's service to the Board will require it to work with the crop and regional committees and such other organs as the Board may establish. Having reviewed the condition of many existing collections, and the state of knowledge about genetic resources which they reflect, we are satisfied that the purposes of the Board require that the Taximetrics Laboratory participates in all meetings of the crop germplasm committees, and we recommend that it be invited to do so.

49. All of this will require a sound foundation in continuing research in fields related directly to the work of the Laboratory and the interests of its members. While part of this will no doubt deal with information systems or with the further improvement and refinement of computer-based operations, other parts will presumably be concerned with the further analysis of genetic resources information (and so linked to Professor Rogers' chosen field of systematic economic botany). For this work, the growing library of duplicate information will be a most valuable research resource. One particular topic mentioned during our meeting is the unique opportunity the library will offer to study genetic diversity across political boundaries and to compare species with one another in respect of genetic diversity. For example, it will be possible to study quantitatively the concept of centres of diversity which has so powerfully guided genetic resources work for 50 years.

50. Much of this will no doubt be funded in other ways, but we advise that 10% of the effort supported by the Board should be regarded as available for forward-looking investigations intended to advance knowledge related to the Board's general fields of interest, freely selected by the staff of the Laboratory subject only to normal reporting procedures.

Programmes and budgets

51. In a situation advancing so rapidly, the Laboratory must have a budget sufficiently flexible to respond, within the bounds of its agreed programme, to advancing opportunities. At the same time, the Advisory Committee feels that in established projects within the programme the objectives should be more clearly defined than they have been in the past, the ways in which it is intended to attain them should be projected over a five-year period, and the extent to which they have been reached should be assessed, year by year. The budgets themselves may have to be more detailed, and so constructed that they make plain the expected costs of the individual activities set out in the work plan. In effect we are suggesting that budgeting by objectives would be a valuable aid to management for the Laboratory as well as for the Board. All this will have to fit within the limitations on the Board's budget; but we advise that the management of information is so important for the Board's work that it may require the largest single allocation from the Board's budget for several years to come. In developing exploration, collection and other operational activities, it is the Board's practice to finance the initial stages directly (where such support is required) but then to seek to transfer the cost to the users or to other agencies. In the same spirit, the Board expects that some of the costs of many of the extension and training functions associated with GR/CIDS will also be taken up by users or by the donors who support them. On the other hand the costs of central investigative and development activities, including the work on GR/CIDS, which are designed to serve the Board's network as a whole, cannot be so transferred and must remain with the Board until the work is completed.

A new institutional structure

52. The developments we foresee and recommend will require that the institutional arrangements for the Taximetrics Laboratory be further developed. We recommend that a study be undertaken of possible alternative new structures, and of the ways of achieving them, which takes into account the interests, needs and responsibilities of the Laboratory, the University and the Board. This study should include possible structures for management, and for advice to the Director as well as to the University and the Board. The possibility of arranging financing in a 'rolling triennium' system should also be reviewed. We are informed that a grant is available to the Laboratory for a study of this sort.

FURTHER WORK OF THE ADVISORY COMMITTEE

53. The Advisory Committee notes with pleasure that its terms of reference require it to respond to specific requests for advice from the Director of the Taximetrics Laboratory on matters relating to the GR/CIDS programme and to GR/CIDS itself. During our visit to Boulder it was evident that this relationship is also welcomed by the Director and his staff. Moreover it appears that they hope that the Committee will in practice act as an Advisory Committee to the Laboratory as well as to IBPGR, and that it will not necessarily restrict its advice to matters related to GR/CIDS. The Committee feels that this matter should await its study of future institutional arrangements recommended in paragraph 52, but if in the end the Committee acquires such broader responsibilities we feel that it would be appropriate to add to our number a member nominated by the University of Colorado.

54. We have devoted our first meeting largely to immediate questions relating to our terms of reference. We hope to devote future meetings to the longer term considerations set out in them.

55. We also hope at our next meeting to consider the work programme and estimates of GR/CIDS for 1978. For this reason we have tentatively decided to meet again in January 1977 at Boulder, Colorado.

56. At that meeting we hope also to receive part or all of the studies of training requirements (paragraph 38), of software and hardware problems (paragraph 36), and of possible new institutional arrangements for the Taximetrics Laboratory (paragraph 52).

SUMMARY

57. This section summarises our findings in relation to our terms of reference (paragraph 1).

58. i. "Evaluate the technical quality of the System for the purposes of classification of and exchange of information on crop germplasm resources".

GR/CIDS can only become a fully standardized and systematic operating system to the extent that institutions and individuals, both in and outside the Board's network, make use of it, and in particular agree on, and use in an agreed way, appropriate international systems of descriptors. So far we do not yet have such agreements. However the Laboratory has developed, as an essential tool for information management in genetic resources work, a computer-based system for assembling information about accessions into data bases, and for assembling subsets from them for particular purposes (EXIR), together with a number of other computational procedures for various additional functions and analyses (the EXIS modules). We judge EXIR and EXIS to be very effective for their purpose, and they have already been used to form, query and analyse data bases using the existing descriptors for the accessions from which they are derived. We conclude that, though the system is still far from complete, the elements of it which already exist are technically sound for the classification and exchange of information on crop germplasm resources.

59. ii. "Evaluate the specific priorities and targets of the GR/CIDS programme in the light of the goals and objectives of the IBPGR".

The targets of the GR/CIDS programme, as it has been developed so far, accord satisfactorily with the goals and objectives of IBPGR. There are five main priorities: analysis of current practices, needs and difficulties in the management of information about existing genetic resources collections; the development and transfer of EXIR/EXIS including arrangements for technical assistance; helping genetic resources centres to assemble information about their collections, new and old, and to form data bases from them (which has included or will include working with the Board's regional and crop germplasm advisory committees, with international centres and other institutions, with national organizations, and with interested individuals); the training of trainers who will provide technical assistance in developing GR/CIDS including the transfer of EXIR/EXIS; and studies of new methods and forms of analysis of information (which includes the further development of EXIS). The Advisory Committee concludes that EXIR is ready to go out to users, perhaps as a first edition (to be followed by improved editions as they are developed), and that for a year or so, this should take priority, if necessary, over the further development of the EXIS modules. The work on existing practices, needs and difficulties, has brought to notice two questions which we advise the Board to consider - the poor state of documentation of many existing collections of valuable genetic resource material, and the need for improved methods of managing and analysing large breeding programmes. Each of these is important, GR/CIDS is relevant to each, and the Board should encourage the Taximetrics Laboratory's efforts on both. In both cases, the cost of the work would appear to fall more logically on the institution concerned than on the Board, except perhaps where GR/CIDS or some other major concern of the Board seems likely to be advanced by it.

60. iii. "Evaluate the plans and resources of the Taximetrics Laboratory as against the objectives of the GR/CIDS project, and advise on the time period and manpower and financial resources likely to be required to achieve those objectives".

The Taximetrics Laboratory sees GR/CIDS as part of a general activity in systematic economic botany, but since 99% of the budget of the Taximetrics Laboratory is devoted to GR/CIDS, there is no significant distinction in practice between the plans of the Laboratory and the objectives of the GR/CIDS project. The resources in and available to the Laboratory appear to be satisfactory for the work which is being done. The Advisory Committee is not yet able to estimate the time period, the manpower, or the financial resources likely to be required to achieve the objectives of the GR/CIDS project; but since one of the main objectives must be to get GR/CIDS into operation world-wide, they will depend very much on the rate of development of the Board's programme as a whole, and on the activity of the components of the Board's network.

61. iv. "Consider the present and future computer software and hardware requirements of the System and advise on (a) whether these appear reasonable in relation to the objectives of the IBPGR programme and the staff and computing facilities likely to be available to prospective users of the System, and (b) whether there are practicable means by which the operational requirements of the System might be simplified".

We are not yet ready to offer quantitative answers to this question. GR/CIDS consists of a great deal more than computer software and hardware. As we see it at this stage the most urgent tasks are to reach international agreement on descriptors for as many of the priority crops as possible, to get the descriptors applied in collections, new and old, and to get the descriptions of all accessions into systematic and preferably machine-readable form. Once these things have been done, a relatively small network of computer installations could do all that is required, communicating with other collectors and users by post. With reference to (a) the Committee feels that the computer software and hardware requirements of EXIR and EXIS are appropriate to the needs of the Board's programme of which GR/CIDS is an integral and indeed central part. It is however not necessary, even if it were practicable, for every institution which breeds crops or holds collections of plant genetic material to have its own computer to manage the information about its genetic resources. With reference to (b), the Committee feels that the technical requirements for using EXIR are not intrinsically difficult or complex for institutions which have or have access to a computer organization including a systems programmer. Given this, EXIR appears to be adaptable to most, if not all computer systems which have 32,000 words or more of memory storage. We do not feel that the operational requirements of GR/CIDS as a whole are so complex that they need to be simplified, nor does experience suggest that EXIR is in fact particularly complex for the user, once it has been correctly set up for him.

62. v. "Advise on the long-term aspects of genetic resources data management, including whether there is need for a central point in the international network to monitor and assist in both computer-related work and use of the gathered data, and if there is believed to be such a need, on how it can most effectively be met".

We are not yet ready to advise fully on this topic, but we feel that for some time to come the Taximetrics Laboratory will have to cooperate with many centres and individuals in all aspects of the assembly, management and analysis of genetic resources data, and that it should continue to build up, through this cooperation, a library of duplicates of sets of information. This library need not be unique (for example FAO may wish to hold a duplicate) and it must not preempt in any way the rights of holders of collections in relation to their own material and the information about it, or their right to publish and win credit for their own work. In these relations, the Laboratory will function as a research and development organization, and not as a service or production organization except in special cases where it is asked to do so and the work requested also helps to develop GR/CIDS or advance the Board's work in some other way. The Laboratory's tasks are not to control, instruct or coordinate, but to serve, advise and articulate, the common international endeavour.

63. vi. "Advise on any other matters with regard to the System or the GR/CIDS programme (a) which the Advisory Committee believes to be important with respect to the effectiveness of the System, and to the duration and amount of financial support by the IBPGR for the GR/CIDS programme, or (b) on which the advice of the Committee is specifically requested by either the Director of the Taximetrics Laboratory of the University of Colorado, the IBPGR or the Technical Advisory Committee of the Consultative Group on International Agricultural Research".

We do not yet have precise advice to offer on (a), though we believe that financial support, at a level sufficient to maintain at least the present volume of activity, will have to continue for a number of years. In respect of (b), we have advised the Director of the Laboratory to institute a study of possible new institutional forms for the Laboratory which will serve the needs of the Laboratory as a research and development organization, the purposes of the University of Colorado as a body dedicated to advancing knowledge by teaching and research, and the purposes of the Board as set out in its terms of reference.

ACKNOWLEDGEMENTS

The members of the Advisory Committee offer their thanks to the authorities of the University of Colorado, Boulder, for creating and maintaining the Laboratory in which we were able to meet so productively; to the Director and staff of the Taximetrics Laboratory, for guidance, support and friendly comradeship; to the International Board for Plant Genetic Resources, for enabling them to offer it a service which they have found both pleasant and instructive to perform; to Dr. Trevor Williams, an FAO Consultant to the Secretariat of the Board, for keeping track of proceedings which at times became tortuous in spite of his help; and to Mr. Richard Demuth, Chairman of the Board, for joining the meeting and contributing wise advice and cheerful encouragement as well as penetrating questions.

A.H. Bunting
Chairman
for the Advisory Committee

28 May 1976

APPENDIX I

## USERS OF TAXIR AND EXIR

RECENT VERSIONS:

| | Contact | Version |
|---|---|---|
| U.S.A.: | | |
| University of Colorado<br>Boulder, Colorado | | |
| Computing Center<br>used by Highway Department<br>various departments of University | | CDC |
| Administrative Data Processing | E. Gruidel | IBM |
| Taximetrics Laboratory | M. Bailey | Nova 2/10 |
| University of Colorado<br>Dept. of Preventive Medicine and<br>Comprehensive Health Care<br>4200 E. 9th Avenue<br>Denver, Colorado 80220 | R.C. Kosa | CDC |
| Bureau of Land Management<br>Division of Data Processing<br>Denver Federal Center, Bldg. 50<br>Denver, Colorado 80255 | R. Barkey | CDC |
| University of California at Los Angeles<br>College of Business Administration<br>Los Angeles, California | J. Dyer | CDC |
| Cambridge Science Center<br>Cambridge, Massachusetts | S. Greenberg | IBM |
| Colorado Commission on Higher Education<br>Room 1000 Social Services Building<br>Denver, Colorado | E. Lyell or<br>W. Adrian (deputy director) | PDP |
| Colorado School of Mines<br>Computing Center<br>Golden, Colorado | A.R. Brown | PDP |
| Denver Regional Council of Governments<br>Comprehensive Health Planning Council<br>1776 S. Jackson<br>Denver, Colorado 80210 | Beverly Tarver | CDC |

APPENDIX I
(continued)

| | Contact | Version |
|---|---|---|
| University of Florida<br>Computing Center<br>Gainesville, Florida | R.J. Varnell | IBM |
| Florida State<br>Computing Center<br>Tallahassee, Florida | R.J. Menzies | CDC |
| MSC<br>Boulder, Colorado | C. McMillan | CDC |
| National Seed Storage Laboratory<br>Colorado State University<br>Fort Collins, Colorado 80521 | Dorris Clark | UNIVAC |
| University of Nevada<br>College of Business<br>Las Vegas, Nevada | P. Taylor | CDC |
| NOAA<br>Environmental Data Service<br>PSRB2-105<br>Boulder, Colorado 80302 | H. Myers | CDC |
| University of Texas<br>College of Business<br>Austin, Texas | J. Stutz | CDC |

Other countries:

Brazil:

| | | |
|---|---|---|
| Empresa Brasileira de Pesquisa<br>Agropecuária (EMBRAPA)<br>Brasilia | G. Paez | IBM |

Colombia:

| | | |
|---|---|---|
| Centro Internacional de Agricultura<br>Tropical (CIAT)<br>Cali | through ICA<br>D. Franklin | IBM |
| Instituto Colombiano Agropecuária (ICA)<br>Bogotá | Data Processing Section | IBM |

APPENDIX I
(continued)

| | Contact | Version |
|---|---|---|
| Mexico: | | |
| Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT)<br>Londres 40, Mexico, DF | through IBM Science Center | IBM |
| Mexico IBM Science Center<br>Mexico City | H. Hernandez | IBM |

EARLY TAXIR VERSIONS:

| | Contact | Version |
|---|---|---|
| Australia: | | |
| Commonwealth Scientific and Industrial Research Organization (CSIRO)<br>Canberra | | |
| Canada: | | |
| Central Office for the Plant Gene Resources of Canada<br>Research Station, Research Branch, Agriculture Canada<br>Ottawa, Ontario K1A OC6 | R. Loiselle | |
| Italy: | | |
| Laboratorio del Germoplasma<br>Consiglio Nazionale delle Ricerche<br>Bari | E. Porceddu | |
| U.K.: | | |
| Plant Breeding Institute<br>Cambridge | | |
| University of Southampton<br>Department of Botany<br>Southampton | F. Bisby | |

APPENDIX I
(continued)

| | Contact | Version |
|---|---|---|
| U.S.A.: | | |
| University of California at Berkeley<br>Forestry Department<br>Berkeley, California | | |
| University of Illinois<br>Champaign/Urbana, Illinois | | |
| University of Michigan<br>Computing Center<br>Ann Arbor, Michigan | | |
| USDA/Plant Introduction Center<br>Ames, Iowa | | |
| USDA/Plant Introduction Center<br>Pullman, Washington | | |

EARLY VERSIONS OF TAXIR DEVELOPED INTO NEW PACKAGES:

| | | |
|---|---|---|
| Colorado State University<br>Biology Department<br>Fort Collins, Colorado, U.S.A. | R. Adams | RAPIC |
| Gulf Universities Research Consortium<br>Galveston, Texas, U.S.A. | | ENVIR |

APPENDIX II

## INSTITUTIONS WITH WHICH THE TAXIMETRICS LABORATORY HAS COLLABORATED OR IS TO COLLABORATE TO FORM DATA BASES OR PROVIDE OTHER SERVICES RELATED TO THE MANAGEMENT OF GENETIC RESOURCES INFORMATION

| Country | Centre | Contact | Crop |
|---|---|---|---|
| BRAZIL | Centro Nacional de Pesquisa de Trigo<br>Caixa Postal 569<br>99.100 Passo Fundo<br>Rio Grande do Sul | A.C. Baier | Wheat |
| | Empresa Brasileira Pesquisa Agropecuária (EMBRAPA)<br>Palacio do Desenvolvimento<br>Brasilia, DF (70000) | G. Paez | Maize |
| | Instituto Genetica - ESALQ<br>13.400-Piracicaba, SP | R. Ruschel | Maize |
| COLOMBIA | Centro Internacional de Agricultura Tropical (CIAT)<br>Apartado 67-13<br>Cali | R. Burns<br>D. Laing<br>K. Kawano | Bean<br><br>Manihot |
| | Instituto Colombiano Agropecuária (ICA)<br>Apartado Aereo 151123<br>(El Dorado)<br>Bogotá | M. Torregroza<br>R. Reyes<br>M. Gomez | Maize<br>Wheat<br>Cotton |
| EUROPE | European Association for Research on Plant Breeding (EUCARPIA)<br>c/o P.O. Box 128<br>Wageningen, Netherlands | B. Gunn<br>F. Lupton<br>(Plant Breeding Institute (PBI)<br>Cambridge, U.K.) | Maize<br>Wheat |
| GERMANY, Federal Republic of | Institut Pflanzenbau FAL<br>Bundesallee 50<br>33 Braunschweig-Völkenrode | L. Seidewitz | Wheat |
| INDIA | International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)<br>1-11-256, Begumpet<br>Hyderabad, 500016, AP | L.J.G. van der Maesen | Chickpea<br>Sorghum<br>Pigeon pea |

APPENDIX II
(continued)

| Country | Centre | Contact | Crop |
|---|---|---|---|
| ITALY | Consiglio Nazionale delle Ricerche (CNR)<br>Laboratorio del Germoplasma<br>Via G. Amendola, 165/A<br>70126 Bari | E. Porceddu | Wheat |
| | Food and Agriculture Organization of the United Nations (FAO)<br>Plant Production and Protection Division<br>Via delle Terme di Caracalla<br>00100 Rome | A. Brandolini | Maize |
| MEXICO | Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT)<br>Apartado Postal 6-641<br>Londres 40<br>Mexico 6, DF | R. Bird<br>E. Sprague<br>M. Alcala | Maize<br>Maize<br>Wheat |
| | Instituto Nacional de Investigaciones Agricolas (INIA)<br>Apartados 6-882 y 6-883<br>Mexico 6, DF | H.H. Arrieta | Maize |
| NIGERIA | International Institute of Tropical Agriculture (IITA)<br>Oyo Road, PMB 5320<br>Ibadan | E.E. Watt | Cowpea |
| PERU | International Potato Center (CIP)<br>Apartado 5969<br>Lima | R.R. Rowe | Potato |
| | Programa Cooperativo de Investigaciones en Maiz (PCIM)<br>Universidad Nacional Agraria<br>Apartado 456<br>La Molina, Lima | W. Salhuana | Maize |
| PHILIPPINES | International Rice Research Institute (IRRI)<br>P.O. Box 933<br>Manila | T.T. Chang<br>E. Price | Rice<br>Cropping Systems |

APPENDIX II
(continued)

| Country | Centre | Contact | Crop |
|---|---|---|---|
| TURKEY | Aegean Regional Agricultural Research Institute<br>P.O. Box 9, Menemen<br>Izmir | | Grains |
| U.K. | Scottish Plant Breeding Station<br>Pentlandfield, Roslin<br>Midlothian EH25 9RF<br>Scotland | D.R. Glendinning | Potato |
| U.S.A. | University of Florida<br>Agronomy Department<br>Gainesville, Florida 32610 | R.J. Varnell | Groundnut |
| | National Seed Storage Laboratory<br>Colorado State University<br>Fort Collins, Colorado 80521 | Dorris Clark | Guar |
| | United States Department of Agriculture (USDA)<br>Germplasm Resource Laboratory<br>Northeastern Region, BARC-West<br>Beltsville, Maryland 20705 | J. Craddock | Small Grains<br>Guar<br>Barley<br>Wheat<br>Catalogue of Cotton Collection |
| | United States Potato Collection<br>Inter-regional Potato Introduction Station<br>Sturgeon Bay, Wisconsin | R.R. Rowe<br>(now at CIP) | Potato |

APPENDIX III

## DATA BASES COMPILED IN THE TAXIMETRICS LABORATORY

| CROP | DATA BASE NAME | CENTRE | COUNTRY | RAW DATA[1] MEDIUM | NUMBER OF ITEMS | NUMBER OF DESCRIPTORS |
|---|---|---|---|---|---|---|
| WHEAT | CRWHT | USDA | USA | MT | 32710 | 13 |
| | CRDWHT | USDA | USA | MT | 2320 | 61 |
| | IZMIR | IZMIR | Turkey | C | 2208 | 44 |
| | FGHLWHT | PBI | UK | MT | 1001 | 78 |
| | LOTHWHT | IPFAL | Germany(FR) | MT | 404 | 35 |
| | ICAWHT | ICA | Colombia | NMR | 80 | 33 |
| | BRWHEAT | PASSO-FUNDO | Brazil | NMR | 64 | 33 |
| | DURUM | CNRLDG | Italy | C | 39 | 49 |
| MAIZE | CIMANA | CIMMYT | Mexico | MT | 10974 | 30 |
| | CIMANO | CIMMYT | Mexico | MT | 10974 | 30 |
| | CIMB | CIMMYT | Mexico | MT | 10974 | 23 |
| | CIMC | CIMMYT | Mexico | MT | 10974 | 26 |
| | ICAGERM | ICA | Colombia | MT | 3653 | 42 |
| | PCIMR | PCIM | Peru | MT | 2440 | 60 |
| | ICAZ | ICA | Colombia | MT | 100 | 37 |
| | PCIMZ | PCIM | Peru | C | 98 | 64 |
| | INIAZ | INIA | Mexico | C | 96 | 52 |
| | EMBRAPA | EMBRAPA | Brazil | NMR | 89 | 47 |
| SORGHUM | ICRSORG | ICRISAT | India | NMR | 300 | 24 |
| | ICRSGM | ICRISAT | India | NMR | 300 | 24 |
| RICE | IRRICE 2 | IRRI | Philippines | MT | 8626 | 48 |
| | IRRICE | IRRI | Philippines | MT | 1000 | 48 |
| BEANS | CIATPHS | CIAT | Colombia | MT | 8656 | 36 |
| | CIATPRM | CIAT | Colombia | MT | 929 | 66 |
| | FRIJOL | CIAT | Colombia | NMR | 100 | 36 |
| COWPEA | VIGNA | IITA | Nigeria | C | 4232 | 50 |
| CHICKPEA | ICRCHIC | ICRISAT | India | NMR | 284 | 28 |
| GUAR (CYAMOPSIS) | GUAR | USDA | USA | C | 1134 | 74 |

[1] NMR = Non-machine readable
MT = Magnetic tape
C = Card

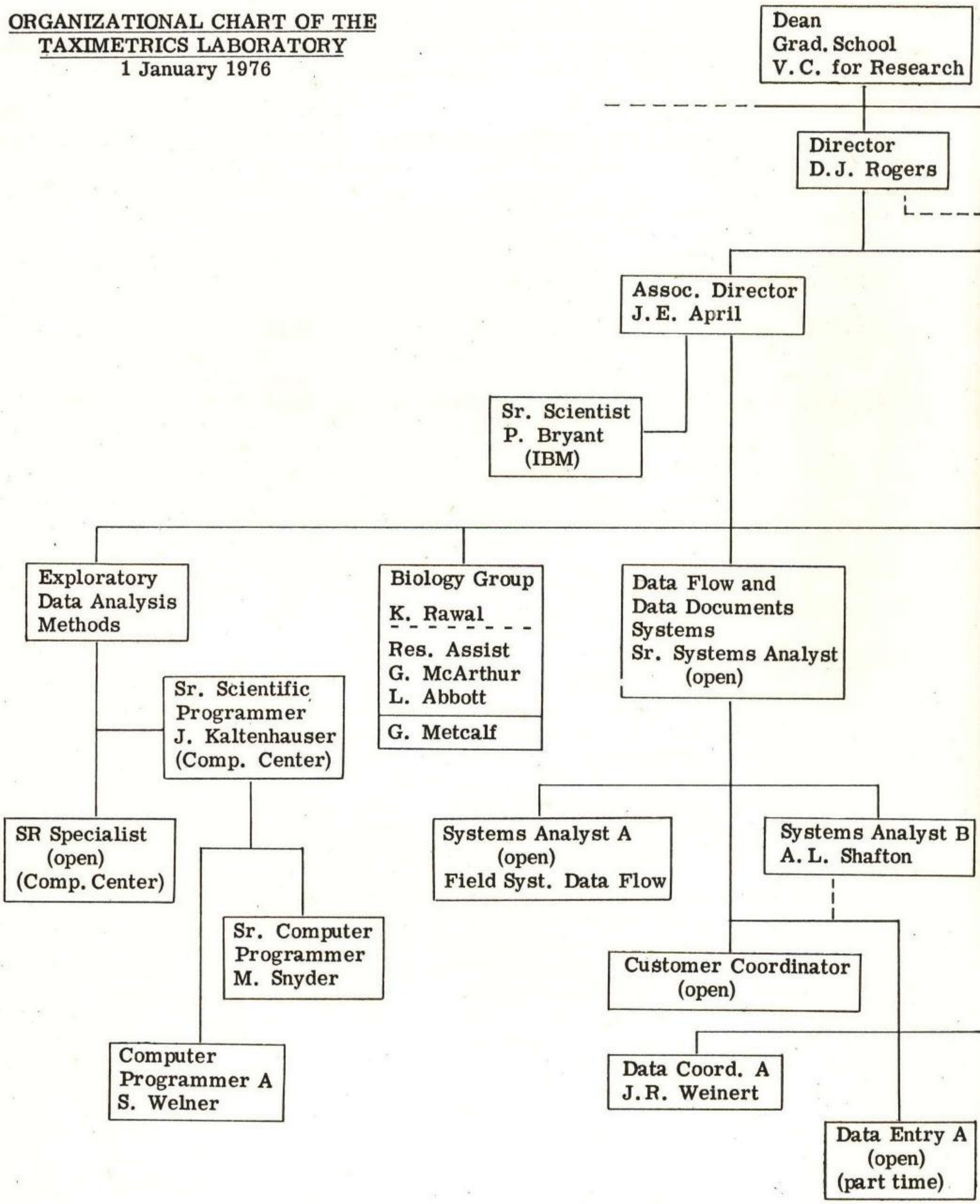
APPENDIX III
(continued)

| CROP | DATA BASE NAME | CENTRE | COUNTRY | RAW DATA[1] MEDIUM | NUMBER OF ITEMS | NUMBER OF DESCRIPTORS |
|---|---|---|---|---|---|---|
| CASSAVA | CASSAVA | CIAT | Colombia | NMR | 2016 | 35 |
| GROUND-NUT | PNUTMER | U FLORIDA | USA | NMR | 193 | 40 |
| PIGEON PEA | ICRPIGN | ICRISAT | India | NMR | 305 | 24 |
| POTATO | CIPGERM | CIP | Peru | NMR | 2258 | 37 |

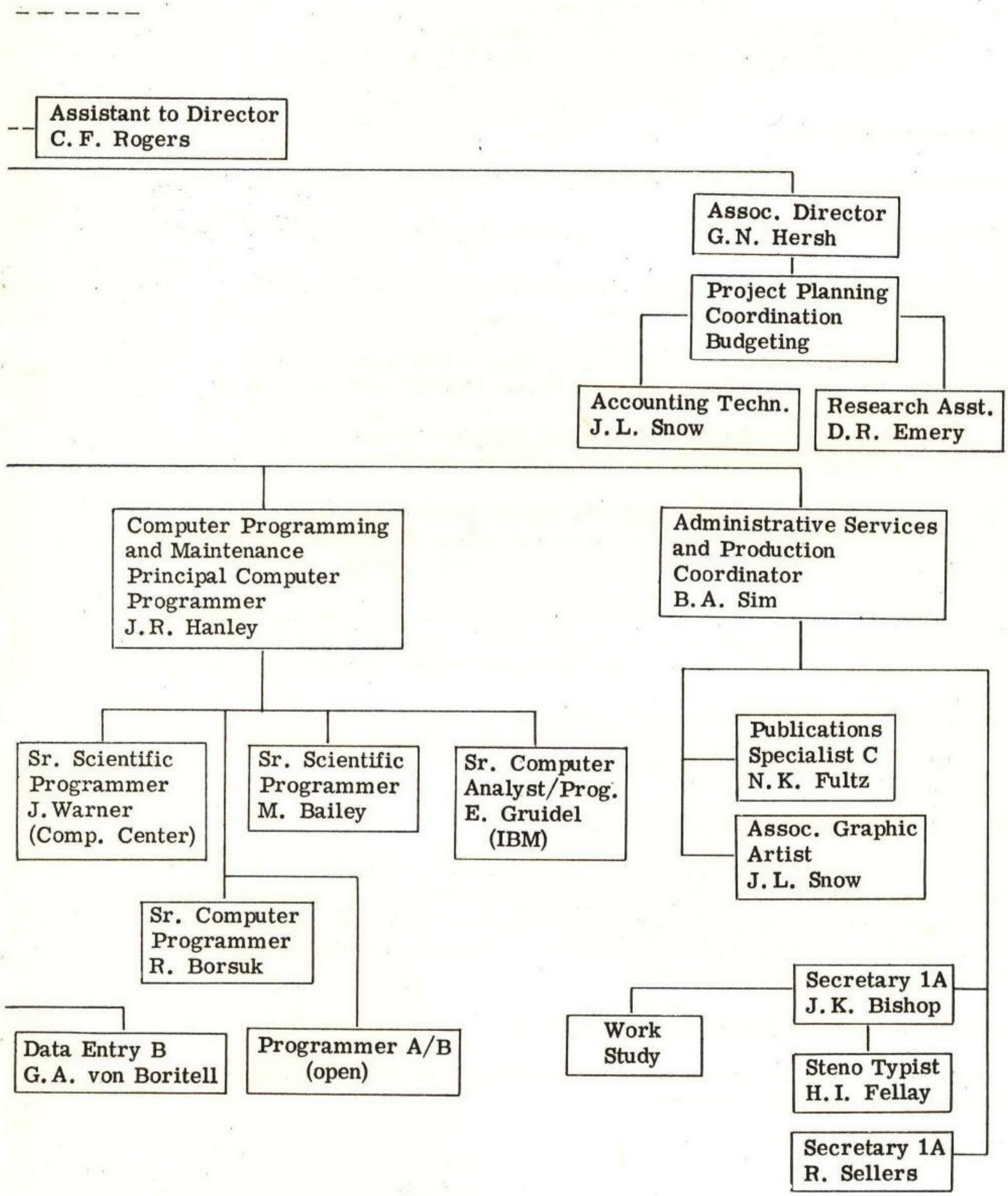
[1] NMR = Non-machine readable
MT = Magnetic tape
C - Card

ORGANIZATIONAL CHART OF THE TAXIMETRICS LABORATORY

1 January 1976



APPENDIX IV


Assistant to Director
C. F. Rogers
Assoc. Director
G.N. Hersh
Project Planning
Coordination
Budgeting
Accounting Techn.
J. L. Snow
Research Asst.
D. R. Emery
Computer Programming
and Maintenance
Principal Computer
Programmer
J.R. Hanley
Administrative Services
and Production
Coordinator
B. A. Sim
Sr. Scientific
Programmer
J. Warner
(Comp. Center)
Sr. Scientific
Programmer
M. Bailey
Sr. Computer
Analyst/Prog.
E. Gruidel
(IBM)
Publications
Specialist C
N. K. Fultz
Assoc. Graphic
Artist
J. L. Snow
Sr. Computer
Programmer
R. Borsuk
Secretary 1A
J. K. Bishop
Work
Study
Data Entry B
G. A. von Boritell
Programmer A/B
(open)
Steno Typist
H. I. Fellay
Secretary 1A
R. Sellers

APPENDIX V

## SUMMARY OF THE MAJOR RECOMMENDATIONS AND ITEMS OF ADVICE OF THE ADVISORY COMMITTEE'S FIRST MEETING

EXIR/EXIS (paragraphs 31-40)

1. It is recommended that during the coming year the Taximetrics Laboratory should:

   (a) seek to promote the use of EXIR in as many centres as possible;

   (b) prepare a general account of EXIR, directed to non-technical readers, so that this may be circulated widely;

   (c) complete the existing draft EXIR users' manual, edited to ensure that the inexperienced can readily understand it, and this should be published;

   (d) prepare a technical account of EXIR (and of EXIS also in due course), intended for systems programmers, and make this available.

2. The Advisory Committee proposes to make a special study of how the Taximetrics Laboratory can advise users on the general specifications of computer systems which can perform the work the users wish to do with EXIR/EXIS.

3. The Taximetrics Laboratory should consider providing training courses. The Advisory Committee has discussed some proposals for training (para 37) but questions related to training will be further discussed at the next meeting.

4. The role of the Taximetrics Laboratory in developing EXIS modules should in general be limited to the development of demonstration modules for the management and analysis of breeding programmes.

The management of existing collections (paragraph 41)

5. It is not felt that it would be appropriate for the Laboratory to provide a service by assembling and organizing the information about the accessions in the collections of centres, except in cases where the work would also benefit the Laboratory and the Board and help to make GR/CIDS more effective. In some cases at least the cost should be borne or shared by the users.

Library of genetic resources information (paragraph 42)

6. It is recommended that the Laboratory should build up a world-wide collection of duplicate information about collections.

APPENDIX V
(continued)

The development of GR/CIDS and the future of the Taximetrics Laboratory (paragraphs 46-50)

7. It is recommended that the Taximetrics Laboratory should participate in all meetings of the Board's Crop Germplasm Committees.

8. Of the effort of the Taximetrics Laboratory supported by the Board, it is advised that 10% should be regarded as available for forward-looking investigations intended to advance knowledge related to the Board's general fields of interest.

Programmes and budgets (paragraph 51)

9. It is felt that in established projects within the programme at the Taximetrics Laboratory the objectives should be more clearly defined than they have been in the past, the ways in which it is intended to attain them should be projected over a five-year period, and the extent to which they have been reached should be assessed, year by year.

10. It is advised that the management of information is so important for the Board's work that it may require the largest single allocation from the Board's budget for several years to come.

A new institutional structure (paragraph 52)

11. It is recommended that a study be undertaken of possible alternative new structures of the Taximetrics Laboratory and of the ways of achieving them, which takes into account the interests, needs and responsibilities of the Laboratory, the University and the Board.

Further work of the Advisory Committee (paragraph 53)

12. If the Advisory Committee acquires broader responsibilities, it is felt that it would be appropriate to add to the Committee a member nominated by the University of Colorado.

G12

1977

IBPGR

ADVISORY COMMITTEE OF THE INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES (IBPGR) ON THE GENETIC RESOURCES COMMUNICATION, INFORMATION AND DOCUMENTATION SYSTEM (GR/CIDS): Third Meeting

ADVISORY COMMITTEE OF THE UNIVERSITY OF COLORADO AT BOULDER ON THE INFORMATION SCIENCES/GENETIC RESOURCES PROGRAM (IS/GR): Second Meeting

IS/GR

# REPORT

AGPE:IBPGR/77/36
December 1977

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

Report of the

Third meeting of the Advisory Committee of the Board on the Genetic Resources Communication, Information and Documentation System (GR/CIDS)

Second meeting of the Advisory Committee of the University of Colorado at Boulder on the Information Sciences/Genetic Resources Program (IS/GR)

Boulder, Colorado, 17-19 October 1977

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

Rome 1977

IBPGR Secretariat
Crop Ecology and Genetic Resources Unit
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, Rome 00100, Italy

CONTENTS

CONTENTS (continued)

HISTORICAL AND ORGANIZATIONAL

1. The history, terms of reference and membership of the Advisory Committees, (which meet jointly and are known for convenience as the Programme Advisory Committee (PAC) are set out in the report on their joint meeting at Boulder, 24-26 January 1977. It was necessary for PAC to meet again in October 1977 so that it could review the budget proposals of IS/GR for 1978 at an appropriate time in the annual budgeting cycle of the International Board for Plant Genetic Resources (IBPGR) and of the Consultative Group for International Agricultural Research (CG). The members and observers present are listed in Appendix I. In addition, Professor Claude McMillan, Dr. G. Hersh and Dr. J. April of the IS/GR Program staff were present throughout, and other members of the staff attended for specific items or from time to time.

Membership and terms of reference

2. Following a discussion on the tasks and working of PAC, the Advisory Committee advises the University and the Board:

(a) that PAC should be continued after the three-year terms of office of the members appointed by IBPGR end in April 1979;

(b) that its terms of reference appear to be satisfactory;

(c) that Dr. L. Branscomb, whose other commitments are likely to make it increasingly difficult for him to participate as fully as he would wish in the work of the Committee in future, should be pressed to retain his membership, at least until April 1979, but invited to nominate an alternate to represent him at meetings which he cannot attend himself;

(d) that after April 1979 the terms of membership of the IBPGR Advisory Committee should be varied in length so that there will be both some continuity and some rotation in the membership;

(e) that the University of Colorado at Boulder should be invited to appoint an additional member from its College of Business and Administration (see paragraph 3 below);

(f) that the United States National Committee for Plant Genetic Resources should be invited to send an observer to future meetings of PAC, at least for so long as IS/GR continues to work with the Agricultural Research Service of the US Department of Agriculture on the genetic resources of economic plants in the US (see paragraph 23 below).

Organizational matters

Relation of IS/GR with the University

3. The Advisory Committee considered a proposal that the IS/GR Program become a part of the College of Business and Administration, associated particularly with the proposed Division of Information Science Research. The Advisory Committee, believing that the Program must remain at Boulder, agreed that this was not only the most suitable arrangement possible within the University (which does not include a school of agriculture or a biological department with a sufficient range of appropriate interests), but was also a good arrangement in its own right. The PAC, and IBPGR itself, will have to ensure that IS/GR's links with biology and agriculture are not weakened by their association with the business school, though PAC does not, at the moment, see any reason to fear that they will be. It commended the steps already taken to develop productive relationships with the applied biological and agricultural departments of Colorado State University at Fort Collins, 60 miles north of Boulder.

Internal organization of IS/GR

4. The present organizational structure of IS/GR is shown in Figure 1. Under Professor McMillan's direction, G. Hersh is Associate Director in Charge of Planning and Finance (currently assisted by E. Lyell), and J. April is Associate Director in Charge of Operations. He is assisted by J. Hanley and K. Rawal, and he manages four sections for Data Services (L. Vincent), investigations relating to the analysis and development of Genetic Resources Systems (D. Watt), Education and Training (G. McArthur), and Staff Support Services (A. Switzer). The operations are divided into projects. Each project is managed by one or another of the section leaders, but is executed by a mixed project team drawn from these four sections as appropriate.

5. The planning, budgeting and fiscal control processes of IS/GR have been developed, in part with the help of a staff officer from the World Bank. They are based essentially on estimates of the professional staff time, computer time and travel costs needed for particular projects. The estimates of professional staff time are derived from continuous records, kept by each staff member, of the allocation of his or her working time, in units of one hour, to different projects; and the multiplier which converts them into costs allows for the cost of support staff, services and consumables, and for other incidental costs. PAC was satisfied that these procedures are adequate at the present time, and they are also in accordance with the advice of the staff officer of the World Bank.

PROGRESS, PROSPECTS AND PROBLEMS: A GENERAL OVERVIEW

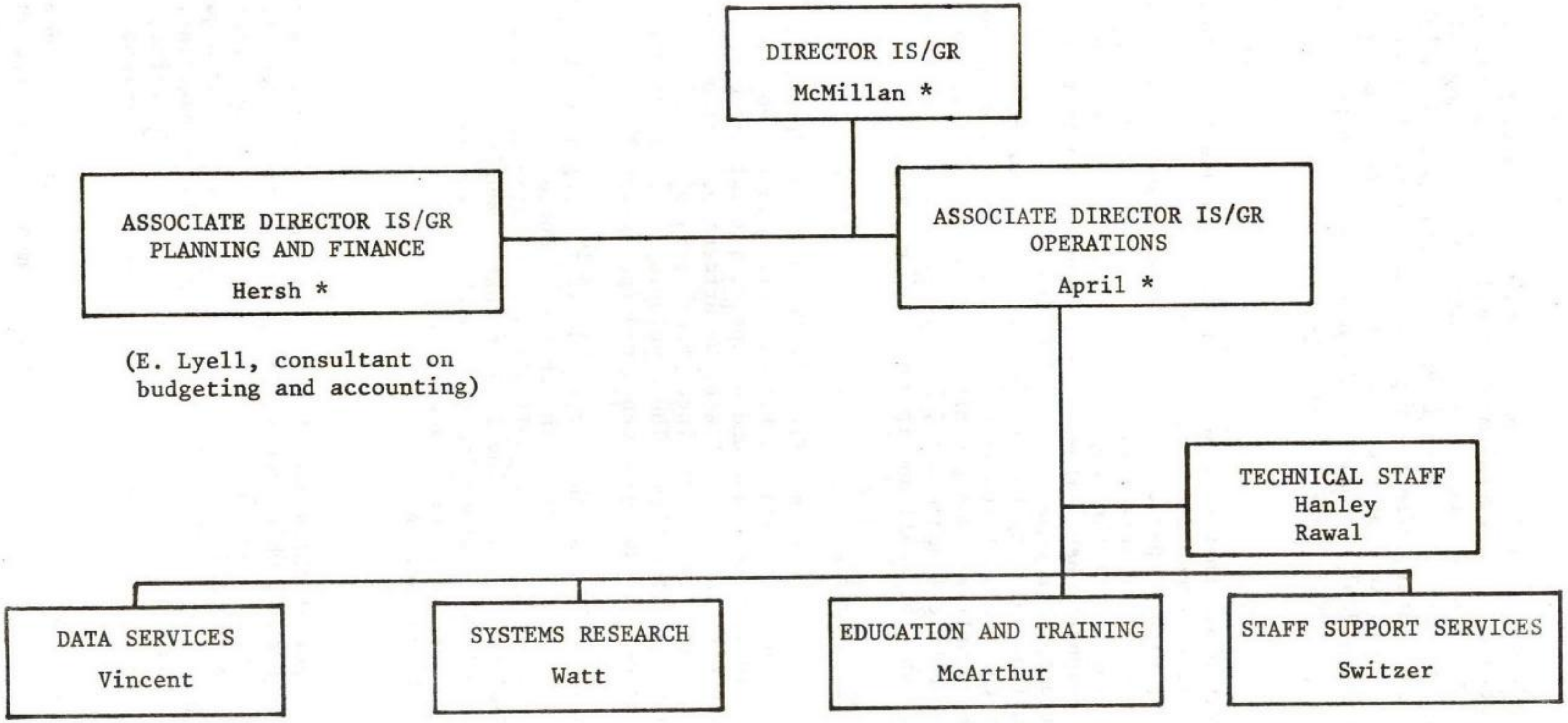
Evolution of the programme: from data to systems

6. The programme of work approved by the Committee at its meeting in January 1977 has made good progress. The quantity and quality of the work, and the internal organization and personal relations within the enterprise appear to be generally satisfactory. The presentations on information systems were not particularly clear to several members, but subsequent exchanges (reflected in paragraphs 41 to 53 below) have shown that this was more a question of semantics and professional language than of unclear or imprecise thought.

7. Perhaps the most significant feature of the past 10 months has been a distinct movement onwards from work and ideas related to the assembly, communication and retrieval of information, exemplified by the interest of PAC and IBPGR in descriptor systems and in EXIR, to work on systems for the management of information about genetic resources and for the management and use of the collections themselves. This appears to reflect the needs and pressures of the users, for whom information management is usually of interest only insofar as it helps them to work more effectively with the genetic materials themselves to improve crops and for other purposes. Of course these needs and pressures have been sensed before; and indeed much of the new work proposed for 1978 is on topics which it was hoped at one time to approach through specialised modules of EXIS.

8. As a corollary of this, little new work has been done on EXIR in 1977 except for the addition of a preprocessing procedure which will make it easier to set up EXIR on different types of computing machines. This is incorporated in the latest (and possibly final) version of EXIR, EXIR 3.0. The PAC agreed that while IS/GR would continue to supply appropriate versions of EXIR and the manuals about it to users, it could not afford to act as a conventional 'software' supplier, who would normally be expected, at a price, to set up EXIR on a client's equipment and to maintain it and incorporate improvements thereafter.

9. In general, it is clear, and perhaps not surprising, that non-commercial software produced by IS/GR, like EXIR, can be used effectively at present only by clients who can call on the help of computer programmers. In such circumstances, the questions arising from the work of IS/GR which relate to computers, and to which so much attention has been directed hitherto, are comparatively straightforward. More complex and difficult are those which relate to the nature and management of the information which goes into the computers, and to the use of the output which they produce.




* Executive Committee

Fig. 1 IS/GR ORGANIZATION CHART

as at
14 October 1977

Descriptors

10. Part of the information which goes into the computer consists of descriptors. The PAC was impressed by the opinion, expressed by several members and observers at the meeting, that descriptors (which often refer at present largely to taxonomic and morphological information) should also encompass information about environmental (soil and climatic) factors, yield and other agronomic attributes, effects of pests and diseases (rather than the arbitrary and even deceptive resistant/susceptible categories which are commonly used), and the extent of diversity within individual accessions (which are usually populations rather than assemblies of identical or even similar genotypes).

Costs

11. It has also become abundantly plain that to assemble, manage and use the information about genetic resources effectively is an expensive business. The numbers of species, of individual accessions and populations within species, and of centres interested in holding and using substantial collections, may all be large; much of the work of observation, recording and compiling the information before the computer can play a part has to be done by people, and mostly by hand; and computers have hitherto been expensive to install, operate and maintain. Two somewhat disparate consequences flow from this. First, IBPGR cannot attempt to finance all operations relating to genetic resources information: in general it expects IS/GR to recover the costs of its work from users, particularly those within the CG system or in developed countries, who can afford to pay for what they need. Second, IS/GR is to investigate the technical and economic usefulness, in work on genetic resources information, of the newer types of small and inexpensive computers.

IS/GR and the world genetic resources community

12. IS/GR is attracting growing interest not only from the Consultative Group, its members and the institutes which are funded through it, but also from other agencies. As its work and procedures become more widely understood and accepted, its influence is increasing. The growing relationship with the United States Department of Agriculture is valuable in its own right, but it also helps to convince other users of genetic resources that IS/GR has much of value to offer them. The developing association with the School of Agriculture at Fort Collins has already been mentioned (paragraph 3).

13. As it proceeds, the work of IS/GR is reaching wider and wider sections of the world community which is interested in its work and services in genetic resources, but the process has a long way to go yet. Through visits, lectures, publications, training courses and the like IS/GR will, we hope, come to feel more closely involved in that community. IS/GR will no doubt take every opportunity it can to strengthen its links with biology and agriculture, even though it has not so far proved feasible to associate a senior biologist with the Program, as PAC recommended at its 1st/2nd meeting.

Growth and some of its consequences

14. The growth of the work and budget of IS/GR has already required the new and more formal organization described in paragraph 4, which seems appropriate to the present size and pattern of activity of the group. We can be reasonably sure that this organization, so far from remaining static, will have to be developed further as IS/GR grows and acquires new clients, new interests and new activities. It maybe, for example, that managerial, policy-forming and development functions will tend to move to the office of the Director, releasing the time of senior professional staff members for more strictly professional duties.

15. Growth will entail other, more subtle, internal changes. To a visitor, it seems that relations within the IS/GR group are friendly and informal, communications free and spontaneous, and duties mutually understood and shared in ways which are normal (and may also be efficient) in a small organization. As organizations grow, these conditions change

because in a larger group people are not able continuously to be aware of what all their colleagues are doing and thinking, and a degree of specialization becomes necessary. This process has begun in IS/GR, and it is being offset by the usual device of constructing mixed project teams from different sections. This will no doubt be buttressed by formal channels of communication, planned to supplement the informal ones; but these do not come spontaneously or easily in a group which has hitherto been accustomed only to the latter.

16. New clients, new interests and new activities will also lead to changes in the relationship between IS/GR and IBPGR. IS/GR has hitherto depended on the University and the Board for resources. It is now well embarked on an entrepreneurial phase which is bringing in new clients with money to spend. The more such clients it acquires, the more independently it will be able to behave, possibly even in fields other than genetic resources. The relations of IS/GR with IBPGR, and also with the University, will therefore have to be carefully fostered.

REVIEW OF 1977

Work with particular crops and crop committees of IBPGR

17. The Maize Advisory Committee approved a first list of descriptors, selected from a list prepared by IS/GR after the meeting. IS/GR prepared an international directory and report for the committee. Special steps are being taken to obtain information about the holdings in a number of large and significant collections in Latin America, specified by the maize committee. The committee endorsed IS/GR's work with CIMMYT on maintenance and control procedures for CIMMYT's maize collections. A world-wide registry of holders of maize germplasm is in prospect, but to achieve it IS/GR and the crop advisory committee wish to consult the wider community of maize specialists with whom they are not at present directly in touch.

18. The Wheat Advisory Committee endorsed the list of descriptors approved by the Symposium organized by IBPGR in Leningrad in 1975, and pressed IS/GR to organize a meeting with a working group of international specialists to draft a minimum list of descriptors. It also encouraged IS/GR's work on a world-wide directory and inventory of genetic resources in wheat. As in the case of maize, the search for information obliges IS/GR and the crop advisory committee to go out to the world community, and this has so far yielded information from a number of centres in the United States. Data on collections in the USSR are awaited, and have also been sought from Japan, Germany and Italy.

19. IBPGR will note the need to ensure that the advice it receives from the crop advisory committees represents as widely as possible the interests and wishes of the world community concerned with each crop. There would be serious dangers if a significant part of that community were to come to feel that the crop committee does not adequately represent its views and interests.

Other crops

20. IS/GR's experience with wheat and maize has provided models for work on other crops, whether or not crop committees have been set up for them by IBPGR. A draft list of descriptors for cultivated potato was prepared for the International Potato Center, Lima, in collaboration with the curator of the collections, and data banks were assembled for sorghum and millet, *Phaseolus*, mung and urd beans *(Vigna radiata* and *V. mungo)*, groundnuts and quinoa. The short course (paragraph 25) provided opportunities for some small-scale work with information on coffee from Costa Rica and on fruit trees from Turkey.

Work with institutes within the Consultative Group system

21. IS/GR's work on individual crops has led to associations ranging from correspondence and visits to detailed collaborative work with plant breeders and genetic resources specialists in all the crop improvement institutes in the Consultative Group system (other than ICARDA, which has only just been set up). As a result, IS/GR has become increasingly

interested in the systems by which curators, breeders and other users manage, or would like to manage, not only the information about genetic resource materials, but the materials themselves, and in the links between these two management aspects and the use of the genetic materials in crop improvement programmes (see paragraph 22). It may well be useful in the future for IS/GR to explore, at the professional, operating level, with the community of curators and breeders in the system, the ways in which it can most effectively support their endeavours and share its growing experience with them. Possibly a workshop for this community would offer a suitable occasion. The work on physical management is reflected in the genetic resources maintenance and control system which is being developed for CIMMYT in the first instance but will be generally available later in 1977 or early in 1978 (see paragraph 44).

22. The work with CIMMYT has included a very important analysis of the results of international series of observations, tests and variety trials, intended to enable breeders to tabulate and assess the performance of lines and varieties, in different localities, both systematically and rapidly. This has led to the work foreseen in paragraph 49 on genetic resources evaluation systems.

Work with other elements of the world genetic resources network

23. The most important element here is the National Plant Germplasm System of the United States. Following the feasibility study reported at the last meeting of PAC, arrangements are now in train for five years of work to develop a national plant genetic resources data and information system for the United States Department of Agriculture. This system will strengthen the ability of curators and selected users to obtain information about, and to locate, the genetic resources for which they are responsible or which they need for their work; and it is also specified that it shall be compatible with the international system. The cost, over five years, is likely to exceed 2.5 million 1978 dollars.

24. IS/GR is in touch with numerous other centres in the world to find out how they manage and how they would like to manage information about genetic resources. The product will be a generalised descriptive statement about what genetic resources centres do (a germplasm centre information systems model). During 1977 IS/GR discussed with the IBM Scientific Centre at Peterlee, Durham, England, a possible joint project in which the two organizations would seek to identify the essential features of such a model. This may lead to a joint effort by IS/GR and the Peterlee Centre on the design of a system for the management of data bases that might be useful not only in genetic resources centres but perhaps in agricultural science generally.

Education, training and extension

25. Thanks to the financial support of FAO, 1977 saw IS/GR's first formal venture into education and training including participants from developing countries. Nineteen people from 15 mostly developing countries participated at Boulder in a short course of six weeks on systems for the management of genetic resources information. Eight participants were supported by FAO and the rest by their employers. Additional funds were provided by IBPGR (from funds allocated to regional programmes) and FAO. The course was expensive in travel costs, maintenance and computer time, but the class teaching and the practical experience of programming and working on computers (including the use of EXIR) were felt by the students to have been extremely valuable. The IS/GR staff felt that they had benefited from their close working relationship with those who attended the course.

26. A modest start was made in 1977 on the internship programme under which selected scientists came to IS/GR to increase their knowledge and experience by working as members of the group. One intern, from the University of Birmingham, England, was at Boulder during the Spring and a second, from Mexico, was there during the meeting of PAC.

27. A longer term programme of systematic teaching and practice in information management and related subjects is being planned (paragraph 55). It will lead to academic credits in the University and to a certificate.

28. The training and other materials produced by IS/GR during 1977 for distribution to students, would-be users, and crop germplasm advisory committees are listed in Appendix II.

Research and investigations related to development in 1977

29. A limited programme of research and investigation related to development was possible in 1977. None of it was concerned with the further refinement of EXIR; all of it was concerned with the ways in which curators and users manage genetic materials and information or with problems they encounter in so doing.

30. One group of projects was concerned with diversity in collections from two points of view. Two methods were studied for measuring diversity in collections, with the general object of devising a procedure which would enable users to draw, from a collection, samples of given size which contain as much heritable diversity as possible. Another project endeavoured to identify likely duplicates, or very similar accessions, in collections so that curators can grow them side by side to assess how far they are in fact identical.

31. Another project, based in part on the associations mentioned in paragraph 24 and on work in 1976, was a study of existing data management procedures of different kinds, in order to assess their comparative usefulness in the management of data about genetic materials. Associated with this was a study of a particular specialised (relational) method for drawing information from numerous files or data bases which relate to the same material but which cannot be merged efficiently or at all into a single data base. This is a very real problem in many centres which record separately the results of several different sorts of operations with genetic materials and then wish to consider aspects of them collectively.

32. Finally a study was begun of the usefulness of small, inexpensive sorts of computers which, if dedicated to a single application or a small number of applications, might help many smaller institutions and centres to apply to their work with genetic resources powerful data management procedures which have hitherto required a large and costly machine and programming support.

PROGRAMME FOR 1978

General

33. By and large, the programme for 1978 follows the lines described above for 1977. It seeks to define with increasing understanding what breeders and other workers with collections of genetically diverse materials of economic plants do and would like to do, what information they need for these purposes, and how that information can be obtained most effectively for a given cost. It also seeks to tell the genetic resources community what information science and its associated technology have to offer, and to design means by which the users, or would-be users, can acquire information management technology appropriate to their needs and resources.

34. The first stages in all this were, of course, begun several years ago. As a result, IS/GR is reasonably well informed about the essential components of effective information (data) management systems in individual centres of different kinds, and how they are realised in practice (usually by costly and tedious manual procedures) at present. It is also aware in a more general way of the tasks that have to be performed in a network system, and of the criteria (mostly relating to uniformity of procedures) which are necessary if a network is to work effectively.

35. The way in which IS/GR plans to carry its work forward are most simply indicated by the main budget headings, set out in the narrative below, of the programme planned for 1978. The structure of the programme is based on the management structure illustrated in Figure 1. Under the budget head for each section, several projects are described, together with the estimated total cost and the IBPGR contribution. The headings and the figures are repeated in the budget (Appendix III). Except for some of the projects in Section II (Development of Systems for Information Management) all the projects are intended to meet needs in both the GR/CIDS network of the IBPGR and the National Plant Germplasm System of the United States Department of Agriculture.

36. The budget, which was not firm at the time of our meeting, was discussed by PAC in principle only, and not in detail. Since the meeting, the budget has been completed in the light of our discussions. It will be considered by the Executive Committee of the IBPGR in December and also circulated to members of PAC, whose comments will be conveyed to the IBPGR when it meets in February 1978. Subject to these further comments, PAC commends the budget to IBPGR and to the University of Colorado at Boulder.

I. Data services (acquisition, transfer and interpretation of data)

37. The work under this heading is concerned primarily with information rather than with procedures or systems for managing it, which is the task of II below (paragraph 41 *et seq.*). It continues the effort, initiated in 1976, to assemble large quantities of genetic resources data at Boulder and organize them into data banks which provide information for users and may serve as models for other centres.

A. Development of crop descriptor language

38. In cooperation with IBPGR's germplasm advisory committees, this project will identify, and help to reach broader agreement on, minimum descriptors and descriptor states for different crops. The agreed standards will be communicated to the community of breeders and others concerned with each crop ($67,300, of which $54,700 from IBPGR). 1/

B. Acquisition of data about germplasm

39. This project will assemble, from as many institutions as possible, data about genetic resources of wheat and maize, and of sorghum, potatoes, beans and (as opportunity allows) other crops. In wheat and maize, centres have been designated by the crop germplasm advisory committees. They include INIA (Mexico), ICA (Colombia), INTA (Argentina), EMBRAPA (Brazil), PCIM (Peru), USDA and various centres in Europe for maize; and the Bari Germplasm Centre (Italy), the Vavilov Institute (USSR), the Institut Pflanzenbau FAL (Braunschweig, Federal Republic of Germany), EMBRAPA, INTA and centres in the United States for wheat ($79,100, of which $49,400 from IBPGR).

C. Organization and communication of data

40. This project will promote the use of data by providing efficient means for managing and analysing them, by publishing summaries and directories, and by helping centres (particularly PCIM (Peru), CIP (Lima, Peru) and Bari). By the end of 1978 IS/GR expects to have assembled the information about all the accessions in all the larger or more significant collections of wheat and maize in the world. From published summaries of the information the crop committees will be better able (as the first meeting of the Wheat Committee pointed out) to advise IBPGR about the further collections needed, and about description, evaluation and other genetic resources activities for these crops ($97,400, of which $63,200 from IBPGR).

II. Investigation and development of systems for the management of information about genetic resources

41. Work in this section is intended to develop computer procedures ('software'), and the associated methods for preparing data for them and using the output from them, which

1/ Costs in paragraph 38 *et seq* do not include C.U. costs.

will help users to deal more coherently and efficiently with a number of important tasks or difficulties which arise in the conservation, distribution and use of germplasm materials. Two of these procedures were initially developed for, and applied at, CIMMYT in 1977 (for germplasm maintenance and control, and for the analysis of data arising from multiple variety trials and other evaluation procedures); and others were contemplated earlier as modules of EXIS. Though the work of IS/GR is evidently evolving from an initial concentration on data about accessions towards a broader endeavour on management systems, many of the newer tasks were in fact envisaged two or more years ago.

42. The projects are intended not only to resolve a number of practical difficulties which have become evident at one or more centres but also to find out whether it is possible to devise and use standard but adaptable components which, taken together, will form an articulated and logical system for handling information, and even the materials themselves, in a genetic resources centre, programme or network. This is, of course, the central purpose of GR/CIDS; and indeed such standard components would make it substantially easier and cheaper to realise IBPGR's conception of GR/CIDS as a unified global communication system.

A. Germplasm registry (for the US National Plant Germplasm System)

43. USDA wishes to develop a national registry system for holdings of plant genetic resources in the US which can be queried, and into which data can be entered, at many points. (We are all well accustomed to multiple-access information systems in our dealings with banks and airlines). A prototype component will be designed and tested at the National Seed Storage Laboratory (NSSL), Fort Collins and at the Plant Introduction Office in Washington, using the computer at Fort Collins ($56,700, IBPGR nil).

B. Germplasm maintenance and control

44. This will develop the component already designed for CIMMYT for the control and maintenance of the stock inventories of genetic resources collections (see paragraph 21). PCIM, INIA and selected centres in the United States will probably participate as well as CIMMYT ($61,400 of which $26,700 from IBPGR).

C. Germplasm data capture

45. This component will seek to improve and standardise the methods by which field and laboratory data are collected and prepared for use, and to lessen the number of times they have to be transcribed. In these ways it should decrease labour and minimise errors. ($17,400, all IBPGR).

D. Management of germplasm data

46. Commonly, in genetic resources work, information about a particular accession is contained in several different sets or files of information in a data bank, or in different data banks which are only partly congruent or compatible with one another. Unless special procedures are available, it may be extremely tedious to assemble information about a particular accession from the different files; and in addition it is to be expected that a good deal of information will be redundant because it is duplicated in different files. This wastes both time and memory space in the computer, and it can lead to particular difficulties if a correction is made to the information about an accession in one file but not in all the others in which that accession figures.

47. A converse difficulty arises because software programmes are tied intimately to the data they are designed to process: they are 'data dependent'. If several different programmes are used to process the same file, and a change is made in the file to facilitate the use of one of the programmes, the other programmes will have to be changed also.

48. Difficulties of these types entail substantial increases in costs for computer time and the maintenance of both data files and processing procedures (software). IS/GR proposes to investigate possible systems for the management of multiple data base systems, in cooperation with PCIM, INIA, CIMMYT, CIP, EMBRAPA and some centres in the United States ($80,100, IBPGR $34,300). The collaboration with the IBM Science Centre at Peterlee, Durham, England (paragraph 24) is relevant here.

E. Germplasm evaluation procedures

49. Accessions in a collection will sooner or later be evaluated in respect of greater or smaller numbers of attributes in which users are interested. The evaluations may be conducted by means of variety trials, or by planting nurseries at many locations in different environments. This project will seek to develop efficient and unified procedures for the organization and analysis of the large, costly and diverse masses of information which are generated in this phase of genetic resources work. In developing this component it may be appropriate to work with CIAT, CIMMYT, ICRISAT and IITA as well as with centres in the United States ($40,450, IBPGR $36,800).

F. Exploratory data analysis

50. The components grouped together under this heading are intended to permit certain types of preliminary examination of large assemblages of data, for example to detect possible duplicates, to indicate patterns and relationships, to assess and sample diversity and to measure the extent to which described attributes are affected by environment. IS/GR may be able to work with PCIM, CIP, CIAT and the Vavilov Institute in developing them($30,850, IBPGR $27,200).

G. Investigation of low-cost computing systems

51. Now that small micro-computers are becoming relatively cheap and easier to get, it is essential to find out how far they can be used, along with standard and adaptable information management components, to make the handling and communication of information more economical, more reliable and more convenient for the genetic resources community, while decreasing or eliminating the difficulties of computer maintenance that beset most users, particularly in developing countries. This project is intended to continue IS/GR's past studies of the usefulness of these evolving machines ($32,000, IBPGR $24,200).

H. Field Support for CIMMYT

52. It is proposed to assign a systems analyst from IS/GR to CIMMYT until the end of July 1978 to help with the development and testing of the CIMMYT information management system for plant genetic resources, which has been so valuable a test bed for components of GR/CIDS hitherto ($15,250, IBPGR nil).

I. System development for Great Western Sugar Co.

53. This company has asked IS/GR to develop, at its cost, an information management system for its own work with plant genetic resources ($15,250, IBPGR nil).

III. Education and training

54. In this sector, IS/GR will continue to design, develop and implement programmes of instruction of various kinds, to make potential users aware of the help information science can give to plant genetic resources work, and to enable them to understand and use the procedures it has to offer.

55. The budget contains four elements. $5,600 (all IBPGR) is the estimated cost of some preparatory work on a possible formal course, which would lead to University credit,

to be conducted both in Colorado State University at Fort Collins and in the University of Colorado at Boulder. The formal short course, leading to a certificate, will be offered for the second time ($63,300, IBPGR $6,000). A somewhat limited trainee programme, and an expanded and formalised internship programme, will require $33,800 (all IBPGR).

56. In addition to these three more formal components, directed to teaching and training in-house, staff time will be devoted to the planning and perhaps to the execution of a series of Field Training Programmes to be conducted at genetic resources centres for curators, researchers and administrators ($40,800, IBPGR $19,900).

57. Additional work related to education and training will include consultation with visiting scientists and participation in the affairs of learned and professional societies.

IV. Planning and programme development

58. During 1978 IS/GR proposes to continue the process begun in 1976 and 1977 of moving past developments out of Boulder and delivering them to the genetic resources community. IS/GR wishes to advance its relationships with genetic resources centres and other present and possible future users, including at least some who will pay for the services of IS/GR and will consequently acquire the status of donors. The budget provides $109,100 (IBPGR $80,750) for these purposes, but no detail of the breakdown of this substantial item is available at the time of writing.

V. Further outlook

59. In addition to the budget for 1978, a notional projection was submitted to PAC of financial needs up to 1983, for which year the proposed total (in 1978 dollars) was $2,234,000 (IBPGR contribution suggested, $720,000). PAC was informed that it did not seem likely at this stage that the IBPGR contribution would ever exceed $600,000, that $500,000 was a more probable limit, and that it should be expected to decline rather than increase over the years ahead.

60. IS/GR clearly wishes to be able to follow up all possibilities of support to, and cooperation with, people (and institutions) in the genetic resources field who need to use information more productively, and to be able to develop procedures, within the international network, to enable them to do so. This is a laudable ambition, but it is also a substantial one; and it may not be possible or desirable to achieve it at the rate which IS/GR proposes. There is a very real possibility that the growth of IS/GR's work with the international institutes, and with national and regional centres in the richer countries, will outrun the rate of development of the Board's network, particularly in the less developed countries, as well as the capacity of existing network elements to absorb the output from IS/GR. PAC imagines that IBPGR will wish it to keep this matter under continual close review.

A.H. Bunting
Chairman
for the Advisory Committee

25 November 1977

APPENDIX I

## MEMBERS AND OBSERVERS PRESENT AT THE MEETING OF THE PROGRAM ADVISORY COMMITTEE, 17-19 OCTOBER, 1977

### MEMBERS PRESENT

Dr. Lewis M. Branscomb
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Dr. Rose M. Litman
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Dr. Wilfredo Salhuana
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### MEMBER ABSENT

Dr. Keith W. Finlay
Deputy Director-General
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APPENDIX II

## IS/GR PUBLICATIONS DURING 1977

| | |
|---|---|
| Technical Report to the Maize Advisory Committee of the International Board for Plant Genetic Resources | July 1977 |
| Maize Directory | September 1977 |
| Wheat Directory | September 1977 |
| General Data Summary | September 1977 |
| Data Preparation Manual | September 1977 |
| EXIR Brochure | September 1977 |
| EXIR Ready Reference Guide | September 1977 |
| EXIR Error Messages and Dimensions | September 1977 |
| Internship Brochure | September 1977 |
| GRIS Short Course Brochure | November 1977 |
| IS/GR "Who We Are" Brochure | November 1977 |
| EXIR User's Manual (Version 3.0) | December 1977 |

APPENDIX III

## BUDGET OF IS/GR FOR 1978

Table 1 - Combined IBPGR, USDA, FAO, CIMMYT and GWS Budgets

| | PM | PM Dollars (at $2,650 each) | Computing: Grantors | C.U. | Travel | Total |
|---|---|---|---|---|---|---|
| I. DATA SERVICES | | | | | | |
| A. Development of Crop Descriptor Language | 22 | 58,300 | 4,000 | 25,000 | 5,000 | 92,300 |
| B. Acquisition of Data about Germplasm | 24 | 63,600 | 4,000 | 20,000 | 11,500 | 99,100 |
| C. Organization and Communication of Data | 26 | 68,900 | 25,000 | 95,000 | 3,500 | 192,400 |
| SUBTOTAL | 72 | 190,800 | 33,000 | 140,000 | 20,000 | 383,800 |
| II. DEVELOPMENT OF INFORMATION MANAGEMENT SYSTEMS | | | | | | |
| A. Germplasm Registry | 18 | 47,700 | 5,000 | 5,000 | 4,000 | 61,700 |
| B. Germplasm Maintenance and Control | 16 | 42,400 | 10,000 | 35,000 | 9,000 | 96,400 |
| C. Germplasm Data Capture | 6 | 15,900 | 500 | 5,000 | 1,000 | 22,400 |
| D. Management of Germplasm Data | 24 | 63,600 | 12,000 | 40,000 | 4,500 | 120,100 |
| E. Germplasm Evaluation Procedures | 13 | 34,450 | 1,500 | 14,000 | 4,500 | 54,450 |
| F. Exploratory Data Analysis | 9 | 23,850 | 2,500 | 19,000 | 4,500 | 49,850 |
| G. Investigation of Low Cost Computing Systems | 10 | 26,500 | 4,000 | 2,000 | 1,500 | 34,000 |
| H. Field Support for CIMMYT | 5 | 13,250 | 1,000 | 5,000 | 1,000 | 20,250 |
| I. Systems Development for Great Western Sugar Co. | 5 | 13,250 | 1,750 | - | 250 | 15,250 |
| SUBTOTAL | 106 | 280,900 | 38,250 | 125,000 | 30,250 | 474,400 |
| III. EDUCATION AND TRAINING | | | | | | |
| A. Development of University Accredited Programs | 2 | 5,300 | - | - | 300 | 5,600 |
| B. Formal Certificate Program* | 14 | 37,100 | 5,500 | 25,000 | 20,700 | 88,300 |
| C. Intern and Trainee Program | 12 | 31,800 | 1,000 | 10,000 | 1,000 | 43,800 |
| D. Seminar and Field Training | 12 | 31,800 | 3,000 | 15,000 | 6,000 | 55,800 |
| SUBTOTAL | 40 | 106,000 | 9,500 | 50,000 | 28,000 | 193,500 |
| IV. PLANNING AND PROGRAM DEVELOPMENT | 34 | 90,100 | 1,000 | - | 18,000 | 109,100 |
| TOTAL | 252 | 667,800 | 81,750 | 315,000 | 96,250 | 1,160,800 |
| | | | | | Less C.U. Computing - | 315,000 |
| | | | | | TOTAL GRANTS - | 845,800 |

* Short course

Table 2 - IBPGR Budget

| | PM | PM Dollars (at $2,650 each) | Computing: Grantors | C.U. | Travel | Total |
|---|---|---|---|---|---|---|
| I. DATA SERVICES | | | | | | |
| A. Development of Crop Descriptor Language | 18 | 47,700 | 3,000 | 20,000 | 4,000 | 74,700 |
| B. Acquisition of Data about Germplasm | 16 | 42,400 | 1,000 | 10,000 | 6,000 | 59,400 |
| C. Organization and Communication of Data | 18 | 47,700 | 13,000 | 70,000 | 2,500 | 133,200 |
| SUBTOTAL | 52 | 137,800 | 17,000 | 100,000 | 12,500 | 267,300 |
| II. DEVELOPMENT AND INFORMATION MANAGEMENT SYSTEMS | | | | | | |
| B. Germplasm Maintenance and Control | 8 | 21,200 | 2,500 | 20,000 | 3,000 | 46,700 |
| C. Germplasm Data Capture | 6 | 15,900 | 500 | 5,000 | 1,000 | 22,400 |
| D. Management of Germplasm Data | 12 | 31,800 | 2,000 | 15,000 | 500 | 49,300 |
| E. Germplasm Evaluation Procedures | 12 | 31,800 | 1,000 | 12,000 | 4,000 | 48,800 |
| F. Exploratory Data Analysis | 8 | 21,200 | 2,000 | 17,000 | 4,000 | 44,200 |
| G. Investigation of Low Cost Computing Systems | 8 | 21,200 | 2,000 | 1,000 | 1,000 | 25,200 |
| SUBTOTAL | 54 | 143,100 | 10,000 | 70,000 | 13,500 | 236,600 |
| III. EDUCATION AND TRAINING | | | | | | |
| A. Development of University Accredited Programs | 2 | 5,300 | - | - | 300 | 5,600 |
| B. Formal Certificate Program* | 2 | 5,300 | - | 15,000 | 700 | 21,000 |
| C. Intern and Trainee Program | 12 | 31,800 | 1,000 | 10,000 | 1,000 | 43,800 |
| D. Seminar and Field Training | 6 | 15,900 | 1,000 | 5,000 | 3,000 | 24,900 |
| SUBTOTAL | 22 | 58,300 | 2,000 | 30,000 | 5,000 | 95,300 |
| IV. PLANNING AND PROGRAM DEVELOPMENT | 25 | 66,250 | 500 | - | 14,000 | 80,750 |
| TOTAL | 153 | 405,450 | 29,500 | 200,000 | 45,000 | 679,950 |
| | | | | | Less C.U. Computing - | 200,000 |
| | | | | | TOTAL IBPGR - | 479,950 |

* Short course

Table 3 - Summary Budget Breakdown by Grantors

| | Board | USDA | FAO | CIMMYT and Great Western | TOTAL |
|---|---|---|---|---|---|
| I. DATA SERVICES | 167,300 | 76,500 | - | - | 243,800 |
| II. DEVELOPMENT OF INFORMATION MANAGEMENT SYSTEMS | 166,600 | 152,300 | - | 30,500 | 349,400 |
| III. EDUCATION AND TRAINING | 65,300 | 20,900 | 57,300 | - | 143,500 |
| IV. PLANNING AND PROGRAM DEVELOPMENT | 80,750 | 25,700 | 2,650 | - | 109,100 |
| | 479,950 | 275,400 | 59,950 | 30,500 | 845,800 |
| | | | | Plus C.U. Computing | - 315,000 |
| | | | | TOTAL BUDGET- | $1,160,800 |

APPENDIX IV

## SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

### FUTURE AND MEMBERSHIP OF PAC (paragraph 2)

1. (a) PAC should be continued after the three-year terms of the members appointed by the IBPGR end in April 1979

   (b) The terms of reference of PAC appear to be satisfactory

   (c) Dr. L. Branscomb should be pressed to retain his membership, at least until April 1979, but should be invited to nominate an alternative to represent him at meetings which he cannot attend himself

   (d) After April 1979 the terms of membership of the IBPGR Advisory Committee should be varied in length to ensure both continuity and rotation in the membership

   (e) The University of Colorado at Boulder should be invited to appoint an additional member from its College of Business and Administration

   (f) The United States National Committee for Plant Genetic Resources should be invited to send an observer to future meetings of PAC, at least as long as IS/GR continues to work with the Agricultural Research Service of the US Department of Agriculture on the genetic resources of economic plants in the US.

### STATUS OF IS/GR IN THE UNIVERSITY OF COLORADO, BOULDER

2. The IS/GR Program should become a part of the College of Business and Administration of the University of Colorado at Boulder, associated particularly with the proposed Division of Information Science Research, if it is established. Care will be needed to foster IS/GR's links with biology and agriculture (paragraph 3).

### ORGANIZATION AND BUDGETARY PROCEDURE

3. PAC approved the current budgetary procedure of IS/GR and took note of the present organizational structure (paragraphs 4, 5).

### EVOLUTION OF THE IS/GR PROGRAM DURING 1977

4. The IS/GR Program has made good progress in 1977 and its internal organization and personal relationships appear to be satisfactory. PAC still encounters semantic difficulties with the professional language in which some presentations are made to it (paragraphs 6, 7).

5. Work on systems for the management of genetic resources information is now developing alongside the continuing work on the assembly, organization and retrieval of information about genetic resources collections. Little further work has been done on EXIR which is available on request (against payment in appropriate cases). It is clear that EXIR is likely to be useful only to users who cann call on the help of computer programmers.

### GROWTH OF IS/GR

6. The rapid growth of IS/GR which can be foreseen will lead to new needs in management, in organization and in relationships, particularly with IBPGR and the University (paragraphs 14, 16).

CROP COMMITTEES AND DESCRIPTORS

7. Descriptors should include information about environmental adaptation, yield and agronomic factors, diversity within accessions and reaction to pests and diseases, in addition to taxonomic and morphological information (paragraph 10).

8. It is important to ensure that crop advisory committees consult sufficiently widely to ensure that their advice to IBPGR truly represents the interests and wishes of the world communities they are intended to represent (paragraph 19). It may be useful to IS/GR to explore, with the breeders in the institutes of the CG system, the ways in which collaboration might develop (paragraph 21).

PROGRAMME AND BUDGET

9. Subject to further comments from its members, the Advisory Committee commends the budget in 1978 (paragraphs 38-58 and Appendix III) to IBPGR and to the University. All the items proposed for financing by IBPGR are relevant to IBPGR's GR/CIDS programme, and almost all of the items to be funded by other agencies, including the US Department of Agriculture, are also relevant to that programme (paragraph 36).

10. The proposed programme for 1978 has four sections. The first (paragraphs 37-40) is concerned with the acquisition, transfer and interpretation of information about genetic resources, and includes work on descriptors and the assembly of information about the accessions in existing collections. The second (paragraphs 41-53) will investigate ways to make a wide range of essential practical activities and procedures in genetic resources centres and collections as efficient and coherent as possible. Some of these procedures have the same objectives as the earlier EXIS modules. The third (paragraphs 54-57) covers education and training and the fourth (paragraph 58) cover aspects of the delivery of the products of IS/GR's work to users and the further extension of IS/GR's service to users, some of whom may become donors.

11. There is a certain risk that the wish of IS/GR to expand and grow may run ahead of the development of the global network which it is IBPGR's task to develop and articulate (paragraph 60).

Central Files -
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1977

# Programme and Budget Proposals for 1978

International Board for Plant Genetic Resources

AGPE:IBPGR/77/14
12 May 1977

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

# PROGRAMME AND BUDGET PROPOSALS FOR 1978

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES
Rome, 1977

IBPGR Secretariat
Crop Ecology and Genetic Resources Unit
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, Rome 00100, Italy

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# I OBJECTIVES OF THE IBPGR

The major task of the IBPGR is to organize an international network of plant genetic resources centres, to ensure that the genetic diversity of important food crops and other plants - which represents one of the world's major natural resources - is adequately collected, is satisfactorily conserved, evaluated and documented, and is made available for use by plant breeders and other scientists. The successful accomplishment of this task will prevent the threatened loss of significant genetic diversity of many crops in a time of great change and development in agriculture and land use, including the introduction of new varieties, and will provide genetic resources for future progress in plant improvement.

The emerging IBPGR network includes centres concerned with specific crops or groups of crops, and centres concerned with all crops in a particular geographical area, national or regional. The IBPGR has accepted the responsibility assigned to it by the CGIAR to encourage and, where necessary, support an appropriate and coordinated global programme of genetic resources activities by these various centres, and to foster collaborative efforts among them.

More specifically, the IBPGR seeks:

- to identify the needs for exploration, collection, evaluation and conservation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities, and to ensure that the materials conserved are made available for plant breeding and other specific activities as required

- to establish standards, methods and procedures for exploration and evaluation and to determine minimum standards for conservation and regeneration of stocks of both seeds and vegetative material

- to arrange for duplicate storage of seed and vegetative stocks

- to promote technical meetings on crop genetic resources

- to promote relevant training at all levels

- to develop a world-wide network of institutions, organizations and programmes able to contribute to the Board's objectives

- to promote the coordination of programmes to avoid unnecessary duplication and fill in gaps

- to strengthen the programmes of existing institutions and, where necessary, to encourage the establishment of new organizations, institutions and programmes, particularly in areas of major diversity

- to promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections

- to encourage the development and implementation of appropriate information storage and retrieval systems, linking together the genetic resources centres in the Board's international network

- to help finance those parts of priority genetic resources programmes not adequately supported by other sources of finance

## II FUNDS REQUESTED FOR 1978

The total proposed budget for 1978 is $1,863,500 ($1,969,310 after provision for inflationary price increases of 6%). This proposed budget is substantially larger than the amount originally budgeted for 1977, $1,289,000, which has since been revised upwards to $1,361,727 (see Table III). Both the upward revision of the 1977 programme and the increase in the 1978 programme are due, to a very large extent, to a marked increase in projected collection activities, as a result both of recommendations of the Board's Crop Germplasm Advisory Committees and of the formulation of regional programmes under the Board's auspices. In the 1978 proposed budget, unlike the 1977 budget, most of these collection activities have been provided for as components of regional activities.

It should be emphasized that the IBPGR's programme, in the view of the Board, has now entered or is approaching a period of maximum growth. The Board believes that its budget will settle at a plateau of around $3 million (in present dollar terms) over the next 3-5 years. No major shift of emphasis is envisaged in the Board's programme over the next three years, except for the continuing development of regional activities.

As shown in Table II, there is expected to be a carry-over from 1977 of $50,000 of restricted core funds. Accordingly, the new funds requested by the IBPGR for 1978 amount to $1,908,000.

The Board agreed at its fourth meeting that it was not yet in a position to provide meaningful projections for specific activities to be undertaken in the years 1979, 1980 and 1981. However, where estimates of future requirements could be made with any degree of confidence, provisional projections have been mentioned in the narrative (see Section IV, Programme Elements).

## III SUMMARY OF ACHIEVEMENTS AND RESULTS

Perhaps the most significant result of the Board's work during its first three years has been the remarkable catalytic effect which its establishment and initial operations have had upon the genetic resources activities of many nations around the world and of many international, regional and national agricultural research centres. The agricultural research community seems to have been waiting for the lead the Board has provided. In several countries, new national organizations have been created to accelerate genetic resources programmes; in a number of others, additional funding for existing organizations has been provided. The International Agricultural Research Centres, which since their inception have been active in building up their germplasm, have now, for the most part, assumed a more general responsibility for promoting genetic resources activities in relation to the crops for which they have research responsibility. In addition, several of them have either established new germplasm units, or expanded their collection and evaluation programmes, or improved their seed storage facilities, or have taken action in several of these respects. On the regional level, two new regional genetic resources centres have been established - in Turrialba and Addis Ababa - and new regional efforts are being undertaken in Southeast Asia and in the Mediterranean area.

In sum, the pace of genetic resources activity over much of the world has quickened markedly since the IBPGR was created, thus greatly facilitating advancement of the Board's objectives. The world community of plant breeders has come to see the Board as representing an international endeavour vital to its work.

Among the Board's own activities, the following may be singled out as particularly noteworthy:

(a) Creation of five Crop Germplasm Advisory Committees - for wheat, maize, rice, sorghum and millets and *Phaseolus* beans - in cooperation (except for wheat) with the appropriate International Agricultural Research Centre. Each of these Committees serves as a bridge between the Board and the global community of scientists working on the particular crop. Each Committee has met at least once and each has begun to provide the Board with invaluable information with respect to the priority actions needed for the satisfactory collection, conservation, evaluation, documentation and use of the genetic diversity of the crop or crops with which the Committee is concerned;

(b) Support by the Board for intensified collection efforts in the Mediterranean region - particularly of cereals and other crops in North Africa where the risk of loss is substantial. While no regional organization has yet been created, nor any long-term regional programme yet been agreed, a growing number of countries in the region are participating in collecting expeditions and duplicates of all seeds collected are being stored, for the time being, for all the countries at the Germplasm Laboratory at Bari, Italy;

(c) Development by the Board of a plan to accelerate collection and conservation activities in Southwest Asia, where important genetic diversity is also in danger of being lost. This plan envisages establishment of a Genetic Resources Support Unit (GRSU) to assist in the expansion and execution of the national genetic resources programmes of Afghanistan, Iran, Iraq, Pakistan, Syria and Turkey. Implementation of this vital programme awaits only the formal governmental approvals required;

(d) Formulation by the countries of Southeast Asia, under the sponsorship and with the help of the Board, of a proposed regional plan of action and a proposed organizational framework to assure its implementation. Initial steps in carrying out this plan are being taken in 1977;

(e) Intensification of collection activities, financed by the Board, to collect sorghum and millets in the Sahelian zone, roots and tubers in various parts of Africa, forage legumes in Latin America, potatoes in Argentina, groundnuts in Brazil and a range of crops in parts of Pakistan and India;

(f) Designation by the Board, in consultation with the centres concerned, of the institutions responsible for maintaining the world's major base collections of seeds of the principal food crops;

(g) Development and publication, by the Board, of recommended standards for the engineering and design aspects of long-term seed storage facilities;

(h) Support by the Board for the development and installation of appropriate computerized systems to deal with information concerning genetic resources collections and their documentation, storage and retrieval;

(i) Support by the Board for the expansion of training programmes designed to provide adequate numbers of personnel in the developing world trained for genetic resources work.

## IV PROGRAMME ELEMENTS

A summary of costs by programme activity is shown in the appended tables:

Table I Summary of costs by programme activity 1975-78

Table II Summary of sources and application of funds

Table III Breakdown of costs by items: 1976-1978

### 1. INFORMATION AND DOCUMENTATION ACTIVITIES

The proposed 1978 budget provides for continuation of support, at a modestly increased level, for the Information Sciences/Genetic Resources (IS/GR) Program (formerly the Taximetrics Laboratory) at the University of Colorado in Boulder. This Program has made significant progress in developing adequately a Genetic Resources Communication, Information and Documentation System (GR/CIDS) for recording and managing information about the accessions in genetic resources collections, and the emphasis of its work, both this year and in 1978, will be on assisting the international and other centres within the world network in installing and using such systems. The Board believes that this work must proceed, and at an accelerated pace, so that the breeders and the other scientists can know what genetic resources are available in the world's collections, what characteristics they have, and where samples can be obtained.

The IS/GR Program has been working with a number of international (including those of the CG system) and national centres in building up data bases. The Program now holds duplicates of considerable amounts of genetic resources information on a wide range of crops: maize, rice, sorghum and wheat; cassava and potato; beans, chickpeas, groundnuts, peas and pigeon peas. In 1977 the Program will cooperate closely with the IBPGR Crop Advisory Committees, especially in the effort to work out agreed lists of descriptors. All the data held at Boulder are duplicates of those held by the institutions which assembled them in the first place, but the Program continues to assist centres in preparing data for machine processing, identifying duplicates, and generally putting the information about their germplasm collections in order.

During 1976-1977, the IS/GR Program has also made progress in developing systems to help managers of germplasm collections maintain appropriate inventories and physically control stocks.

EXIR (Executive Information Retrieval) has proved to be very effective for recording and managing genetic resources information. Users' manuals for EXIR have been published, and versions of EXIR are available for installation in a wide range of computers of different makes and sizes, including the so-called 'mini-computers'. In 1977, manuals will be available dealing with data preparation for use in EXIR, with graphic and other visual displays of EXIR outputs, and with the EXIR report generator.

In the summer of 1977, the IS/GR Program will conduct a short training course on management systems for genetic resources information for scientists from developing countries. This course is being financed by FAO. The Board believes that in 1978 the training activities of the IS/GR Program will have to be intensified.

The IBPGR established in 1976 a small, high-level Advisory Committee to advise it with respect to the IS/GR Program. The members of this Committee also serve, together with members of the faculty of the University of Colorado, as an advisory body to the University and to the Director of the Program. The Advisory Committee, at its second meeting held in January 1977, agreed that the next few years must be a period of expansion in the work of the Program in order to serve the needs of the Board and of institutions in establishing its network. The Board agreed with this conclusion but, because of its own financial constraints, decided that it could provide only limited additional support for the IS/GR Program in 1978. The Board hopes that financing from other sources may be forthcoming to supplement its own subvention.

Of the total of $471,500 for Item 1 in the proposed 1978 budget, $450,000 is for services provided by the IS/GR Program. The allocation of this total among the various items of expenditure will be agreed by the third meeting of the IBPGR Advisory Committee on GR/CIDS in October 1977. The IS/GR Program estimates a minimum requirement for 1978 of $598,800 but the IBPGR proposes to provide support to the level of $450,000. The remainder represents the cost of the Advisory Committee and a modest sum to help implement documentation systems in the regions. It should be noted that, of the amount paid to the University of Colorado in 1976, $44,000 related to the 1975 programme and $7,000 related to the 1977 programme.

## 2. REGIONAL ACTIVITIES

The Board has identified the following regions for priority action: Mediterranean, Southwest Asia, South Asia, Southeast Asia, Ethiopia and Meso-America. With encouragement from the Board, new regional genetic resources centres were established in 1976 in Turrialba and Addis Ababa, with financial support from the Federal Republic of Germany. These two centres will take the lead in formulating and implementing regional programmes for Ethiopia and Meso-America. In two other regions, the Mediterranean and Southwest Asia, collection and other genetic resources activities are being, or are to be, supported directly by the Board and these account for a large part ($370,000) of the total allocation for regional activities ($620,000) in the proposed 1978 budget.

A regional programme in South Asia has yet to develop but, under the leadership of the newly established Indian National Bureau of Plant Genetic Resources, a meeting of representatives of countries in the South Asia region will be convened in 1977 to formulate proposals for cooperative action. Support of $20,000 is proposed to continue this development in 1978, with the expectation that effective implementation of a regional programme will start in 1979.

The countries of Southeast Asia, with the encouragement and support of the Board, have moved faster than those of any other region in developing a specific plan of action for their genetic resources activities. As noted below, late in 1976, they formulated a collaborative programme which is expected to be fully operational in 1978.

By 1978, too, the Board expects genetic resources activities to have accelerated in other priority regions, particularly Western Africa (with a lead being provided already by the Germplasm Collection Unit of IITA), Eastern Africa and the Andean zone of South America.

The activities in the various regions are likely to vary substantially in nature and size, depending on the strength of the national programmes, the expertise and physical facilities available within the countries of the region, and the specific crops which characterize the area. In a number of regions, the need may be primarily for strengthening individual country programmes; in others, substantial regional collaboration may be feasible and desirable. In either case, funds allocated for genetic resources activities in each priority region will represent a package containing elements of support for collecting, evaluation, conservation, documentation and training. Each region will require a different mix of these elements, depending upon the intensity of particular efforts, what has already been accomplished and how long it is likely to be before national programmes take over most of the responsibility.

Support for regional activities, where much of the most important work is done, is likely to account for the major increases in IBPGR's budgets for 1979-1981, and ultimately this item may well account for nearly 50% of the total budget.

The four major regional efforts to be supported in 1978 (accounting for $530,000 of the $620,000 proposed for this item) are:

2.1 Mediterranean: Collections have been undertaken in this region since 1975, first with UNEP support, and subsequently with IBPGR financing. These collections have for the most part concentrated on the countries of North Africa, with emphasis on collecting the traditional varieties of wheat and barley which are rapidly being displaced by the spread of new varieties. In 1976 this work was based on the activities of the Germplasm Laboratory of the Italian National Research Council at Bari, Italy. In 1977, with substantially greater involvement by FAO, the work is being expanded to take in other crops, especially forage and grain legumes, and to involve more countries, starting with Spain, Portugal and Greece. In addition, in 1976 several of the IBPGR Crop Advisory Committees recommended specific collections in this region, especially wheat in many parts of the region, maize and Phaseolus in Spain, and millets in southern Spain and the oases of North Africa. Accordingly, in 1977, a series of collecting missions will take place in Spain, Portugal, Algeria, Tunisia, Greece and possibly Libya. To support this expanded effort, the amount budgeted for 1977 by IBPGR for activities in the Mediterranean region has been increased from $50,000 to $95,000. This increase will also provide support to regional documentation activities at Bari, should permit acceleration of work on evaluation of the seeds collected, and will assist one or two centres in providing more adequate seed storage. For the time being, the Bari Laboratory is storing all the seed material but, as the programme develops, it is envisaged that there may be two or three regional centres, each with responsibility for conserving and evaluating the seeds of certain crops.

For 1978, the Board has allocated $120,000 for the continuation and expansion of activities in this region. However, the Board foresees most of the collecting work being done in the next two or three years and thereafter the funds needed should level off. They are not likely to decrease until after 1981, however, because, as the exploration activities slow down, there will be need for increased support, for a few years, for conservation, evaluation, documentation and other activities important to plant breeders.

The Board has followed with interest, and endorsed, the initiative taken by EUCARPIA to encourage a European genetic resources programme, which is now being developed and financed (for a take-off period) by UNDP with FAO as Executing Agency. As the European programme becomes operational in 1977-78, links will need to be created with the activities being supported by the IBPGR in the Mediterranean region, particularly the activities in the countries of southern Europe. At the same time, the Board intends to ensure that the genetic resources activities financed by it in North Africa complement any collection programmes proposed for specific crops in that area by ICARDA. Arrangements will be made to assure the availability to ICARDA of duplicates of seeds collected in the Mediterranean region under IBPGR-sponsored programmes. However, at least until ICARDA becomes fully operational, the IBPGR will have to continue to support collections in North Africa, since genetically diverse materials are still being rapidly lost there through changes in agricultural practices.

2.2 Southwest Asia: The Board assumed financial responsibility as of 1 July 1976 for the support of genetic resources work in six countries of Southwest Asia (Afghanistan, Iran, Iraq, Pakistan, Syria and Turkey) which had previously participated in a regional project based at Izmir, Turkey, funded by SIDA and operated by FAO. The Board proposes to support the national programmes of these six countries through the establishment of a Genetic Resources Support Unit (GRSU) with headquarters at Izmir, Turkey and a sub-station at Karaj, Iran. Unfortunately, the negotiations with the two governments have taken longer than anticipated and the establishment of the GRSU did not take place in 1976, as originally envisaged. The IBPGR's 1976 budget included provision for $100,000 to finance activities in this region for the second half of the year, and the 1977 approved budget provided for continuation of that support for the full year 1977 ($200,000), all to be financed out of restricted core funds provided by the Government of Sweden. However, because of the delay in the establishment of the GRSU, this item in the revised estimate for 1977 has been reduced to $150,000. Accordingly, although $250,000 is allocated to Southwest Asia in the proposed budget for 1978, at least $50,000 of this will be funded by a carry-forward of restricted core funds from 1977.

In 1977 four professional staff will be appointed to GRSU. Two of these will be crop botanists/breeders, one of whom will be the leader of GRSU, and the other two will be experts respectively in documentation and engineering, the latter to advise on the installation, equipment and operation of seed stores. The proposed allocation of $250,000 for the programme in 1978 will pay for the continuation of this Unit, provide funds for fellowships for scientists of the region to receive postgraduate training abroad, support some local training, and enable the Board to provide other help for collection, conservation and evaluation efforts, as may prove necessary.

The Board recognizes that support to the Southwest Asia region is critical and time is fast running out. This accounts for the high level of funding proposed. The Board sincerely hopes that formal governmental approval for the GRSU will be received shortly to enable the project to start.

The Board will continue to follow the development of ICARDA, which has research responsibility for certain of the Board's priority crops in parts of the Southwest Asia region. Contacts will also be sought with the proposed Genetic Resources Section of the Arab Centre for the Studies of Arid Zones and Dry Lands at Douma in Syria, to see whether collaborative efforts can be developed.

2.3 Southeast Asia: A symposium on genetic resources in Southeast Asia was held in Indonesia in 1975, at which recommendations were adopted calling for the formulation of a regional programme and requesting the IBPGR to convene a meeting of technical experts from countries of the region to undertake this task. Such a meeting, co-sponsored by the IBPGR, was held in Manila late in 1976, largely as a result of the leadership role undertaken by Dr. Setijati Sastrapradja, Director of the National Biological Institute (LBN) of Indonesia, a member of the Board. Experts from Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand participated in the meeting, which unanimously agreed on a plan of action for the region and on organizational arrangements to implement the plan. The Board's 1977 budgetary allocation of $60,000 for support of regional activities in Southeast Asia will cover the appointment of a regional genetic resources officer, the establishment of a small Secretariat, the meeting of a regional committee and limited support to exploration and collections as part of the activities of national programmes.

By 1978 the negotiations with governments should be completed and the programme fully operational. Accordingly, it is proposed to increase the allocation for Southeast Asia for 1978 to $140,000, with most of the increase going to finance field activities. The 1976 meeting clearly stated the priorities for action and limited work to the following crops: rice; durian; rambutan; soyabean; coconut; mango; banana; and indigenous vegetables, especially wing bean and Vigna sp. However, this does not exclude action on other indigenous species which will be undertaken by national programmes.

The Board believes that some further increases in support of regional activities in Southeast Asia will be necessary in the period 1979-1981. Provisionally, it is projected that $170,000 may be needed in 1979 and $195,000 in 1980 and 1981. These projected increases assume that other countries of the region, such as Viet Nam, Kampuchea and Lao will join in the regional effort.

2.4 Western Africa: The Board proposes to allocate $50,000 in the 1978 budget for priority collection and other activities in Western Africa. Collections in this region, especially of sorghum and millets, were supported in 1976 and are being supported in 1977 (under budget item 3), and further similar collections will need to be financed in 1978. In addition, the work of the Germplasm Collection Unit of IITA has begun, with emphasis on grain legumes, roots and tubers, and glaberrima rice. The activities of this Unit are, of course, being financed out of IITA's budget, but the Board provided some support for training activities in 1976-77. It should be noted, too, that in January 1977, IRRI, IITA, ORSTOM, IRAT, WARDA and IBPGR began discussions on cooperative work for glaberrima rice and its associated wild species. The Board envisages limited support in 1978 for such regional activities, as well as for emerging national programmes in the countries of Western Africa.

## 3. OTHER EXPLORATION AND COLLECTION ACTIVITIES

This item includes exploration and collection activities not included under regional activities (item 2 above).

The Board has expressed concern in the past that its support for collecting activities was not as high as it considered desirable in the light of its global mandate. For instance, the 1976 budget proposal for exploration, collection and storage was $250,000, of which $110,982 was spent. In addition, approximately $30,000 will be paid in 1977 relating to work carried out in 1976. However, in preparing its 1977 budget, the Board under-estimated the acceleration in collection activities; the budgeted amount of $150,000 for this item has been revised upwards to $197,243. This increase is primarily to finance additional collections recommended by the IBPGR Crop Advisory Committees.

For 1978, as already noted, collection work in the Mediterranean, Southwest Asia and Southeast Asia regions is provided for under budget item 2, 'Regional activities'. In addition, $200,000 is proposed to be allocated under budget item 3 to support collection activities in other parts of the world. It should be noted that, in the 1978 budget, as in the one for 1977, exploration and collection have been separated from storage; these items were lumped together in the budgets for 1975 and 1976. In Table I, however, the expenditures for these two purposes in 1975 and 1976 are separately stated for purposes of clarity and to permit comparison with later years.

In 1977 the Board is supporting the collection of maize in Argentina, Bolivia and Peru; groundnuts in Argentina, Bolivia, Brazil and Paraguay; and sorghum and millets in the Sahelian zone of Africa and in Eastern Africa. It is expected that comparable exploration and collection work will be financed in 1978.

3.1 <u>Forest genetic resources</u>: In 1976 the IBPGR considered the need for action in connection with forest genetic resources. Clearly, tree fruits and nuts fall within the remit of the Board, but advice was sought from TAC as to whether support might be given to certain other specific aspects of forest genetic resources, viz. trees, other than food trees, of importance in agricultural development, especially those used for fuel for cooking and those used for environmental stabilization. TAC agreed that the Board might include an item on forestry.

It was hoped that the 1978 budget would include an allocation to start work on forest genetic resources. However, the Board has been told that one of the projects which it had originally considered had been effected with UNEP funds and that the other did not fall within the guidelines set down by the Board. Therefore the Board will continue to work with the FAO Forest Resources Division and the FAO Panel of Experts on Forest Genetic Resources to develop one or more priority projects for the collection and/or conservation of forest species for fuel and environmental stabilization. The Board expects to be able to make provision for some forest work in the 1979 budget.

At its fourth meeting in February 1977, the Board agreed that support to these specific areas of forest genetic resources should continue, but that such support must remain a modest part of the IBPGR overall budget, probably limited to $50,000-$100,000 per annum.

## 4. CONSERVATION

The Board has surveyed the availability and adequacy of seed storage facilities for long-term conservation at genetic resources centres in different regions. It is important that adequate seed stores be available at centres near where the seed is collected, because they are best suited for evaluation and for the necessary periodic regeneration and increase of seed stocks. On the other hand, long-term storage of duplicate samples of material can be undertaken satisfactorily far from the original sources of the material. Bearing these two points in mind, the Board, with the advice of its Crop Advisory Committees, is beginning to designate various centres, with their approval, as responsible for maintaining the major base collections of specific crops, within the IBPGR global network. By the end of 1977, such responsibility will have been assigned for the following crops: chickpeas; cowpeas; groundnuts; maize; millets; oats; Phaseolus beans; pigeon peas; rice; sorghum and wheat.

In 1976 an IBPGR Working Group prepared a report containing recommendations on the engineering, design and cost aspects of long-term seed storage facilities. A summary of the major recommendations in the report is contained in IBPGR's Annual Report for 1976. The Board has published the Working Group's report and intends to encourage an upgrading of storage facilities to the standards recommended in the report where necessary. In particular, in 1977 the Board expects to provide financial support for the development and/or improvement of facilities for regional storage in the Philippines, Peru and IITA. The support to IITA is conditional upon the Institute obtaining the balance of funds required and holding material on behalf of the IBPGR which it would not otherwise store. The support for seed storage in 1977 has been revised upwards from $52,000 to $95,000.

However, seed storage is far from the full answer to maintenance and conservation of genetic stocks. Many crops must be maintained as living collections in plantations or short-term stores of roots and tubers. This is because such plants produce what are called 'recalcitrant' seeds which do not survive drying and the reduction in temperature which are standard for 'orthodox' seeds. In tropical areas, such species present problems which have not yet been solved. Hence, the Board proposes to support the physiological investigation of seeds to determine whether better methods of conservation can be recommended.

In the proposed 1978 budget item for conservation, $72,000 represents support for capital expenditures necessary for the provision and improvement of seed stores for emerging regional programmes, probably for Western and Eastern Africa, and $50,000 represents support of investigations on seed physiology. These investigations are to be carried out under the supervision of Professor E.H. Roberts of Reading University, UK, one of the world's leading experts in seed physiology.

It is expected that support for conservation may increase to around $200,000 in the next three years to help finance improvement of seed stores in the world network of centres and to continue work on alternative methods of conservation, particularly with reference to tropical crops.

## 5. CROP ADVISORY COMMITTEES AND WORKING GROUPS

As already noted, the Board has organized five Crop Advisory Committees, in co-operation (except for wheat) with the appropriate International Agricultural Research Centre. They consist of a Rice Committee, co-sponsored by IRRI; a Maize Committee, co-sponsored by CIMMYT; a Sorghum and Millets Committee, co-sponsored by ICRISAT; a Phaseolus Beans Committee, co-sponsored by CIAT; and a Wheat Committee, the organization of which was undertaken by the Board's Secretariat. Each of these Crop Advisory Committees held its first meeting in 1976, and in the period 1977-79 will meet again as necessary. These Crop Committees are an invaluable aid to the Board in obtaining the views of the scientific community working on each of the major crops concerning the priorities for action to collect, conserve and make available for use the genetic diversity of these crops.

In addition to the Crop Advisory Committees, the Board has established Working Groups, as necessary, to advise it on other specific crops. Coconuts and tropical vegetables were reported on in 1976, and a Working Group on bananas and plantains will meet in 1977.

The proposed 1978 budget item of $55,000 will support continuation of this work, so that the Board may be advised by the communities of breeders with respect to the action needed on specific crops. It is expected that an annual allocation of between $50,000 and $70,000 is likely to continue to be needed over the next three years for activities of this type and for the commissioning of special studies.

## 6. TRAINING

The 1978 budget proposes to continue support to the University of Birmingham to pay for the additional staff necessary to expand the University's International Training Course in Conservation and Utilisation of Plant Genetic Resources, so as to allow more nationals of developing countries to attend than would otherwise be able to do so. Support will be increased from $25,000 to $30,000 in 1978.

Support has also been given to develop additional training at IITA of African graduate students and post-doctoral fellows, as well as some undergraduates, needed for the development of an African genetic resources network. $35,000 was allocated for this in the original 1977 budget, but it is now estimated that only $20,000 will be spent due to the late implementation of the programme at IITA in 1976 and the consequent carry-forward of funds to 1977.

In 1977 the balance of $15,000 available from this item has been added to a sum of $5,000 budgeted for other training activities. This will be used to finance a short practical training course, to be held in Turkey, on wheat and its wild relatives, pursuant to a recommendation of the Wheat Advisory Committee, and a six-week course for training collectors from Southeast Asian nations, to be held in Indonesia. Thus the training item both in the approved 1977 budget and in the current revision thereof remains the same at $65,000.

The training item in the proposed budget for 1978 represents a slight decrease to $55,000 but does not mean that the Board's support to training is reduced. The item includes continuation of support to the University of Birmingham ($30,000) and $25,000 for other training activities. These will consist of short courses at the technical or field level, especially for seed technology and storage routines, and for field collectors. The funds budgeted for regional activities in the Mediterranean, Southwest Asia and Southeast Asia regions include funds to pay for post-graduate training for a few scientists from those regions and to support short technical courses.

Other aspects of training are included in the total sum budgeted for the IS/GR Program. These consist of the production of technical manuals and the dissemination of technical expertise by the GR/CIDS team (see page 6).

## 7. GENERAL ADMINISTRATION

As far as possible the Board wishes to see its budget allocated to action rather than administration. Thus the item for general administration accounts for only about 12% of the proposed 1978 budget. The funds allocated are for the following purposes:

Board meetings and missions: The 1977 approved budget includes an item of $100,000 to cover meetings of the Board and of its Executive Committee, and specific assignments undertaken by the Chairman and members of the Board. It is expected that a marginal saving may be made in 1977, and the Board therefore proposes that the 1978 budget item be reduced to $95,000. It should be noted in connection with this item that, in contrast to the International Centres, members of the Board of IBPGR undertake extensive executive functions because IBPGR possesses such a small Secretariat.

Publications: It is estimated that, in 1977, publication expenditures will be $23,000 instead of the $15,000 provided in the approved budget. The $8,000 increase is to assist in the publication of a treatise on plant health and quarantine problems in the international transfer of genetic resources. This treatise is based on papers prepared in 1976 for and by an IBPGR Task Force organized to consider these problems. The proposed 1978 budget keeps the publication item at $15,000, which should cover the normal Board publications and any forthcoming as a result of the work of the Crop Committees.

Secretariat: In 1977 Secretariat expenses are estimated to correspond closely to the actual expenditures in 1976. These expenses include the cost of two secretaries necessary for the work of the Secretariat, the professional members of which are provided by FAO. It is now apparent that the increased work of the Board will necessitate, in 1978, an additional professional staff member and another secretary. This, along with an increase in miscellaneous expenses incurred in the day-to-day work of the Secretariat, accounts for the increase from a level of $65,000 in the 1977 budget to a proposed 1978 level of $130,000.

## 8. OTHER ITEMS

8.1 Contingency: In 1977 it is estimated that most of the $50,000 contingency item will be used primarily to finance increased collection activities. In view of the Board's expanded programme for 1978 and of its continuing need for flexibility, provision has been made for a $100,000 contingency item in the proposed 1978 budget. This is believed to be a reasonable minimum.

8.2 Provision for future price changes: In addition, a 6% provision has been included to cover increased costs as a result of inflation.

8.3 Capital expenditures: The Board does not have any separate item in its budget for capital expenditures since, unlike the International Agricultural Research Centres, the Board has no buildings or other capital facilities of its own. Moreover, the Board has not financed the construction of capital facilities and is unlikely to do so unless, under exceptional circumstances, some limited amount of such financing should prove to be necessary for seed storage in a developing country. On the other hand, a number of the Board's grants for exploration, conservation and other genetic resources activities have contained and will continue to contain modest amounts for equipment, such as vehicles and refrigeration equipment, where necessary to carry out programmes approved by the Board. In 1976, 12% of the budget was expended for such items of equipment; in 1977 it is estimated that somewhat under 8% will be used for this purpose; and it is expected that expenditures for equipment will stabilize at about this level.

TABLE I

1978 BUDGET
SUMMARY OF COSTS BY PROGRAMME ACTIVITY 1975-78
(US$ thousands)

| | Actual 1975 | Actual 1976 | Approved Budget 1977 | Current Estimate 1977 | Proposed Budget 1978 |
|---|---|---|---|---|---|
| 1. Information and documentation activities | 193 | 413 | 409 | 412 | 471 |
| 2. Regional activities | 81 | 103 | 310 | 325 | 620 |
| 3. Other exploration and collection activities | - | 79 | 150 | 197 | 200 |
| 4. Conservation | - | 32 | 75 | 120 | 122 |
| 5. Crop Advisory Committees, Working Groups, studies, etc. | 44 | 39 | 50 | 62 | 55 |
| 6. Training | 22 | 54 | 65 | 65 | 55 |
| 7. General administration | 143 | 156 | 180 | 171 | 240 |
| 8. All other: | | | | | |
| - Plant health | 4 | 10 | - | - | - |
| - _Arachis_ Information Service | - | 29 | - | 10 | - |
| - Contingency | | | 50 | - | 100 |
| - Provision for future price changes | | | | | 106 |
| TOTAL CORE BUDGET | 487 | 915 | 1,289 | 1,362 | 1,969 |
| Categories of expense: | | | | | |
| - Personnel services | 41 | 70 | 137 | 137 | 269 |
| - Contracts with others | 324 | 659 | 840 | 963 | 1,159 |
| - Equipment, supplies and materials | 5 | 21 | 39 | 39 | 45 |
| - Travel | 107 | 152 | 200 | 200 | 250 |
| - General operating expenses (including project servicing costs) | 10 | 13 | 23 | 23 | 40 |
| - Contingency | - | - | 50 | - | 100 |
| Sub-total | 487 | 915 | 1,289 | 1,362 | 1,863 |
| Provision for future price changes | | | | | 106 |
| TOTAL CORE BUDGET | 487 | 915 | 1,289 | 1,362 | 1,969 |

TABLE II

1978 BUDGET
SUMMARY OF SOURCES AND APPLICATION OF FUNDS
(US$ thousands)

| SOURCES OF FUNDS | Actual 1975 | Actual 1976 | Approved Budget 1977 | Current Estimate 1977 | Proposed Budget 1978 |
|---|---|---|---|---|---|
| 1. Core operations | | | | | |
| a. Unrestricted: | | | | | |
| - Belgium | - | 0 | 50 | 100 2/ | |
| - Canada | 97 | 103 | 100 | 100 | |
| - Germany, F.R. | 20 | 39 | 40 | 40 | |
| - Netherlands | 100 | 125 | 100 | 100 | |
| - Norway | - | 75 | 95 | 95 | |
| - Rockefeller Foundation | 85 | - | - | - | |
| - Saudi Arabia | - | 10 | 10 | 10 | |
| - Sweden | 101 | 95 | 130 | 130 | |
| - UK | 54 | 53 | 75 | 75 | |
| - UNEP | 0 | 100 1/ | 100 | 200 2/ | |
| - USA | 0 | 80 1/ | 200 | 400 2/ | |
| - Unidentified sources | - | - | 3/ | - | 1,708 |
| - Balance from previous year | 201 | 185 | 184 | -48 4/ | - |
| - Income applied in year | 14 | 2 | - | 10 | 11 |
| Sub-total | 672 | 867 | 1,084 | 1,212 | 1,719 |
| Restricted | | | | | |
| - Sweden | - | - | 200 | 200 | 200 |
| - Balance from previous year | - | - | - | - | 50 |
| Sub-total | - | - | 200 | 200 | 250 |
| Total core operating funds | 672 | 867 | 1,284 | 1,412 | 1,969 |
| 2. Capital | - | - | - | - | - |
| 3. Special projects | - | - | - | - | - |
| TOTAL FUNDS | 672 | 867 | 1,284 | 1,412 | 1,969 |

1/ refers to 1975

2/ includes pledges not received in 1976

3/ sources of funds have been identified to show funds pledged but not received

4/ because of pledges not received in 1976

TABLE II
(continued)

1978 BUDGET
SUMMARY OF SOURCES AND APPLICATION OF FUNDS
(US$ thousands)

| | Actual 1975 | Actual 1976 | Approved Budget 1977 | Current Estimate 1977 | Proposed Budget 1978 |
|---|---|---|---|---|---|
| APPLICATION OF FUNDS | | | | | |
| a. Core operations | 487 | 915 | 1,289 | 1,362 | 1,969 |
| b. Capital | - | - | - | - | |
| c. Special projects | - | - | - | - | |
| d. Unexpended balances: | | | | | |
| - Unrestricted core | 185 | (48) 1/ | - | - | |
| - Restricted core | - | - | - | 50 | |
| - Capital | - | - | - | - | |
| - Working funds | - | - | - | - | |
| - Special projects | - | - | - | - | |
| Sub-total | 185 | (48) | - | 50 | |
| TOTAL APPLICATIONS | 672 | 867 | 1,289 | 1,412 | 1,969 |

MEMO:

| | Actual 1975 | Actual 1976 | Approved Budget 1977 | Current Estimate 1977 | Proposed Budget 1978 |
|---|---|---|---|---|---|
| Total core operating funds required: | 487 | 915 | 1,289 | 1,362 | 1,969 |
| Less: Unexpended balances from previous year | (201) | (185) | (184) | (-48) | (50) |
| Less: Earned income applied from current year (excluding earned income included in core restricted grants) | (14) | (2) | (0) | (10) | (11) |
| Net core operating funds required from CG donors | 272 | 728 | 1,105 | 1,400 | 1,908 |

1/ Funds were not received in 1976 from: Belgium $50,000; UNEP $100,000; USA $200,000

TABLE III

BREAKDOWN OF COSTS BY ITEMS
1976 - 1978
(US$)

| Activities | 1976 Expenditure | | 1977 Current Estimate | | 1978 Proposed Budget | |
|---|---|---|---|---|---|---|
| 1. Information and documentation activities | | | | | | |
| 1.1 Contractual services with the University of Colorado (IS/GR) | | | | | | |
| - Personnel | | | 382,800 | | | |
| - Computer expenses | | | - | | | |
| - Travel | | | 9,200 | | | |
| - Technical publications | | | 8,000 | | | |
| sub-total | 396,727 | | 400,000 | | 450,000 1/ | |
| 1.2 Advisory Committee | 15,859 | | 11,500 | | 11,500 | |
| 1.3 Other documentation activities | - | | | | 10,000 | |
| 1 Total | | 412,586 | | 411,500 | | 471,500 |
| 2. Regional activities | | | | | | |
| 2.1 Mediterranean | | | | | | |
| - Support to national activities and exploration missions | 44,893 | | 30,000 | | 30,000 | |
| - Training | | | 20,000 | | 20,000 | |
| - Storage | | | 30,000 | | 50,000 | |
| - Data services | 3,000 | | 3,000 | | 5,000 | |
| - Travel and meetings | | | 12,000 | | 15,000 | |
| sub-total | 47,893 | | 95,000 | | 120,000 | |

1/ The IS/GR Program estimates a minimum requirement for 1978 of $598,800, but the Board proposes to provide support to the level of $450,000. The allocation of this amount among the various items of expenditure will be agreed by the third meeting of the IBPGR Advisory Committee on GR/CIDS in October 1977

TABLE III
(continued)

| | | 1976 Expenditure | 1977 Current Estimate | 1978 Proposed Budget |
|---|---|---|---|---|
| 2.2 | Southwest Asia | | | |
| | - Support to national programmes | | 17,500 | 10,000 |
| | - Personnel | | 67,713 | 180,000 |
| | - Travel | | 12,055 | 15,000 |
| | - Training | | 18,000 | 10,000 |
| | - Documentation/ Information | | 4,000 | 5,000 |
| | - Operating expenses | | 8,800 | 5,000 |
| | - Project servicing costs | | 21,932 | 25,000 |
| | sub-total | 14,886 | 150,000 | 250,000 |
| 2.3 | South Asia | | | |
| | - Regional Symposium/Workshop | | 20,000 | - |
| | - Support to national programmes | | - | 20,000 |
| | sub-total | - | 20,000 | 20,000 |
| 2.4 | Southeast Asia | | | |
| | - Regional Workshop | 13,753 | - | - |
| | - Support to national programmes | | 36,500 | 48,500 |
| | - Personnel | | 6,000 | 25,000 |
| | - Training | | 5,000 | 40,000 |
| | - Documentation/ Information | | - | 5,000 |
| | - Storage | | - | - |
| | - Travel | | 7,000 | 10,500 |
| | - Operating expenses | | 5,500 | 11,000 |
| | sub-total | 13,753 | 60,000 | 140,000 |
| 2.5 | Western Africa | | | |
| | - Support to national programmes and regional activities | 26,500 | - | 50,000 |

TABLE III
(continued)

| | | 1976 Expenditure | | 1977 Current Estimate | | 1978 Proposed Budget | |
|---|---|---|---|---|---|---|---|
| | 2.6 Eastern Africa | - | | - | | 20,000 | |
| | 2.7 Andean zone, S. America | - | | - | | 20,000 | |
| 2 | Total | | 103,032 | | 325,000 | | 620,000 |
| 3. | Other exploration and collections including collections recommended by Crop Advisory Committees and Working Groups (not included in regional activities) | | | | | | |
| 3 | Total | | 78,561 | | 197,243 | | 200,000 |
| 4. | Conservation | | | | | | |
| | 4.1 Development and improvement of storage facilities | 32,421 | | 95,000 | | 72,000 | |
| | 4.2 Investigations on seed physiology | | | 25,000 | | 50,000 | |
| 4 | Total | | 32,421 | | 120,000 | | 122,000 |
| 5. | Crop Advisory Committees, Working Groups and Studies | | | | | | |
| | - Rice | 6,511 | | - | | 7,000 | |
| | - Maize | - | | 20,874 | | - | |
| | - Wheat | 8,716 | | 8,000 | | 12,000 | |
| | - Sorghum/millets | 8,365 | | - | | 10,500 | |
| | - Phaseolus | - | | 7,867 | | 8,000 | |
| | - Coconut | 7,196 | | 11,000 | | - | |
| | - Vegetable study | 7,000 | | 3,243 | | - | |
| | - Bananas | - | | 11,000 | | - | |
| | - Other | 800 | | - | | 17,500 | |
| 5 | Total | | 38,588 | | 61,984 | | 55,000 |
| 6. | Training | | | | | | |
| | 6.1 University of Birmingham | 51,815 | | 25,000 | | 30,000 | |
| | 6.2 IITA | - | | 20,000 | | - | |
| | 6.3 Evaluation of facilities | 1,850 | | - | | - | |
| | 6.4 Short technical courses | - | | 20,000 | | 25,000 | |
| 6 | Total | | 53,665 | | 65,000 | | 55,000 |

TABLE III
(continued)

| | | 1976 Expenditure | | 1977 Current Estimate | | 1978 Proposed Budget | |
|---|---|---|---|---|---|---|---|
| 7. | General administration | | | | | | |
| | 7.1 Meetings of Board and its Executive Committee | 49,706 | | 48,000 | | 55,000 | |
| | 7.2 Specific assignments undertaken by Chairman and Board members | 32,662 | | 35,000 | | 40,000 | |
| | 7.3 Publications | 10,593 | | 23,000 | | 15,000 | |
| | 7.4 Travel (Secretariat and consultants) | 24,729 | | 23,000 | | 30,000 | |
| | 7.5 Personnel (Secretariat) | 28,200 | | 30,000 | | 80,000 | |
| | 7.6 Miscellaneous (including duplicating expenses) | 10,645 | | 12,000 | | 20,000 | |
| 7 | Total | | 156,535 | | 171,000 | | 240,000 |
| 8. | All other: | | | | | | |
| | 8.1 Plant health | 10,494 | | - | | - | |
| | 8.2 *Arachis* Information Service | 28,951 | | 10,000 | | - | |
| | 8.3 Contingency | - | | - | | 100,000 | |
| | 8.4 Provision for future price changes | - | | - | | 105,810 | |
| 8 | Total | | 39,445 | | 10,000 | | 205,810 |
| 9. | GRAND TOTAL | | 914,833 | | 1,361,727 | | 1,969,310 |

G-12

1978

# PLANT GENETIC RESOURCES
# RESSOURCES GÉNÉTIQUES VÉGÉTALES
# RECURSOS GENETICOS VEGETALES

## Newsletter – Bulletin – Noticiario No. 33

FIAT PANIS

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

The Plant Genetic Resources Newsletter is published under the joint auspices of the Crop Ecology and Genetic Resources Unit, Plant Production and Protection Division of FAO and the International Board for Plant Genetic Resources. Contributions are considered for publication in English, French and Spanish, and will be published in the original language with a summary in the other two.

Editor: J.T. Williams, AGPE
FAO, 00100 Rome, Italy

AGP/PGR/33
February 1978

# PLANT GENETIC RESOURCES NEWSLETTER

C O N T E N T S

## AVANT-PROPOS

La FAO a entrepris la publication du Bulletin des ressources génétiques végétales à l'époque où les moyens d'information traitant de ce sujet étaient limités. Les communications scientifiques qu'il contenait, et dont les auteurs comptaient des savants du monde entier, ont mis en lumière l'importance des ressources génétiques végétales pour l'avenir de la phytologie. Ce Bulletin a beaucoup contribué à promouvoir l'activité internationale qui a conduit, en 1974, à la création du Conseil international des ressources phytogénétiques. Nous remercions vivement ici Sir Otto Frankel, F.R.S., F.A.A., Messieurs J.G. Hawkes, J.R. Harlan et M.S. Swaminathan, et tout particulièrement la rédactrice Mademoiselle Erna Bennett, de leurs efforts, de leur collaboration, et de l'attention assidue consacrée à la production de cette importante publication.

Dans le passé, ce Bulletin contenait surtout des documents et des rapports scientifiques; mais la création du CIRPG a stimulé les travaux relatifs aux ressources génétiques et un changement de style et de format s'imposait. Nous sommes heureux de présenter le premier numéro du nouveau Bulletin qui contient des articles, des notes et des informations sur les activités actuelles. Nous espérons grâce à lui, susciter un intérêt plus vif pour le réseau mondial d'activités concernant les ressources génétiques et le faire mieux connaître, alors même qu'il devient réalité.

Les objectifs du CIRPG sont orientés vers la sauvegarde de ressources génétiques végétales que l'introduction de variétés et hybrides nouvellement créés pourrait épuiser, mais il est tout aussi important que ces ressources soient immédiatement mises à la disposition de tous les sélectionneurs qui pourront les utiliser dans les meilleures conditions pour leurs travaux d'amélioration. C'est pour promouvoir cet objectif que le Bulletin contient des informations rapides et concises.

Ce Bulletin, qui entend tenir le lecteur informé des derniers progrès, est parrainé conjointement par la FAO et le CIRPG. Sa publication est assurée par le Groupe de l'écologie des cultures et des ressources génétiques de la Division de la production végétale et de la protection des plantes de la FAO qui fournit le Secrétariat du CIRPG et assure la coordination des activités de chaque organisation dans ce domaine.

## PREFACIO

El Noticiario de Recursos Genéticos Vegetales empezó a publicarlo la Organización de las Naciones Unidas para la Agricultura y la Alimentación (FAO) en los días en que escaseaban las publicaciones que trataban de recursos genéticos. Sus aportaciones científicas, en las que han participado numerosos hombres de ciencia de todo el mundo, han puesto de relieve la importancia que tendrán los recursos genéticos de los cultivos para el futuro de la ciencia vegetal. Esta publicación ha sido un importante promotor de una acción internacional que culminó en 1974 con el establecimiento de la Junta Internacional de Recursos Fitogenéticos (IBPGR). Quede aquí constancia de los mas cordiales sentimientos de gratitud a que se han hecho acreedores los miembros del comité de redacción, Sir Otto Frankel, F.R.S., F.A.A., Profesor J.G. Hawkes, Profesor J.R. Harlan y Dr. M.S. Swaminathan y en especial el Director, Srta.Erna Bennett, por sus esfuerzos y contribuciones y por la constante atención que han dedicado a la producción de esta importante publicación.

En el pasado, el Noticiario sostenía mayormente trabajos e informes científicos pero la creación de la IBPGR ha acelerado los trabajos en materia de recursos fitogenéticos, y obligado en secuencia a cambiar el estilo y el formato. Nos complacemos en presentar el primer número de la nueva versión, que contiene reseñas, notas e información sobre actividades actualmente en curso. Abrigamos la esperanza de estimular por medio de esta publicación un mayor interés y conocimiento de la red mundial de actividades sobre recursos fitogenéticos que, actualmente en vias de creación, puede ya considerarse como una realidad.

La IBPGR se ha impuesto el objetivo de salvaguardar los recursos fitogenéticos que pudieran agotarse a causa de la introducción de nuevas variedades de híbridos; sin embargo, es igualmente importante que dichos recursos se encuentren a disposición immediata de los que se ocupan de mejora genética en todo el mundo para que puedan utilizarlos con el mayor provecho posible en sus trabajos de selección. La información rápida inmediata y concisa, que facilita el Noticiario responde al propósito de alcanzar ese objetivo.

Este Noticiario, que se propone tener a los lectores bien al corriente de la situación, está bajo el patrocinio conjunto de la FAO y la IBPGR. Su publicación incumbe a la Dependencia de Ecología de Cultivos y Recursos Genéticos de la Dirección de Producción y Protección Vegetal de la FAO, que proporciona la Secretaría del IBPGR y vela por que la labor de cada organización complete y amplíe la de la otra.

# FOREWORD

The Plant Genetic Resources Newsletter was introduced by the Food and Agriculture Organization of the United Nations (FAO) in the days when the media dealing with genetic resources were limited. Its scientific contributions, in which numerous scientists throughout the world have participated, have highlighted the importance of crop genetic resources for the future of plant science. It has been an important instrument promoting international action which led to the establishment of the International Board for Plant Genetic Resources in 1974. Warmest thanks are expressed to the members of the editorial committee, Sir Otto Frankel, F.R.S., F.A.A., Professor J.G. Hawkes, Professor J.R. Harlan and Dr. M.S. Swaminathan and especially to the editor, Miss Erna Bennett, for their efforts, contributions and constant care in the production of this important publication.

Whereas in the past the Newsletter contained mostly scientific papers and reports, the creation of IBPGR has accelerated genetic resources work which has in itself necessitated a change in its style and format. We are happy to present the first issue of the revised version with review articles, notes and information on current activities. Through this media it is hoped to stimulate greater interest and knowledge of the emerging global network of genetic resources activities which is now becoming a reality.

The objectives of the IBPGR are directed to safeguard plant genetic resources that might be exhausted through the introduction of newly bred varieties and hybrids, but it is equally important that such resources are immediately available to breeders all over the world to be used with all possible advantages in their breeding work. Prompt, concise information in the Newsletter is designed to advance this objective.

This Newsletter, aimed at keeping readers informed and up-to-date, is sponsored jointly by FAO and IBPGR. It is the responsibility of the Crop Ecology and Genetic Resources Unit of the FAO Plant Production and Protection Division which provides the Secretariat of the IBPGR and ensures that the work of each organization complements and supplements the other.

Dieter F.R. Bommer
Assistant Director-General
Agriculture Department, FAO

Richard H. Demuth
Chairman
International Board for Plant Genetic Resources

# IBPGR PLANS FOR CROP COLLECTING

IN 1976 IBPGR PUBLISHED A BOOKLET OUTLINING ITS PRIORITIES FOR ACTION ON SPECIFIC CROPS AND REGIONS OF THE WORLD. THE AIM WAS TO SELECT INDIVIDUAL SPECIES OF GROUPS OF SPECIES, GIVE THEM PRIORITY RATINGS ACCORDING TO CERTAIN CRITERIA, AND THUS TO FOCUS ATTENTION ON COLLECTING WHICH NEEDS TO BE DONE.

The criteria were:

●the risk that genetically diverse materials of the species and their wild relatives will be lost in the future through changes and developments in agriculture and land, and through the introduction of new varieties,

●the economic and social importance of the materials to be collected, measured in terms of their usefulness and importance, as well as their expected or potential contributions to mankind,

●the agreed needs of plant breeders and research workers, in both developing and developed countries, for genetically diverse material,

●the size, scope and quality of existing collections.

At the same time, the IBPGR set up five crop germplasm advisory committees to advise on how genetic resources activities could be implemented on the major crops - wheat, rice, maize, sorghum and millets, and *Phaseolus* beans. These committees are co-sponsored (except in the case of wheat) by the appropriate International Agricultural Centre of the CG. The committees have provided detailed advice to the IBPGR and represent a consensus of opinion of the world community of breeders of the particular crop. All of the committees have met at least once since they were set up, and over the next few pages, the exploration targets for crops which they identified, are outlined. Some brief notes on the recent action to implement these recommendations are given.

## SORGHUM & MILLETS

Sorghum

Priority areas for collecting and taxa to be collected:

MOST URGENT

| | |
|---|---|
| Priority No. 1. | Mali, Niger, Sudan. |
| Priority No. 2. | Chad, Central African Empire, Tanzania, Malawi, Somalia, Botswana, Zambia, Mozambique. |

## LESS URGENT

Southeast Asia (a limited amount of collecting is necessary in Burma, Thailand, Malaysia, Indonesia, and the Philippines), China, Southwest Asia (a few good collections are needed from Turkey and North Syria) Yemen Arab Republic and the part of Saudi Arabia adjoining the Yemen border.

The major gaps in sorghum collections (excluding the priority areas listed above, and assessed both taxonomically and geographically) are as follows:

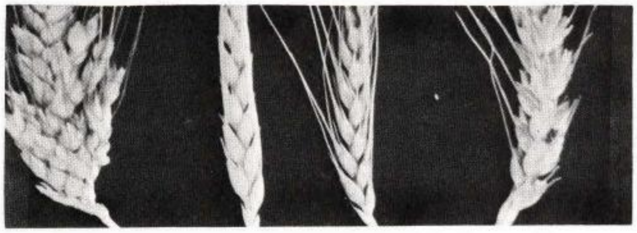
| Taxonomically | Geographically |
|---|---|
| No species other than *S. bicolor* | North Africa, Morocco, Algeria, Tunisia, Libya, Arab Republic of Egypt. |
| Very few wild races | West Africa, Guinea, Sierra Leone, Ghana, Ivory Coast, Togo, Congo. |
| Very few shattercanes | Southwest Africa and Angola. |
| Few cultivated grassy sub-races | East Africa: Somalia, Rhodesia. |
| Very few kaoliangs | Near East: Syria, Lebanon, Jordan, Iraq, Iran. |
| Short on some special sub-races (rigidum, membranaceum, decrue and transplanted types) | Afghanistan, West Pakistan. |
| | Hill country: India, Nepal, Sikkim. |
| | Southeast Asia: Assam, Burma, Lao, Democratic Kampuchea, Viet Nam. |
| | Japan, Korea. |

### Millets

Priority areas for collecting *Pennisetum* millets are:

| | |
|---|---|
| First priority: | Sudan, Chad, Southwest Africa. |
| Lower priority: | Ghana, Guinea, Ivory Coast, Tunisia, Algeria, Morocco, Spain, Yemen Arab Republic, Arab Republic of Egypt, Saudi Arabia, Kenya, Uganda, Zaire, Zambia, Tanzania, Malawi, Lesotho, Rhodesia, South Africa, Angola, Mozambique, Pakistan India. |

ORSTOM started work in West Africa in 1975 with funding from UNEP. In 1976, IBPGR assumed responsibility and the work has continued through 1977 and will go on in 1978. Collecting in the Sudan started in 1977 with UNEP/IBPGR funding and will continue in 1978. Plans are going ahead for collecting in Kenya and Tanzania this year. A short report on the Sudan is on p. 27.



# WHEAT

The priorities for collecting are: 1. tetraploid, 2. hexaploid, 3. diploid (including *Aegilops*). Nevertheless, these priorities are somewhat empirical because it is recommended that missions should collect whatever is available in the field.

The committee considered the priority ratings of geographical regions for wheat collecting which were drawn up at the Leningrad Symposium and reaffirmed these with some modifications. A finalized list is given below:

<u>Priority 1.</u>

The Near East (from Afghanistan to the Mediterranean) and the Caucasus

Greece

Ethiopia

People's Republic of China

<u>Priority 2.</u>

Tunisia, Algeria, Morocco, Spain and Portugal

Yugoslavia and Albania

South Asian sub-continent (India and Pakistan)

<u>Priority 3.</u>

France and Italy

Northern Europe

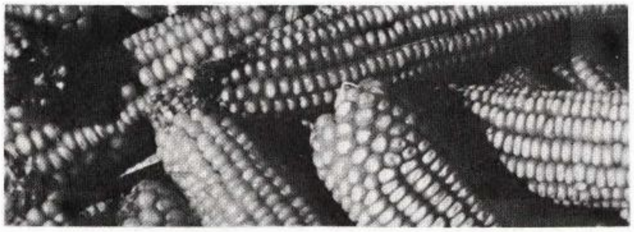
Latin America

During 1977 wheat was collected in Greece, Tunisia, Algeria, Spain, and Portugal as part of the IBPGR Mediterranean programme.

Some collecting has continued as part of the national programmes of the IBPGR's Southwest Asia regional programme and Afghanistan plans to collect in North Badakhshan and Southeast Afghanistan in 1978.

The Genetic Resources Centre in Ethiopia has laid high priority on the collection of wheat.

The Indian authorities are considering the priorities for collection in India. The committee suggested that within the country the first priority should be the rainfed area of Central India, the second priority, the State of Gujurat (chiefly for tetraploid wheat), and the third should be Rajasthan (because of the importance of salinity/alkalinity tolerant germplasm).



# MAIZE

Collection plans relate largely to cultivars, but the wild relatives of maize should also be collected during exploration missions. The committee agrees that collections of Teosinte and *Tripsacum* are reasonably complete.

PRIORITIES

| HIGH | LOWER |
|---|---|
| Western Peru | Nepal, Bhutan, Sikkim, Assam |
| Santa Cruz Plains (Bolivia) | Northeast Brazil |
| Argentina | People's Republic of China |
| Spain | Indonesia and the Philippines |

ØAction started in 1977 with collecting taking place in Argentina (Northeast Cordoba, La Rioja, Catamarca, Tucuãman, Jujuy and Salta); Peru (the coastal region) and some work started in Spain and Portugal. We are informed that the Indian authorities have started collecting in the Himalayan Region (see p.25), and the IBPGR will fund some exploration in Brazil in 1978.

# PHASEOLUS

Emphasis should be placed on collecting the following species: *Phaseolus vulgaris*, *P. coccineus*, *P. lunatus*, and *P. acutifolius*. Other *Phaseolus* sp. will be considered later but current information does not yet justify their extensive consideration or collection.

Major emphasis in future collections should be:

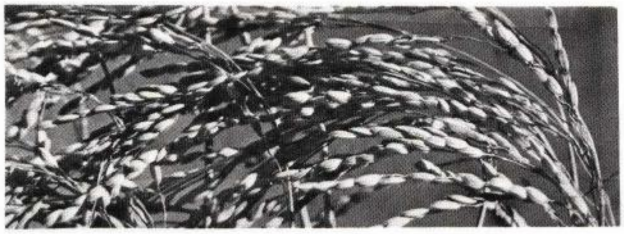
In the highlands and lowlands of Mexico and Peru for *P. vulgaris* and *P. coccineus*; more comprehensive collections of *P. vulgaris* from Turkey and the Iberian peninsula.

In Peru and Brazil for *P. lunatus*, and possibly also in Guatemala and the Caribbean Islands.

In Argentina, Honduras and Peru and the Galapagos Islands for *P. aborigineus*.

In North Mexico and Arizona for *P. acutifolius*.

ØCIAT, which has the major responsibility for *Phaseolus* germplasm will keep the priorities under review and initiate action in the priority areas when necessary.



# RICE

Efforts should be made to extensively collect in the Asian belt of diversity: North and Northeast India, northern Burma, northern Thailand, and Yunnan Province of China. IRRI will continue its proposed scheme of collection in South and Southeast Asia. Priority should also be given to the collection and conservation of minor cultivars in the undisturbed areas of tropical Asia, the annual weed races, and wild species.

The following details provide the priority areas:

(a) India: In addition to North and Northeast India, Madhya Pradesh, the western part of Orissa bordering M.P., Himachal Pradesh, Konkan district covering Maharashtra and Karnataka, Dangs district in Gujarat, and Adelabad district in Andhra Pradesh.

(b) Nepal and Bhutan: High-elevation areas.

(c) Indonesia

(i) East Lombok ("Dendek" varieties of the bulu type).

(ii) South Sulawesi ("Banda" varieties of the bulu type and "Bakka" varieties of the *indica* type).

(iii) East Java: Jember area, ("Gropak" varieties of the bulu type).

(iv) Bojonegoro and Lamongan areas ("Bronjong" varieties of the *indica* group).

(v) South Sumatra ("Lebak" and "Kwatik" varieties).

(vi) South Kalimantan ("Bayar" varieties).

(vii) Coastal regions of Java, Sumatra, Sulawesi and Kalimantan (Salinity-tolerant varieties).

(viii) Hill regions of Java, South Sumatra and Sulawesi, southern coastal region of Java; island group in Nusa Tenggara; and remote areas in central and eastern Kalimantan, Aceh, Bengkulu and north Lampung.

(d) People's Republic of China: (especially southwest China).

(e) Africa

1. Areas of primary importance:
   - (a) Western part of Ivory Coast
   - (b) Northwest section of Nigeria
   - (c) Guinea

2. Areas of secondary priority are: Niger, Sierra Leone, Mali, Upper Volta, Guinea-Bissau, Senegal, Gambia, Chad, Ghana, Togo and Benin.

ØA concerted attack has been launched on West African rice (see p.23) and IRRI has continued its central coordinating role for the collection of Asiatic material.

## Forage genetic resources in N. Africa, Near and Middle East —

# 'A SPECIAL AREA OF CONCERN'

*Grazing, dryland cultivation and the need for fuel are causing severe genetic erosion of forage plants in North Africa, and the Near and Middle East.*

*The erosion is so bad that an FAO expert, Mr. M. Kernick, has called it "a special area of concern".*

*In his report, Mr. Kernick, of FAO's Crop and Grassland Production Service, says that in the past, far too much emphasis has been placed on the introduction of exotic varieties to the region. More work, he says, should be done in surveying and evaluating existing collections of indigenous forage species.*

*Mr. Kernick makes suggestions as to what should be collected and gives orders of priority for the different species, along with brief outlines of where major collections of forage plant material are held at the moment.*

Local genetic erosion is continuing of PALATABLE PERENNIAL WOODY SHRUBS belonging to the Chenopodiaceae and Compositae which are being cut for fuel, e.g. *Artemisia herba-alba, Salsosa vermiculata, Rhanterium eppaposum,* and *R. suaveolens*. There are many other similar examples in danger not only by cutting for fuel, but from the extension of cultivation into steppe and desert areas. In some cases, local ecotypes have disappeared altogether after the land has been ploughed and where shifting cultivation is practised these are often replaced by ecotypes which are less palatable.

This also applies to PALATABLE PERENNIAL GRASSES in arid and semi-arid regions which are not only in danger of erosion from the rapid extension of dryland cultivation, but in a number of cases are under severe grazing pressure or have even been grazed out in some places, e.g. *Dactylis glomerata,* subsp. *hispanica, Danthonia forskhalii, Cenchrus ciliaris, Chrysopogon aucheri, Cymbopogon schoenanthus* spp. *laniger, Lasiurus hirsutus, Panicum antidotale* and *Tricholaena teneriffe* while an example of a not very palatable grass is *Stipa tenacissima* which is being harvested on a considerable scale for paper making in North Africa. In the semi-arid/semi-humid mountain regions, genetic erosion of forage species is likely to be more local, but the loss of local ecotypes may well occur in specific areas where heavy grazing pressure exists. Perennial grass and legume species of *Bromus, Dactylis, Hedysarum, Phalaris, Trifolium* and *Trigonella* are likely to be particularly affected.

ANNUAL FORAGE SPECIES throughout the region are likely to be less susceptible to genetic erosion than perennials since they are generally prolific seed producers and have a short growing season, surviving severe drought as dormant seeds.

Species which should be collected for immediate use in farm systems include:

(a) annual : *Lathyrus, Lolium, Medicago, Trifolium* and *Vicia* spp. for inclusion in dryland cereal rotations in semi-arid areas with 300-500 mm annual rainfall, *Scorpiurus* spp. could also prove important but have been little studied so far.

(b) short-lived (2-3 years) grasses including such species as *Astragalus siliquosus, Hedysarum coronarium, Lolium multiflorum, Secale montanum* and *Onobrychis viciifolia* for inclusion in longer term dryland crop rotations in areas with at least 500 mm annual rainfall.

(c) perennial grasses and legumes such as *Dactylis glomerata* subsp. *hispanica, Festuca arundinacea, Medicago sativa, Oryzopsis holciformis, O. milacea, Phalaris truncata* and *Trifolium fragiferum* for re-seeding depleted grasslands in high plateaux and littoral areas of the region with mild winters and an annual rainfall at or above 450 mm.

(d) perennial grasses, legumes and shrubs such as *Agropyron desertorum*, *A. elongatum*, *A. intermedium*, *Bromus tomentellus*, *Kochia prostrata*, *Medicago sativa* and *Secale montanum* for re-seeding depleted grasslands in steppic and sub-steppic areas of the region with cold winters and 250-300 mm annual rainfall.

(e) perennial grasses and legumes such as *Arrhenatherum elatius*, *Dactylis glomerata*, *Phalaris tuberosa*, *Trifolium ambiguum* and *T. fragiferum* for re-seeding depleted grasslands in mountain areas of the region with at least 500 mm annual rainfall.

The following species may be of interest in stabilizing agriculture in emergency areas, although this is not an exhaustive list:

(a) perennial grasses, legumes, shrubs and trees such as *Acacia cyanophylla*, *A. cyclops*, *A. nilotica*, *A. nilotica* subsp. *indica*, *Agropyron junceum*, *Ammophila arenaria*, *Artemisia manosperma*, *Arundo donax*, *Calligonum aridi*, *C. azel*, *C. comosum*, *C. polygonoides*, *Cenchrus pennisetiformis*, *C. setigerus*, *Haloxylon persicum*, *Lotus creticus*, *Panicum turgidum*, *Pennisetum dichotomum*, *P. orientale*, *Polygonum equisetiforme*, *Retama raetam*, *Saccharum aegyptiacum*, *S. biflorum aegyptiacum*, *Stipagrostis pennata*, *S. pungens* and *Ziziphus spina-christi*, *Z. nummularia* for reclamation of sandy wadis and sand dune fixation in steppe and desert areas of the region with 150-200 mm annual rainfall.

(b) perennial grasses, legumes and shrubs such as *Aeluropus littoralis*, *A. repens*, *Atriplex glauca*, *A. leucaclada*, *A. verruciferum*, *Camphorosma perenae*, *Cynodon dactylon*, *Elymus triccoides*, *Haloxylon aphyllum*, *H. articulatum*, *Hedysarum carnosum*, *Lotus tenuis*, *Puccinellia distans*, *P. distans* subsp. *eu-distans*, *Sporobolus marginatus* and *S. spicatus* for the reclamation and improvement of saline desert areas in the region with 150-250 mm annual rainfall.

There are several known existing collections of germplasm and some need to be surveyed. The following represent a brief, but not comprehensive list.

Within the Near and Middle East region itself, the most notable collection of indigenous forage species exists at the Agricultural Research and Introduction Centre at Izmir in Turkey, where more than 3 000 accessions of forage grasses and legumes were assembled from the different climatic regions of the country during 1966-1973. A considerable collection of indigenous *Medicago sativa*, *Onobrychis sativa* and *Secale montanum* is also being maintained at the Grassland and Forage Crop Research Institute near Ankara.

Meanwhile, in Iran there are some 400 accessions of indigenous grasses legumes, herbs and shrubs, collected during the life of the FAO Pasture and Fodder Crops Project and now maintained and evaluated by the Range Organization of the Ministry of Natural Resources in nurseries at Karadj and Hamand, near Teheran.

In Israel, at the Volcani Research Institute, Bet Dagan, there are sizeable collections of annual legumes belonging chiefly to the genera *Medicago* and *Vicia*, as well as smaller collections of perennial grasses, in particular, *Phalaris* and *Oryzopsis*. The Soil Conservation Division of the Ministry of Agriculture at Haifa is also giving emphasis to the collection and conservation of desert and sand binding plants, and a sizeable collection of perennial desert grasses and shrubs has been built up.

In North Africa, there is a large collection of indigenous annual *Medicago* spp. (about 850 accessions) collected by CIMMYT in Algeria and maintained in nurseries at Tessala and Saida near Algiers. The Institut National de Recherches Forestières near Tunis, Tunisia, has a good collection of indigenous and introduced *Atriplex* and *Opuntia*, and planting material has been exchanged with other countries in the region. Finally, in Morocco at the Institut de Recherche Agronomique at Rabat, there are collections of both temperate and sub-tropical grasses and legumes, and improved varieties of *Chloris gayana*, *Dactylis glomerata*, *Festuca arundinacea* and *Phalaris tuberosa* have been developed.

Outside the region there are many relevant collections.

A very large collection of grasses and legumes, chiefly belonging to the genera *Dactylis, Lolium, Medicago, Phalaris, Trifolium* and *Vicia,* much of it collected in North Africa, the Near and Middle East, is maintained by the CSIRO at Canberra. From these collections, improved varieties have been developed for *Dactylis glomerata, D. glomerata* spp. *hispanica, Lolium rigidum, Medicago trunculata, M. littoralis, Trifolium cherlei, T. hirtum, T. subterraneum,* and these varieties are now being re-introduced and evaluated in a number of countries in North Africa and the Near East.

A collection of some 330 accessions of arid zone and salt tolerant grasses, legumes and shrubs, many of them collected in Algeria, Iraq and Iran, is being maintained by the Soils Division of the Department of Agriculture, Perth, West Australia.

In the USA and Canada, large collections of temperate grasses and legume species, including material also collected in North Africa and/or the Near and Middle East, is maintained at research institutions listed in the FAO Plant Introduction Newsletter 6, 1959.

In the USA, sizeable collections of indigenous shrubs, including many *Atriplex* spp. are maintained by the USDA Research Service and Inter-mountain State Forest Research Service. A number of these species has been introduced and evaluated in North Africa, the Near and Middle East.

At the Central Arid Zone Research Institute, Jodhpur, India, a collection of arid zone grasses and legumes is being maintained and improved varieties or strains of *Cenchrus ciliaris, C. setigerus, Cyamopsis tetragonoloba, Lasiurus sinducus, Phaseolus aconitifolius* and *Panicum antidotale* have been developed. Attention has also been given to the collection of germplasm of fodder trees and shrubs. Sizeable collections of temperate and sub-tropical grasses and legumes are also maintained at the Indian Agricultural Research Institute, New Delhi, and a considerable number of improved and hybrid varieties have been developed in recent years.

*Dryland agriculture in Algeria (Photo by P. Perrino)*

## Conclusion

At the present time there is a need to survey and further evaluate existing collections of indigenous forage species in North Africa, the Near and Middle East. In the past, rather too much reliance has been placed on the introduction and testing of exotic varieties, which, in some cases, are not as well adapted as the germplasm in existing indigenous collections. Much more collection and evaluation should be carried out within the region itself. Little has so far been done to exploit the valuable arid zone forage plants in the region which have potential for the steppe and desert areas with less than 200 mm annual rainfall.

This is a special area of concern for FAO and UNEP's joint EMASAR (Ecological Management of Arid and Semi-arid Rangelands in Africa, the Near and Middle East) programme since there is a priority need to develop indigenous forage plants that can assist the stabilization of agriculture in emergency areas and help to halt the process of desertification.

M. KERNICK


## Résumé

Le pâturage, la culture des terres arides et les besoins de combustible sont à l'origine d'un grave appauvrissement des ressources génétiques des plantes fourragères d'Afrique du Nord, du Proche- et du Moyen-Orient. L'auteur, M. Kernick, du service FAO de la production végétale, demande qu'on travaille plus activement à inventorier et évaluer les collections existantes d'espèces fourragères indigènes. Il suggère les espèces à récolter et indique des espèces à considérer comme prioritaires. Il donne la liste des collections existantes.



## Resumen

El pastoreo, los cultivos de secano y la necesidad de leña están provocando una grave erosión genética de plantas forrajeras en Africa del norte y el Cercano y Medio Oriente. En el artículo, el Sr. M. Kernick, del Servicio de Producción de Cultivos de la FAO, indica que deberán realizarse más trabajos de reconocimiento y evaluación de las colecciones existentes de especies forrajeras indígenas. Se hacen sugerencias acerca de qué especies deberán coleccionarse y se señalan prioridades para la acción en relación con especies. importantes. Se enumeran las colecciones que existen actualmente.

## FIRST PRIORITY LIST

(Grasses and Legumes)

| Species | Use |
|---|---|
| 1. *Medicago littoralis* 2. *M. rugosa* 3. *M. scutellata* 4. *M. truncLata* 5. *Lathyrus sativus* 6. *Vicia ervilea* | For forage production in dryland cereal rotations with 250-400 mm annual rainfall. |
| 7. *Dactylis hispanica* 8. *Orypzopsis holciformis* 9. *M. sativa* | For reseeding depleted grasslands to provide grazing in areas with 250-350 mm annual rainfall. |
| 10. *Cenchrus ciliaris* | For reseeding depleted grasslands to provide grazing in areas with 200-250 mm annual rainfall. |
| 11. *Lasiurus hirsutus* 12. *Panicum turgidum* | For reseeding depleted grasslands to provide grazing and for fixing sand dunes in areas with 100-200 mm annual rainfall. |

## SECOND PRIORITY LIST

(Grasses and Legumes)

| Species | Use |
|---|---|
| 1. *Medicago orbicularis* 2. *M. polymorpha* 3. *M. turbinata* 4. *Scorpiurus sulcatus* 5. *Trifolium cherlei* 6. *Vicia villosa* | For forage production in dryland cereal rotations in areas with 250-400 mm annual rainfall. |

SECOND PRIORITY LIST

(Grasses and Legumes) cont'd.

| | |
|---|---|
| 7. *Bromus tomentellus*<br>8. *Chrysopogon gryllus*<br>9. *Secale montanum* | For reseeding depleted grasslands for grazing in areas with 250-350 mm annual rainfall. |
| 10. *Stipa barbata* | For reseeding depleted grasslands for grazing in areas with 150-250 mm annual rainfall. |
| 11. *Cynodon dactylon*<br>12. *Puccinellia capillaris* | For reseeding on saline flats to increase forage production in areas with 200-400 mm annual rainfall. |

THIRD PRIORITY LIST

(Herbs, Shrubs and Fodder Trees)

| | |
|---|---|
| 1. *Acacia raddiana*<br>2. *Artemisia herba-alba*<br>3. *Atriplex halimus*<br>4. *Kochia prostrata*<br>5. *Poterium lasiocarpum*<br>6. *Salsola rigida*<br>7. *Taraxacum officinale*<br>8. *Ziziphus nummularia* | For planting as browse and fodder reserves in depleted grasslands in areas with 200-400 mm annual rainfall. |

# Bananas, Plantains & the Future

A MAJOR NEW COLLECTION OF BANANA GERMPLASM IS BEING SET UP AT DAVAO IN THE PHILIPPINES TO SERVE BOTH THE PHILIPPINES NATIONAL PROGRAMME AND THE IBPGR'S SOUTHEAST ASIAN PROGRAMME.

Initially, it will be the biggest collection in Southeast Asia but it could eventually become the major international collection.

The decision to establish this new centre was taken at a meeting of an IBPGR Working Group on the Genetic Resources of Bananas and Plantains last year. The Group met to consider a world programme for genetic conservation and agreed that one was needed for three reasons:

(i) because it is a major food crop as well as an export crop,

(ii) because the crop could play a major role in future rural development,

(iii) because there is evidence of widespread loss of cultivars in the centre of diversity and the variability of some of the wild species of interest is threatened by shifting cultivation and forest clearance.

The Group agreed that as far as possible a programme for collection and conservation should be linked to active breeding programmes. It was, they said, important to complete and conserve collections while the variability is still available.

Five really important collections of banana germplasm exist in the world at the moment. These are in Honduras, Jamaica, the Philippines, Papua New Guinea and India.

There is, however, a wide gap in these collections because they contain very little *Musa acuminata* material. This species, said the Group, is of primary importance for banana breeding and further collections were recommended. In addition, they said that as "a matter of some urgency" exploration and collecting should take place in Burma, Indo-China (Viet Nam, Lao and Democratic Kampuchea), Thailand and Indonesia.

All local collections should ultimately be taken to the Philippines and eventually be duplicated for safety in the New World.

The Philippines was chosen as the new major collection because of the willingness of the Government and also because the site satisfied five criteria laid down by the Group. These criteria were:

(a) political stability,

(b) the absence of major environmental hazards,

(c) the low incidence of Panama disease and Bunchy top,

(d) good local and international communications,

(e) the availability of a technically competent organization to provide management and control.

● A table listing the five important world collections and their holdings is shown overleaf.

| | Total Holding: Cultivars | Wild | Duplication | Date Collection Made | Freely Available |
|---|---|---|---|---|---|
| Honduras (United Fruit Co.) | 470 | 100 | No | 1959-61 | Yes |
| India (Coimbatore) | 48 | 3 | No | 1949 to date | Yes |
| Jamaica (Banana Board) | 80 | 40 | No | 1920's to date | At present No, but request has been made |
| Papua New Guinea (Lae) | Total ca 700 but probably only 100 distinct | | No | 1969-72 | Yes |
| Philippines (Los Baños) | 68 | 1 | Planned at Davao | 1958-59 | Yes |


## Résumé

Un groupe de travail du Bureau International des Ressources Génétiques Végétales, qui s'est réuni l'an dernier, a marqué un progrès considérable dans la voie d'un programme international de conservation des ressources génétiques de bananes et plantains et a formulé les recommandations suivantes: (a) qu'une collection importante soit installée aux Philippines; (b) qu'on fasse des collections de *Musa acuminata* en particulier en Birmanie, en Indochine, en Thailande et en Indonésie.



## Resumen

El Grupo de Trabajo del IBPGR que se reunió el año pasado dió un paso importante para la realización de un programa internacional de conservación genética del banano y el plátano, y recomendó: (a) que Filipina hospede una colección importante; y (b) que se coleccione *Musa acuminata*, en particular de Birmania, Indochina, Tailandia e Indonesia.

*Realizing there were large gaps in the world collection of groundnut germplasm, Dr Walton C. Gregory and Prof. A. Krapovickas organized three exploration missions in South America over an eight-month period in 1976-77. Dr Gregory of North Carolina State University, Raleigh, is one of the world's experts on groundnuts and Prof. Krapovickas is an acknowledged authority on the taxonomy of groundnut species. Here is an abstract of Dr Gregory's report:*

# GROUNDNUTS: FILLING THE GAPS

Earlier explorations for *Arachis* germplasm had recovered only a few isolated specimens from the highly important area lying between the Andes, north of the tropics and west of longitude 56°W on the eastern edge of the Gran Pantanal. The missions reported below were funded by the IBPGR, were designed to remedy this deficiency and were developed in three phases:

1. Exploration of the Gran Pantanal in western Mato Grosso, Brazil, during December 1976.

2. Exploration of an arc extending from near the 24th parallel at Salta, Argentina, northward and eastward along the interface of the eastern cordillera and the Gran Chaco from Salta to Santa Cruz de la Sierra, Bolivia; from there, north and east along or near the continental divide towards the western edge of the Pantanal to San Ignacio below the 16th parallel and west from Santa Cruz to Cochabamba and South Yungas (March-May, 1977).

3. Exploration in Paraguay through to the southern Pantanal (June-July 1977).

The map overleaf shows where the collections were made. These were from 251 localities, 125 were for wild species and 126 were for cultivated strains. *Rhizobia* nodules were collected in each locality.

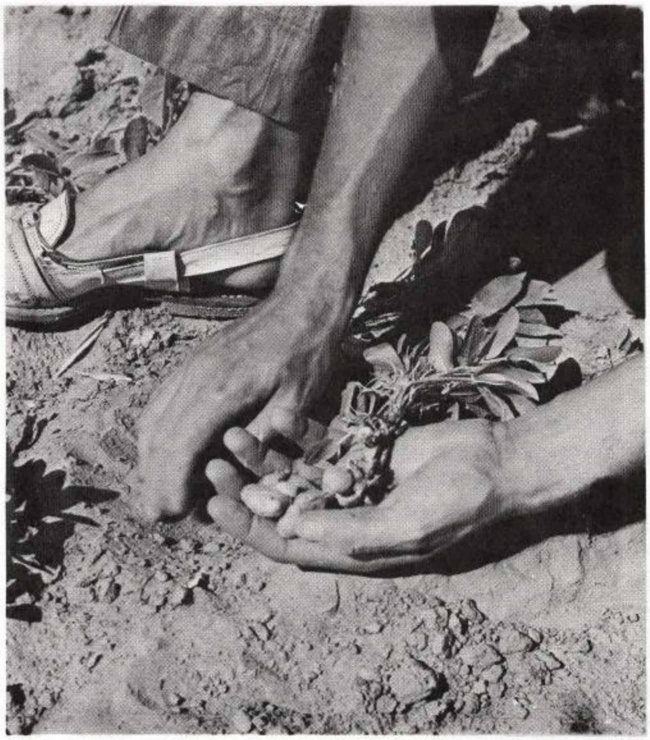
December was chosen for the exploration of the Gran Pantanal because it is the month when the water of the Pantanal is, on average, at its lowest point, and because it is early summer there in December and *Arachis* is then in full bloom, thus making conspicuous plants which are otherwise difficult to find. More than 800 living plant specimens and representative herbarium material of wild *Arachis* species were collected in about 40 localities along the perimeter of the Gran Pantanal, Mato Grosso, during the period 1-20 December 1976. Collections extended from Porto Indio, north of Lagoa Gaiba, in the west, to Corumba through the southern end of the Pantanal to Campo Grande on the east, north to Cuiabá and west to Caceres. The living specimens collected were more or less equally divided into three portions and sent to the Instituto Agronomico, Campinas, São Paulo, Brazil; Centro de Gado do Corte, Empresa Brasiliera de Pesquisa Agropecuaria (EMBRAPA), Campo Grande, Mato Grosso, Brazil; and to the Department of Botany and Ecology, National University of the Northeast, Corrientes, Argentina.

In March, April and May 1977, 43 collections of wild species, nine in northwest Argentina, and 34 in Bolivia, were made. During this same period, 118 collections of the cultivated species *A. hypogaea,* were recovered from markets and farms. Nearly all of these samples, both wild and cultivated, were collected as seeds. From 15 June to 7 July 1977, 47 collections of wild species (mostly as plants) and eight additional cultivated forms were made. Thirteen seed collections were made from plants placed in Campinas, São Paulo, Brazil, in December 1976. The living plant specimens of the respective countries were deposited at Campinas, São Paulo, Brazil; Corrientes, CTES, Argentina; Santa Cruz, Bolivia. Seeds were distributed to Argentina, Bolivia and the USA. Departure from Paraguay through the northern border prevented deposit in that country. *Rhizobia* were sent to the USA. Herb-


**Map showing areas of collection**

arium material of wild *Arachis* was deposited in Corrientes, CTES, Argentina, from where duplicates will be distributed to herbaria in customary fashion.

In conjunction with the IBPGR more work is planned in 1978. Dr Gregory says that Krapovickas is of the opinion that an expedition in 1976 to the northwest of Argentina and Bolivia should look for annual tetraploids as well as *A. monticola* and native races of *A. hypogaea* (particularly in the southern region of Bolivia), types exposed to genetic erosion. A second priority for further action would be exploration for Peruvian groundnuts followed afterwards by exploration of the region of Serra dos Parecis in Mato Grosso, and Rondonia to look for *A. villosulicarpa* and other *Arachis* spp.



*Groundnuts from their centre of diversity, South America*

# Résumé

En 1977, le Bureau International des Ressources Génétiques Végétales a fourni des crédits pour collectionner des souches génétiques d'arachides en Amérique du Sud. Ce travail, organisé par M. Walton C. Gregory (Etas-Unis) et M. A. Krapovickas (Argentine), a été réalisé en trois étapes. Le rapport donne la liste des zones prospectées et indique où les échantillons ont été déposés.

# Resumen

En 1977, el IBPGR facilitó fondos para la recolección de plasma germinal del maní en Sudamérica. El Dr. Walton C. Gregory (EE.UU.) y el Prof. A. Krapovickas (Argentina) organizaron el trabajo, que se realizó en tres fases. En el informe se enumeran las áreas que se han explorado y donde se han depositado muestras.

# USA CO-ORDINATES ITS

WORK BEGINS THIS YEAR ON SETTING UP A SERIES OF FRUIT AND NUT GERMPLASM REPOSITORIES THROUGHOUT THE USA.

This important project which will be linked to any future international germplasm repository system for such crops, is the work of the US National Plant Germplasm Committee in conjunction with national agricultural and research organizations.

Twelve repositories are planned and they will cover a wide range of fruits and nuts, along with coffee and cocoa. The main aim of the system will be to store valuable fruit and nut germplasm and make it readily available to plant breeders and other plant scientists. The map opposite shows where all the repositories will be.

The repositories are being stationed at places where research facilities of State Agricultural Experiment Stations of the Agriculture Research Service already exist, with funds coming from both organizations.

The repositories will be closely associated with the Regional Plant Introduction stations and will be under the regulations of the Animal and Plant Health Inspection Service. This is to ensure that germplasm brought into the country from outside is disease and pest-free and that everything possible is done to keep it that way.

This development will act as an important part of the international network of centres. The IBPGR has not yet decided upon the global priorities for fruits and nuts, since so far, it has laid emphasis on major crop plants. However, coffee, cocoa and bananas have been designated, and the Working Group which set up the IBPGR Regional Cooperative Programme for Southeast Asia has agreed that some tropical fruits should be made priorities for action in the region.

The organizers also hope to include accessions of germplasm from other parts of the world, evaluate it and encourage appropriate research thereon.

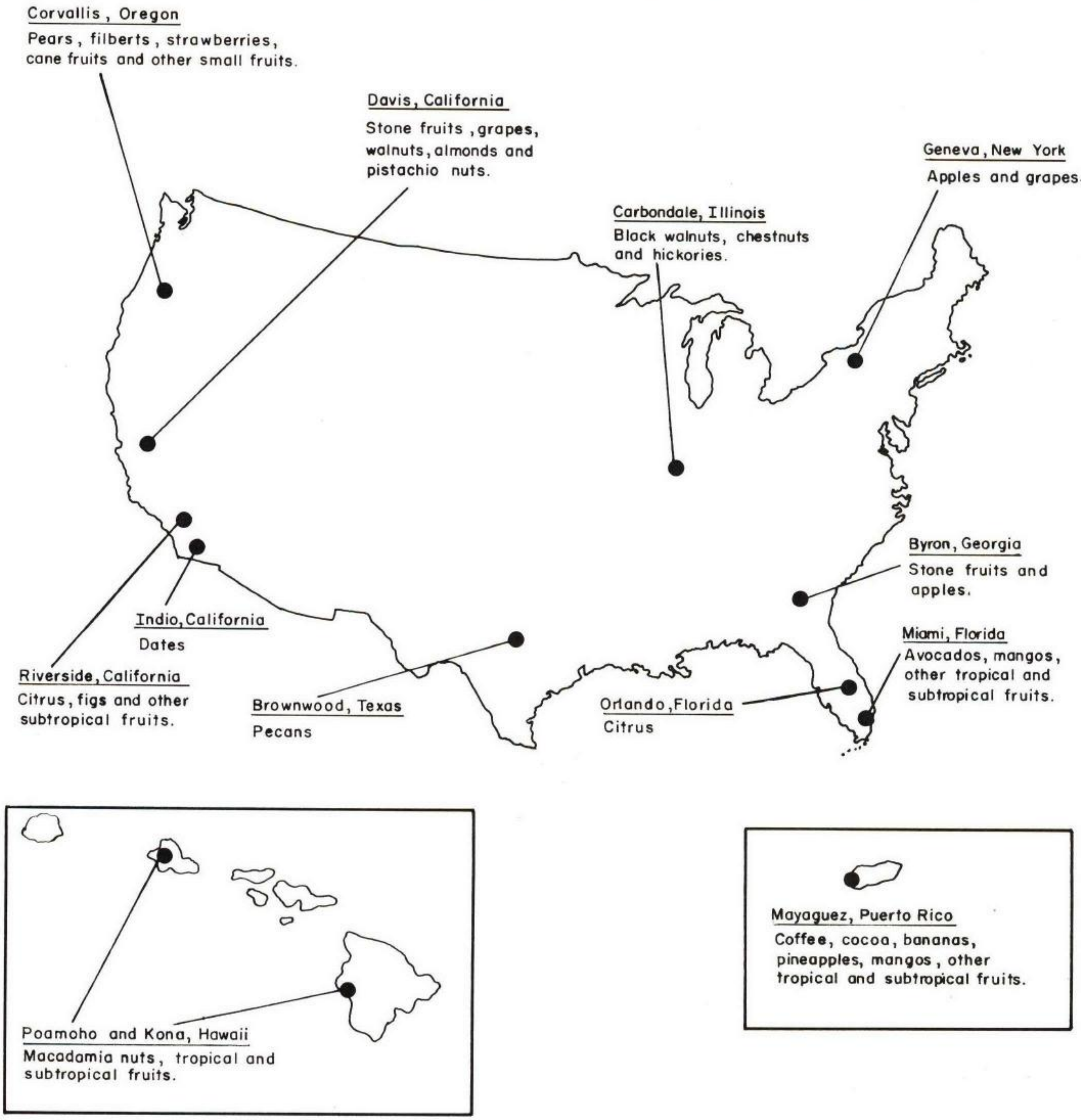
Each repository is to be looked after by a Curator. He will have a series of responsibilities including maintenance, evaluation, preparing publications, keeping down viruses and pests, and preparing the annual budget.

The Curator will also receive advice from one or more of the seven technical Advisory Committees which are being set up. These committees will cover one of seven groups of crops: pome fruits, stone fruits, small fruits, grapes, citrus, sub-tropical and tropical fruits, and nut crops. The committees will be responsible for establishing priorities, reviewing work at the repositories, deciding what germplasm will be maintained, commenting on the annual budgets, and preparing annual reports.

To coordinate all these Advisory Committees, a National Fruit and Nut Germplasm Repositories Sub-committee is being established. It will be made up of the chairmen of the Technical Advisory Committees, the four Regional Plant Introduction Coordinators, advisors from the Cooperative State Research Service, the Agricultural Research Service and the State Agricultural Experiment Stations, and a representative of the Animal and Plant Health Inspection Service.

The Sub-committee will have the responsibility of working out a broad policy for operating the repositories, liaise with Federal and State regulatory agencies, review annual budgets of the Advisory Committees, prepare an annual report, and in general represent the Natonal Plant Germplasm Committee on all matters relating to the establishment and operation of the repositories.

# FRUIT, NUT AND COFFEE COLLECTIONS



## Résumé

Aux Etats-Unis, le Comité national des ressources génétiques végétales a mis en place un réseau coordonné de grandes collections de fruits et noix, conjointement avec des organismes d'agriculture et de recherche. L'article donne la liste des centres de conservation proposés et décrit l'organisation prévue pour en coordonner les activités.



## Resumen

El Comité Nacional de Plasma Germinal Vegetal de Estados Unidos ha establecido una red coordinada de colecciones principales de frutas y nueces, en cooperación con organismos agrícolas y de investigación. Se indican los doce depósitos que se proponen y se expone la estructura administrativa para su coordinación.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### Breeders decide to coordinate germplasm activities

# NEW COMMITTEE FOR ASIA AND OCEANIA

SABRAO, THE SOCIETY FOR THE ADVANCEMENT OF BREEDING RESEARCHES IN ASIA AND OCEANIA, HAS SET UP A PLANT GENETIC RESOURCES COMMITTEE AS A RESULT OF A WORKING GROUP MEETING IN CANBERRA, FEBRUARY 1977, WHICH MET PRIOR TO THE THIRD CONGRESS OF SABRAO.

It will be known as the SABRAO Committee for Plant Genetic Resources and the Chairman will be Sir Otto Frankel, a Vice-President of the Society.

The working group meeting was attended by about 25 scientists from 12 countries and representatives of several international organizations or centres - BIOTROP, AVRDC, ICRISAT, IRRI and EUCARPIA.

Discussions covered progress reports from countries in the SABRAO region and position papers on germplasm of rice, pulses, sorghum, wheat, soybean, winged bean, fruits, vegetables, sugarcane and forest species.

Much of the discussion was devoted to the outcome of a working group on plant genetic resources in Southeast Asia, held under the auspices of the IBPGR and the Philippine Council for Agriculture and Resources Research (PCARR) at Manila, in December 1976.

The SABRAO Working Group warmly welcomed the agreement reached at the Philippines meeting, which included decisions on crop priorities related to crop diversity, the threat to germplasm; exploration targets; collaboration, and the forming of a regional committee of IBPGR.

It felt, however, that SABRAO still had a major role to play in stimulating activities and providing liaison and information for genetic resources workers in the much wider region of SABRAO.

The Board of SABRAO approved the Working Group's recommendations and along with Sir Otto Frankel, the Committee will consist of Dr. T.T. Chang (IRRI); Dr. K.H. Jain (India); Dr. E.Q. Javier (Philippines); Dr. K.L. Mehra (India); Dr. Setijati Sastrapradja (Indonesia); Dr. Muneo Iizuka (Japan); and Mr. N. Rajanaidu (Malaysia).

# COLLECTING AFRICAN RICE

COLLECTING AND CONSERVING GERMPLASM OF *O. glaberrima*, THE INDIGENOUS AFRICAN RICE, HAS BEEN A TOP PRIORITY FOR SOME TIME.

In 1974, a team from IRAT/ORSTOM began a study on the genetic variability of the species and its wild relatives in Africa, and more recently a meeting was held in Paris (25-26 January 1977) jointly organized by IRAT and ORSTOM, as a direct result of the interest shown by the International Rice Research Institute (IRRI), the International Institute for Tropical Agriculture (IITA), the West African Rice Development Association (WARDA), FAO and IBPGR. This was followed by another meeting at Ibadan, Nigeria.

The meetings agreed that WARDA, IRAT/ORSTOM and IITA were organizations of an international character in West africa and so were well placed to take responsibility. It was also agreed that IRRI should be integrated into a proposed conservation programme to make maximum use of its wide experience and expertise.

The meeting further decided that IRAT/ORSTOM should play a major role in francophone Africa - and would collaborate with IITA/IRRI in exploration and evaluation wherever possible. IITA would assume responsibility for anglophone Africa. Moreover, because IITA is using the EXIR system for computerization and documentation of all the collections held by its Germplasm Collection Unit, it was agreed that the documentation of samples would be part of its activities.

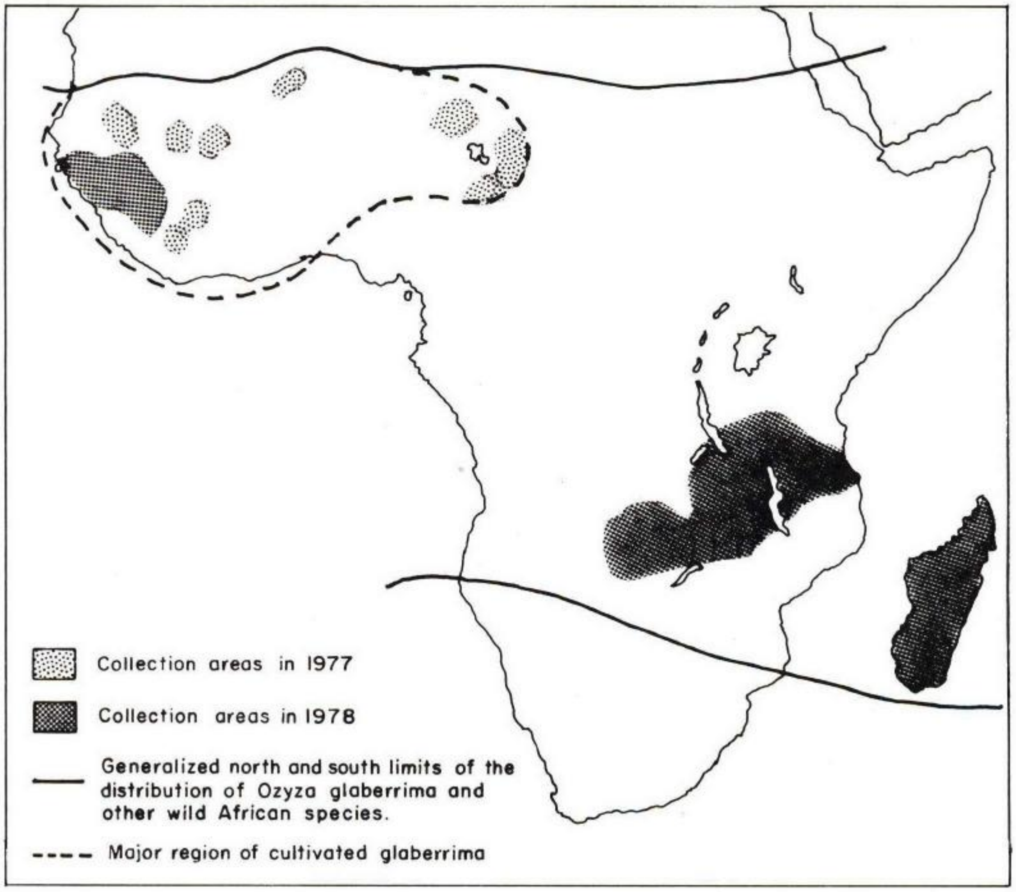
The Paris meeting determined the priority areas for collection in relation to the centres of diversity of the African cultivars and its related wild species. The Asiatic rice *O. sativa*, has long been introduced into Africa and there are many locally adapted rices showing genetic variation. These are to be collected as well as the African rice species. Rice is grown chiefly during the rainy season and during the dry season under irrigation. In some West African centres farmers grow very earlymaturing upland types as a catch crop and medium maturing upland types for the main crop. The diversity covers a wide range of ecosystems from deep water swamps to rain-fed uplands.

During 1977, IRAT/ORSTOM began collecting rice germplasm in the region around Lake Chad, the Senegal river basin, Mali, and the Ivory Coast, with financing provided by ORSTOM, IRAT, IITA, IRRI and IBPGR. At the same time, IITA also collected rice during its collecting missions for a range of crops in Upper Volta, Mali, and the Ivory Coast (October and November 1977) but not in the areas which had already been visited by IRAT/ORSTOM scientists. 1977 therefore, saw the first concerted attack on this priority crop and IBPGR has agreed to fully support IRAT/ORSTOM in 1978 to collect in the region of Guinea and Guinea Bissau, and in East Africa, Tanzania, Zambia and the Malagasy Republic. Details of the collection areas are shown in the map overleaf.

A full report on the Paris meeting can be obtained from IRAT at:

110 rue de l'Université
75007 Paris
FRANCE.

*African rice in typical swamp conditions*




*At the end of 1977, the major holdings of West African rice (i.e. glaberrimas and their relatives) were at IRRI in the Philippines, (2 238 accessions); IRAT, Paris (1 575 accessions); IITA, Nigeria (820 accessions); and the National Institute of Genetics, Japan, (420 accessions).*


## Résumé

Compte-rendu des activités récentes sur les ressources génétiques de riz africain. Une réunion tenue en janvier 1977 à Paris a déterminé les zones dans lesquelles des collectes doivent être organisées en priorité en fonction des centres de diversité des espèces africaines et a réparti les responsabilités entre les organisations internationales. Une attaque concertée sur le travail de collecte a été lancée en 1977 et se poursuit en 1978.

## Resumen

Se informa sobre actividades realizadas recientemente en materia de recursos genéticos del arroz africano. En una reunión celebrada en París en enero de 1977 se determinaron áreas prioritarias para la recogida en relación con los centros de diversidad de las especies africanas, y se distribuyeron las responsabilidades entre organismos de carácter internacional. En 1977 se emprendió de forma concertada la labor de recolección que se proseguirá en 1978.


J.T. Williams

# MORE NEWS ABOUT CROPS

## Himalayan Maize Germplasm

It has long been known that the North-east Himalayan states of India have considerable genetic diversity of maize. In the 1960's Dhawan and Thapa collected maize varieties morphologically resembling the hypothetical progenitor of maize described by Mangelsforf and co-workers. The Indian Maize collection, sponsored by the Indian Agricultural Research Institute, New Delhi, maintains a large collection including 1 571 local maize cultivars recently collected from the Himalayan region. This material comes from Assam, Meghalya, Mizoram, Tripura, Nagaland, Manipur, Arunachal Pradesh, Sikkim, Bhutan, and the Chamba Valley in Himachal Pradesh.

Following the collection of the material, an attempt has been made to classify the races by using a modified scatter diagram technique in which several stable characters showing significant variations were used. The material has been classified into 15 races and three sub-races and fully described in a monograph recently published by the Indian Council of Agricultural Research.

The races have been grouped for convenience into four categories: primitive, advanced or derived, recent introductions and hybrid races.

It should be stressed that some of the races are very primitive and some possibly have counterparts in the American continent. Altogether 305 names of the races are listed in the 11 treatises on maize in the western hemisphere. Each treatise relates to one country and some duplication between the races of one country and those of others is to be expected.

To establish the relationships, additional data for adaptation to altitude, maturity, plant colour, pilosity and kernel characters are necessary.

An attempt has been made to look for resemblances between the Indian races and the American races. A case in hand is the close resemblance of the Indian race Khasi Riewhadem with the Montana of Colombia. Both are adapted to high elevations (above 1 500 m) and have tall plants; low venation index; long and thick ears, tapering slightly from base to tip; shank very long, thick and hard; kernels wide and thick; endosperm flinty; white or yellow; aleurone colour lacking; pericarp colour lacking and rachis tissues spongy.

It is significant to note that Montana is the largest-eared race in Colombia and is the counterpart of the Guatemalan-Mexican race Oloton, which is the progenitor of the highly evolved Mexican race Jala. Further, the races Jala and Khasi Riewhadem belong to the same genealogy, Confite Morocho.

The Indian Biaki shows a marked resemblance to the Peruvian race Kculli. Biaki is a recent collection and resembles other Indian races, e.g. Shyam Nahom. Shyam Nahom and Khasi Riewhadem belong to the advanced and hybrid race groups respectively. Such findings suggest that counterparts exist not only for the primitive races, but also for the advanced (or even hybrid) races in India.

B. SINGH, IARI

# Forage Legumes in Libya

PLANS ARE GOING AHEAD THIS SPRING TO START A COLLECTION OF ECOTYPES OF INDIGENOUS SPECIES OF FORAGE LEGUMES IN LIBYA. THIS FOLLOWS A MEETING OF INTERESTED PARTIES LAST NOVEMBER AT THE AGRICULTURAL RESEARCH CENTRE, TRIPOLI.

The meeting decided that the collecting would concentrate on annual species of *Medicago* and that as many groups as possible would be brought in to make it a nationwide effort and establish it as a reference collection for Libya. Proposed work will be an important link in the IBPGR's activities in the Mediterranean basin.

The Agricultural Research Centre, it was agreed, would act a coordinator. The meeting decided that the project should span two or three years involving joint expeditions each year to collect in specific areas over a 10-14 day period. This, it was thought, would help to make the collection as comprehensive as possible and make it unbiased regarding early or late-flowering types.

There was a lot of discussion about whether the collecting should merely concentrate on *Medicago* species or include other useful species (e.g. *Lotus, Hippocrepis, Hedysarum* etc.) In the end, the meeting agreed to recommend that collecting teams should aim mainly for *Medicago* species, but should collect other species at any site if time permitted.

Main areas to be covered are likely to be: Tripolitana, Cyrenaica and Sirte, with sub-divisions of these to be finalized later. Collecting in some areas may not get under way until next year as the meeting decided that it may be necessary in some parts to conduct a preliminary survey, allowing teams to concentrate on collecting when the time comes. It looks as if ultimately, there will be several teams, half of which will include an experienced collector who will train his assistants.

The object of the exercise will be to help the Jamahiriya region of Libya by increasing the stock of genotypes potentially useful in dry-land farming.

# Pulses in the Himalayas

DR. L.J.G. VAN DER MAESEN, GERMPLASM BOTANIST AT ICRISAT, INDIA, LED AN EXPEDITION INTO THE WESTERN HIMALAYAN FOOTHILLS IN OCTOBER 1977.

The expedition had three objectives: to collect *Atylosia* spp. and *Cajanus cajan* in the foothills; to obtain an impression of the distribution and growth of pigeon pea in the hills; and to collect wild relatives of other pulse crops where possible. The eight-day search realized 150 plant specimens with the main emphasis on *Atylosia, Rhynchosia* and as it appeared, *Vigna*.

Of particular interest to the group was *A. mollis* and *A. volubilis*, which are so closely related that many botanists believe them to be the same species. However, Dr. van der Maesen found considerable differences. *A. mollis* occurs at higher altitudes only and flowers and fruits after the monsoon but *A. volubilis* has seeds around March.

In addition, *A. volubilis* only reaches seven seeds per pod, whereas *A. mollis* were found to have up to ten seeds. Other differences included leaflet size, shape and indumentum.

The expedition, which went up to a height of 1 500 m, found few pigeon peas except in Garhwal. Only three samples were collected.

Dr. van der Maesen concluded that the area needs to be further explored for pigeon peas and that if time can be found, more entries of each *Atylosia* spp. could be traced.

# Sorghum and Millets in Sudan

## A progress report:

The first stage of a national programme for collecting sorghum and millet took place in the Sudan towards the end of 1977. The Sudan has long been regarded as an important area of genetic diversity of both sorghum and *Pennisetum* millets, and the two crops are integral to the country's traditional agriculture. Many varieties of the crops still exist, especially in remote areas, mainly because of the poor transport and communications.

However, gradually new varieties are coming in, and transport is becoming easier. Drought has also tended to increase genetic erosion, so it was felt necessary to make collections before some traditional varieties disappeared altogether.

In 1976/77 a national programme for the collection of sorghum and millet germplasm was planned, scheduled to start in November 1977 and end towards the end of 1978. The idea was to concentrate on areas of maximum variability, and was planned in three stages, as follows:

- the first mission took place between November and December 1977 to Central and Western Sudan, and two collecting missions working together covered North and South Kordofan and North and South Darfur.
- the second mission was to Southern Sudan with one team collecting around the Equatoria Province.
- the third mission is due to set off in November this year and will cover Central and Southeastern Sudan. Once again the mission will be split into two teams, one covering Gezira and Kassala; the other covering the White Nile and Blue Nile provinces.

Full reports of the first two missions are not yet to hand but a progress report has been received on the mission to North and South Kordofan which found interesting variations, despite a low sampling frequency.

North and South Kordofan can be divided into two regions; the northern sandy steppes and the more fertile clay plains of Southern Kordofan, including the Nuba mountains. The most important variation found within both sorghum and millets were: drought tolerance, early maturity, disease-resistance and high yields on infertile soils. Within sorghum the main variations were: bird resistance due to unpalatable grain or inaccessible 'dura' type head; its multiple use as a food, in the preparation of beer, in the chewing of the sweet stems, and its fast maturity - between 70 and 80 days.

Millets were collected with bird resistance due to heavy head bristles.

In total, 142 samples of sorghum and 34 samples of millet were collected by 18 December 1977. The progress report suggests that pests and diseases in the area were relatively common, largely as a result of the lack of knowledge and availability of modern control methods. Common pests were: birds, locusts and grasshoppers, stem borers, and grain borers. Diseases included smut diseases, and downy mildew on millets.

The collecting missions to the Sudan are being organized in conjunction with IBPGR, who are providing genetic resources consultants. The initial phase was supported by UNEP funds.

I.R. DENTON

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Collecting in West Africa

Further information on the IBPGR supported collecting in West Africa (see p. 5) can be obtained from two reports issued by ORSTOM in 1977.

1. Prospection des Mils pénicillaires et Sorghos en Afrique de l'Ouest. Campagne, 1976, Niger. 89p.

2. Prospection des Mils pénicillaires et Sorghos en Afrique de l'Ouest. Campagne, 1976, Nigéria et Sénégal. 101p.

# Okra in Nigeria

OKRA IS AN IMPORTANT VEGETABLE CROP IN NIGERIA BUT INCIDENCE OF VIRUS ATTACK IS SO FREQUENT THAT OFTEN, MORE THAN 90 PERCENT OF THE PLANTS ARE DESTROYED.

So an important project has been put into operation in Nigeria to improve the genetic variability of the plant, organized by Dr. Prem Nath at the National Horticultural Institute in Ibadan.

Dr. Nath made five tours around the country and found that not only was okra liable to attack by viruses but often the fruit was of poor quality, and planting produced low yields. However, it was the virus, as yet unidentified unfortunately, because of the lack of a virologist on the trip, which wreaked most havoc. In addition, wild types were observed to be endangered.

Dr. Nath reports that evaluation of the collection (which now exceeds 200 samples) at the Institute Farm during June to August 1977, clearly showed the unidentified virus or viruses, along with incidence of *Cercospora*. Dr. Nath said that the mystery virus was very serious, damaging 90 to 100 percent of the plants and that there was a "dire need to develop a virus-resistant strain of okra".

Dr. Nath states that the short-term objectives of the okra improvement programme should be to isolate local strains with more than one attribute of: good fruit quality; high yield; and field tolerance to virus/fungal diseases for the southern, northern and eastern region of Nigeria. The longer-term aims should concentrate on suitable plant types, good bearing habits, good fruit quality, high fruit yield, and resistance to diseases and pests, though there were no serious instances of insect pests during Dr. Nath's observations.

The fungus *Cercospora* also caused between 80 and 100 percent damage where it had occurred.

The fruit-bearing ability of the okra varied. Some started at the 7th to 15th node and others as late as the 35th to 40th node. It was very rare, says Dr. Nath, to see a plant which started fruiting at the 3rd or 4th node and in branching types, many of the plants started fruiting very late both on the main stem and on other branches. Some strains took up to ten months to flower. All this resulted in poor fruiting and, not surprisingly, low yield.

# Cassava in Brazil

Professor Nassar of the Universidade Federal de Goiás is working on conservation and evaluation of the genetic resources of cassava, with funding from IDRC.

Between November 1976 and June 1977, wild germplasm was collected and maintained as a living collection in the Instituto de Ciencias Biológicas at Goîania.

Eleven wild species from Goiás state are being evaluated for growth habit, habitat characteristics, tuber formation, HCN and protein content, crossability to cultivated cassava and chromosome behaviour.

This work is part of a broader attempt to obtain detailed information of the 40 or so wild *Manihot* species in Central Brazil and to collect representative diversity.

To date, two samples have proved to have a notable high protein content and some of the wild species screened seem to be adapted to extremely dry habitat conditions. At a later date, screening for resistance will be done especially for reaction to cassava mosaic and bacterial blight.

## Barley in Alaska

Dr. B.R. Baum of the Biosystematics Research Institute, Agriculture Canada, Ottawa, took an expedition to West Canada and Alaska during the summer of 1977 to collect material of the *Hordeum jubatum* complex - a wild relative of barley. Seeds will be made available for cytological research and will also be increased for the Canadian gene pool collection.

## Winged Bean in Papua New Guinea

An important collection of winged bean *(Psophocarpus tetragonolobus)* took place in the lowlands of Papua New Guinea last March. It was organized by Dr. V. Kesavan and Mr. A. Bala of the Faculty of Agriculture of the University of Papua New Guinea with funds from UNEP administered by FAO's Crop Ecology and Genetic Resources Unit.

The collection was in the Madang area of the East Sepik province of the island and material is being grown for single plant selections and further evaluation. The notable feature of the collection was the identification of long-podded (25-35 cm) types.

Another exploration and collection session was planned for December, but details are not yet to hand.

Winged bean is a priority crop which will continue to receive the attention of the IBPGR's Southeast Asian programme.

## Egusi Melons in Nigeria

The Egusi melon *(Citrullus* spp.), grown for its edible seeds which are high in protein and oil, and a popular delicacy cooked with leaf vegetables in Africa, has been collected by the Nigerian National Horticultural Research Institute and five distinct types based on seed characteristics have been identified. These are currently being used in breeding studies to develop higher yielding cultivars and to determine the inheritance of seed types. All forms are cultivars and no wild types have been observed.

## Peppers in Brazil

Dr. Cyro Paulino da Costa of the Institute of Genetics at the University of São Paulo, Brazil, has recently made a collection of *Capsicum* peppers from Northeast Brazil. The collection comprises germplasm of three different species.

# CIMMYT: caretaker of the world's largest maize collection

A germplasm bank is a service unit for researchers. The bank at CIMMYT collects and stores seed, regenerates seed, tests and catalogues seed, and ships seed to users. The following provides some up-to-date information.

The 13 000 items stored in the CIMMYT bank were gathered from 46 countries, mainly by an agency of the Mexican Ministry of Agriculture during the 1940's and 1950's. Over 90 percent of the collection consists of the species *Zea mays* L. The collection also contains near relatives including *Zea mexicana, Zea perennis,* and *Tripsacum* spp.

The bank is held in concrete chambers at a temperature of $0^{o}C$ and there are over 18 000 labelled storage tins of 2-litre and 4-litre capacity containing 40 tons of seed. The tins are arranged on steel shelving like library stacks. A duplicate seed supply for the CIMMYT collection (500 grammes per item) is currently being deposited for long-term storage at the US National Seed Storage Laboratory.

Fresh seed was grown for over 8 000 bank accessions between 1969 and 1976. In 1977, seed for another 122 highland accessions and 200 tropical-temperate accessions was regenerated in Mexico and added to the bank. In 1977, 500 bank accessions of tropical character were evaluated at two sites (Poza Rica and Tlaltizapan), 500 temperate accessions were evaluated at Tlaltizapan, and over 300 highland accessions at El Batan and Toluca.

# genetic resources information and the computer

EVER SINCE THE EARLY DAYS WHEN FAO BEGAN WORK ON PLANT GENETIC RESOURCES THOSE INVOLVED HAVE RECOGNIZED THE NEED FOR AN INTERNATIONALLY ACCEPTED SYSTEM TO RECORD, CLASSIFY, COMMUNICATE, CORRECT AND UPDATE INFORMATION ABOUT ACCESSIONS.

In 1974-75, FAO employed Dr. David J. Rogers to develop a computer-based system - the Genetic Resources Communication, Information and Documentation System (GR/CIDS) following on from earlier computer work on the TAXIR system (Taxonomic Information Retrieval).

Since the establishment of IBPGR it has provided nearly all the funds to develop GR/CIDS through a contract with the University of Colorado at Boulder, USA (the Taximetrics Laboratory - renamed, in 1976, the Information Sciences/Genetic Resources Program).

An information storage and retrieval computer program called EXIR (Executive Information Retrieval) has been developed to meet the specific needs of scientists involved with data management problems. It is a flexible computer program, capable of handling large numbers of descriptive categories. Data can be fed in or extracted as words, numbers of codes, in a variety of ways. The command language can be translated into many languages, so data can be fed into EXIR in any language the user wishes.

Other advantages of the system are that it can handle word data from 1-90 characters; it uses integer, fractional or mixed numbers; input can be in free format; and the feeding in of data can be from a variety of input media - punch cards, disc or tape files, etc. It is designed to accommodate a wide range of data bank sizes and is currently being used by genetic resources centres around the world.

The program has a simple, yet powerful data bank update command, which allows errors to be corrected, data to be updated, and new data to be added, as well as the assignment of new descriptive categories.

It is widely recognized that effective data management is necessary in agricultural research, and building up international data banks relating to important crops would be a boon to genetic resources work. However, most people who have to handle genetic resources information want to do more than just store and retrieve it. It may be necessary to classify it using methods of multivariate analysis, plot data geographically, operate stockholding systems for seed stocks, or other procedures. EXIR produces direct access files which are immediately suitable for use in these additional procedures.

The program has been adapted for mini- and micro-computers, so to find out more about EXIR and its installation, please write to the following address:

Information Sciences/Genetic<br>
  Resources Program<br>
1229 University Avenue<br>
University of Colorado<br>
Boulder, Colorado<br>
USA

The IS/GR Program will also provide a list of publications, including the EXIR Brochure, the Data Organization Manual, the Data Preparation Manual and the EXIR User's Manual. The staff of the Program will be pleased to offer assistance whenever requested.

## Résumé

Un programme d'informatique appelé EXIR a été mis au point dans le cadre du système internationalement accepté, de communications, d'informations et de documentation sur les ressources génétiques, pour enregistrer, communiquer, corriger et mettre à jour les renseignements sur les ressources génétiques. Ce travail a été réalisé par le Programme IS/GR de l'Université du Colorado à Boulder, Etats-Unis, qui s'est disposé à fournir toute information complémentaire.



## Resumen

Se ha elaborado un programa de almacenamiento y recuperación electrónica de información llamado EXIR, como parte del sistema internacionalmente aceptado - "Sistema de Comunicaciones, Información y Documentación sobre Recursos Genéticos" - para registrar, comunicar, corregir y actualizar información sobre plasma germinal. Realiza este trabajo el programe IS/GR de la Universidad de Colorado, Boulder, EE.UU., que tendrá mucho gusto en facilitar más información al respecto.


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# U.S. Germplasm Committee acts as watchdog

SCIENTISTS IN THE USA HAVE INFORMED THE GOVERNMENT THAT A PROPOSED NEW LAW COULD DRASTICALLY RESTRICT THE COUNTRY'S BADLY NEEDED SUPPLY OF EXOTIC CROP VARIETIES.

Crops in America have a very narrow genetic base and more than 98 percent of the country's crop production is based on species brought in from outside. But the proposed law - called Executive Order 11987 - could restrict the introduction of new varieties. So the US National Plant Germplasm Committee, acting as a watchdog, has contacted two government officials. The Chairman, Donald Barton, has written to the Secretaries at the US Department of Agriculture and at the Department of the Interior, expressing the Committee's concern.

In his letter he says: "The welfare of our crop agriculture is, to a major extent, dependent upon the plant genetic resources (germplasm) that we can introduce to this country from many parts of the world and use in crop improvement programs.

"Many exotic species of forage and range plants have proved of immense value to our livestock industry, itself based on exotic species.

"Therefore, this Committee views with concern the possible implications of Executive Order 11987.

"This Committee strongly recommends that it be represented on any departmental or inter-agency task group that may be appointed to develop guidelines on interpretation and implementation of the order."

Dr Barton said the Committee was, however, encouraged by a memorandum from the Department of Agriculture on the President's environmental message and concludes the letter: "We are sure that the President's sincere concern for enhancing environmental quality can be realized while at the same time avoiding unnecessary restrictions on the instruction and use of exotic plant germplasm."

# NOTES FROM GENETIC RESOURCES CENTRES

## BOLIVIA

The IBPGR provided funds to IICA (Instituto Interamericano de Ciencias Agricolas OAE, La Paz) to improve the storage facilities for Andean zone crops to be stored in Puno, and Cuzco. These crops include: quinoa, cañihua, *Lupinus mutabilis* and the roots and tubers as follows: *Oxalis tuberosa, Ollucus tuberosus,* and *Tropaeolum tuberosum*.

This work is part of the Programa Andes Altos IICA which maintains relationships between the institutions of the Andean centres from Colombia to Bolivia. This particular project links Peru and Bolivia.

## BULGARIA

The Institute of Genetics and Plant Breeding at Sofia proposes to establish a new institute to deal with genetic conservation.

## CANADA

Canada has agreed to store the world's base collections of millet and oats. The seeds will be stored at the Central Office, Canada Agriculture, the only base collection centre in the country. The move was initiated by the IBPGR, as part of its international programme for the seed storage of valuable germplasm collections. The first collection of millet arrived at the Central Office on 24 October 1977.

## CHILE

The Institute of Plant Production at Valdivia in Chile maintains 350 clones of potatoes. During the past year the IBPGR finalized an agreement to fund the collection of semi-cultivated *Solanum tuberosum* and to make intensive collections of *S. brevidens,* a species with extreme resistance to certain viruses, from the Chiloe region.

## COLOMBIA

The Instituto Colombiano Agropecuario (ICA), the maize genebank at Tulio Ospina, contains 4 387 accessions of which 1 660 come from Colombia and most of the others from Venezuela, Ecuador, Bolivia and Peru.

## GERMANY (FDR)

In the Genbank-Informationsdienst (GID) No. 5 (November 1977) evaluation results for 74 *Lolium multiflorum* samples from all over the world are reported. Research has been carried out at the Institute of Plantbreeding at Göttingen University and seeds are being stored in the genebank as first, a base collection for long-term storage, and second as a working collection for delivery to breeders, institutes, etc.

## INDIA

About 800 accessions of onion are currently maintained at the Tamil Nadu Agricultural University, Coimbatore, India.

Dr. R. Rajendran, Vegetable Breeder at the Indian Institute of Horticultural Research, Bangalore, informs us that a permanent germplasm and pollen bank will be ready by the end of 1978 to store seed material.

The Central Rice Research Institute at Cuttack maintains the National Rice Germplasm Bank. This genebank at present contains 14 905 viable accessions but stocks are kept at 40 different rice research stations in the country making a total of 48 728. Of these it is estimated that, allowing for duplicates, 24 000 local cultivars are represented.

## INDONESIA

The Central Research Institute for Agriculture at Bogor maintains a national collection of rice germplasm, but lack of adquate storage facilities caused the loss of most of the early collections. More recently, an air-conditioned room has been used as a temporary measure to store the seeds. By the end of 1977, 4 388 accessions of indigenous rice cultivars were in the collection. These comprise 3 248 lowland types, 859 upland types and 231 tidal swamp types. Of these, 3 082 are *indica* rice and 1 256 *javanica*.

ITALY

The Bari Germplasm Laboratory holds a large collection of pea *(Pisum)* germplasm and has evaluated 4 346 accessions for a range of morphological descriptors and disease susceptibility to: *Fusarium; Peronospora; Ascochyta; Erisiphe*. Small amounts of seeds are available for distribution. A catalogue has been produced using the EXIR program.

JAPAN

The Plant Germplasm Institute of the Faculty of Agriculture at Kyoto University, Japan, has offered to store wheat germplasm on a world scale at IBPGR's request.

The Seed Storage Laboratory is based in the Division of Genetics of the National Institute of Agricultural Sciences at Hiratsuka. It was established in 1966 and maintains a collection of 26 766 accessions of 138 crops, of which 8 177 are rice. New facilities are now under construction at Tsukuba Science City.

NEPAL

The Department of Agriculture established a coordinated approach for rice improvement in 1965 and from 1971 has been active in collecting, maintaining and using indigenous germplasm. In 1971, collections were made in 57 out of 75 districts of the country in collaboration with IRRI and USAID. About 780 accessions are maintained.

PAPUA NEW GUINEA

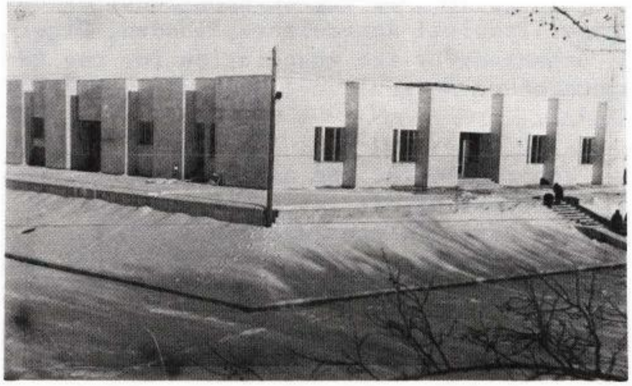
We are informed that the collection of bananas at Lae will continue to be funded by the Papua New Guinea Biological Foundation and that moves are afoot to duplicate the collection at the Laloki Research Station near Port Moresby.

PERU

The Programa Cooperativo de Investigaciones en Maīz has been concerned for the past 20 years with maintaining samples for use in breeding. Much of the material was collected in the 1950's, particularly from areas which were more readily accessible at that time but many have been lost due to the lack of good storage facilities. In 1977, the IBPGR provided funds to upgrade the existing storage facilities and for collections to be made in the coastal region of Peru. We are informed that traditional populations of maize still survive in the higher altitudes and in the many irrigated valleys running from the Sierra through the coastal desert zone to the coast.

PHILIPPINES

The National Genetic Resources Programme of the Philippines which is an integral part of the IBPGR coordinated regional programme for Southeast Asia has been collecting indigenous vegetables in the Philippines. This work is centred on the National Plant Genetic Resources Laboratory at Los Baños, which has collaborated with FAO to use UNEP funds in 1977.



*The USSR Seed Stores at Kubanskaya, Krasnodar*

USSR

The NI Vavilov Institute of Plant Sciences in the USSR has 255 000 samples of crop plants and their wild relatives, one of the biggest collections in the world.

The new long-term seed storage building at Kubanskaya (Krasnodar) is shown above.

# NEWS ABOUT MEETINGS

## WORKSHOP ON THE GENETIC CONSERVATION OF RICE GENETIC RESOURCES

This was held at Los Baños, from 12-15 December 1977, under the joint sponsorship of IRRI and IBPGR. There were 44 participants from 18 centres as well as staff from IRRI. The workshop surveyed the rice situation country by country and led to the development of a five-year collaborative collection plan for the systematic canvassing and assemblage of rice genetic resources in South Asia, Southeast Asia, West Asia, Africa and Latin America.

During one of the discussion sessions, descriptors and descriptor states were reviewed to prepare for standardization in the near future.

## WORKSHOP ON CROP GENETIC RESOURCES

This three-day workshop was held from 4-6 January 1978 at the International Institute of Tropical Agriculture, Ibadan, Nigeria, organized by the Association for the Advancement of Agricultural Sciences in Africa (AAASA).

The aim behind the workshop was to create awareness at all levels of the need to conserve Africa's invaluable genetic resources and to bring together people from all over Africa to discuss how this could be done.

Several world experts attended the workshop to give help and advice, especially on the role of international and regional organizations.

## FORUM ON THE PROSPECTS AND POTENTIAL USES OF THE WINGED BEAN

This was sponsored by the Asia Foundation (TAF), the Philippines Council for Agricultural and Resources Research (PCARR) and the Southeast Asian Regional Center for Graduate Studies and Research in Agriculture (SEARCA). It was held in Manila from 13-14 January 1978. The meeting was designed to give a general picture of the winged bean, its uses and itspotential use, as well as plans for future development. A report will be published later in the year.

## IBPGR COCONUT CONSULTATION

An expert consultation on coconut genetic resources was held from 24-26 January 1978 at FAO Headquarters, Rome. The report of the meeting was presented to the fifth meeting of the IBPGR in February 1978. Full details will reported in the next issue of this Newsletter.

## FIFTH INTERNATIONAL WHEAT GENETIC SYMPOSIUM

This symposium, organized by the Indian Society of Genetics and Plant Breeding, in collaboration with the Indian Council of Agricultural Research, was held from 23-28 February 1978. The proceedings of the symposium will be available in May, 1978 and will be of interest because of the session on conservation, classification and cataloguing of genetic resources, chaired by Sir Otto Frankel and Dr. J. Vallega. This followed a session on changing concepts in the evolution of wheat.

## IBPGR EXPERT CONSULTATION ON FORAGE PLANTS OF SOUTH AMERICA

This Consultation will meet at the CIAT Headquarters in Calĩ, Colombia from 25-27 April 1978 under the auspices of CIAT/INTA/EMBRAPA.

## IBPGR/GOVERNMENT OF INDIA WORKSHOP ON THE GENETIC RESOURCES OF SOUTH ASIA

This Workshop will take place at the National Bureau of Plant Genetics, New Delhi for Government representatives of Bangladesh, Bhutan, Burma, India, Nepal and Sri Lanka, from 9-12 May 1978.

## IBPGR SOUTHEAST ASIA REGIONAL COMMITTEE

The first meeting of the IBPGR Southeast Asia Regional Committee for the cooperative programme on genetic resources will take place in Bogor, Indonesia sometime in July, 1978. This meeting includes official representatives of the governments of Indonesia, Malaysia, Papua New Guinea, the Philippines and Thailand.

## REVIEW CONFERENCE ON LEGUMES

An international review conference on the broad aspects of the classification and use of legumes will be held at the Royal Botanic Gardens, Kew, UK from 24 July to 4 August 1978. The Conference is sponsored by the Royal Botanic Gardens and the Missouri Botanical Garden in conjunction with the Phytochemical Society, USDA and the University of Reading, UK. During the conference the following selected groups of crops will receive special attention: *Arachis, Glycine, Phaseolus, Psophocarpus* and *Vigna;* also fodder, forage and cover legumes, with particular reference to genetic diversity, classification, adaptation and breeding. The attendance is limited and is by invitation only.

## SYMPOSIUM ON CASHEW NUTS

A symposium on cashew nuts, organized by the Commission for Tropical and Sub-tropical Horticulture of the International Society for Horticultural Sciences is to be held in Kerala, India in March or April 1979.

## SYMPOSIUM ON THE GENETIC RESOURCES OF FORAGE PLANTS

A symposium on the genetic resources of forage plants will be held at Townsville, Australia, from 6-11 May 1979.

# NEWS ABOUT PUBLICATIONS

*Several publications have come out in the past few months which should be of special interest to those working with genetic resources.*

The September 1977 issue of "California Agriculture" devoted its entire 40 pages to reports on germplasm. "California Agriculture" emphasises that the narrow genetic base of crop plants all over the world makes them particularly vulnerable to diseases and pests, and discusses what is being done both in the USA and elsewhere to correct this. The magazine covers everything from beach strawberries to garden peppers, concentrating especially on the work carried out by researchers from the University of California. The magazine reviews this work and the diversity of scientific approaches to the four main areas of genetic activity - exploration, collection, conservation and use. "California Agriculture" will be sent free on request from: Publications, University of California, Division of Agricultural Sciences, 1422 S. 10th Street, Richmond, CA 94804, USA.

* * * * *

The IBPGR is credited in an article published by the English journal "Nature" in its issue of 4 August 1977. The article, predicting seed storability, is by Prof. Eric H. Roberts and R.H. Ellis of the Department of Agriculture and Horticulture of the University of Reading, UK. They have carried out experiments on seed storage temperatures. "Nature" can be obtained at any good library or for a reprint of the article, entitled: "Prediction of seed longevity at sub-zero temperatures and genetic conservation", write to: Prof. Eric H. Roberts, University of Reading, UK.

* * * * *

Those people interested in new varieties of the winged bean should read the latest "Winged Bean Flyer" produced by the Department of Agronomy at the University of Illinois, USA. This is the second issue of this newsletter and contains information about the Asia Foundation, which is helping to coordinate an international effort on the winged bean. The Foundation sees the winged bean as the most promising crop for the developing countries. Single copies of the newsletter are available on request from Mrs. Joan Levy, Editor, "Winged Bean Flyer", Department of Agronomy, University of Illinois, Urbana, Illinois 61801, USA.

* * * * *

The possibility of Ethiopia becoming one of the world's major food exporting countries is discussed in the Winter 1977 edition of "Span", a British magazine. Ethiopia is one of the centres of diversity of cultivated plants and hence its potential. Dr. E. Westphal, of the Agricultural University at Wageningen, Netherlands, discusses the traditional cropping systems still practised by the country's peasant farmers today.

* * * * *

Newly published and expected to be much in demand, is a new IBPGR publication entitled "Tropical Vegetables and their Genetic Resources" written by G.H. Grubben of the Royal Tropical Institute, Amsterdam, the Netherlands and edited by D.A. Tindall and J.T. Williams.

Chapters cover solanaceous fruits (tomato, *Capsicum*, egg-plant); cucurbits (melons, pumpkins, cucumber, gourds, loofah and chayote); alliums (onions, shallots, Japanese bunching onion, garlic and leek); leguminous vegetables; brassicas; and leafy vegetables.

A range of other species of minor importance are also included and annexes deal with notes on collecting, a list of institutions involved with vegetable work, and vernacular names.

* * * * *

Another excellent reference paper from Australia is: "Overseas Plant Collections, August 1971 to June 1976" from the Australian Plant Introduction Review (1977) 11:24-32 by P. Broué and J.P. Grace. It reports on 36 missions from Australia in which 3 175 accessions were obtained, 19.3 percent tropical pasture grasses, 13.5 percent tropical pasture legumes, 11.7 percent protein grain crops, 5.1 percent oil crops and 4.9 percent cereals.

Those interested in fruit and nuts should should read the "Fruit and Tree Nut Germplasm Resources Inventory," by H.W. Fogle and H.F. Winters of the Plant Genetics and Germplasm Institute, USDA, Beltsville, Maryland, USA. Published last June, it gives a computerized list of fruit clones, and should prove useful for breeders and other fruit workers trying to locate specific clones.

* * * * *

An account of the forestry research programme supported by the International Development Research Centre is given in "Trees for People" by C. Sanger, G. Lessard and G. Poulson (19 ). The booklet provides useful facts on trees, food and people and emphasizes the need for tree species for shelter belts, stabilization of marginal land and for fuel.

* * * * *

Other short papers which should be of interest include: "The Comparative Evolution of Pulse Crops" by J. Smartt, Department of Biology, Southampton University, U.K., Euphytica (1976) 25:139-143, "An Environmental Interpetation of the Origin of Asian Food Legumes" by R.O. Whyte, Indian Journal of Genetics and Plant Breeding, (1975) 35:61-68., and "The Taxonomic Geography and the Breeding of Fodder Legumes in South Asia", by R.O. Whyte, Forage Research, (1976) 2:19-24.

## ABBREVIATIONS USED BUT NOT IN FULL IN THE TEXT

| | |
|---|---|
| AVRDC | Asian Vegetable Research Development Center |
| BIOTROP | Southeast Asian Regional Center for Tropical Biology, Bogor, Indonesia |
| CIAT | Centro Internacional de Agricultura Tropical, Calī, Colombia |
| CIMMYT | Centro Internacional de Mejoramiento de Maiz y Trigo, Mexico |
| CSIRO | Commonwealth Scientific and Industrial Research Organiztion, Canberra, Australia |
| EUCARPIA | European Association for Plant Breeding |
| IARI | Indian Agricultural Research Institute, New Delhi, India |
| ICRISAT | International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India |
| IRAT | Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières, Paris, France |
| IRRI | International Rice Research Institute, Manila, the Philippines |
| ORSTOM | Office de la Recherche Scientifique et Outre-Mer, Paris, France |
| UNEP | United Nations Environment Programme, Nairobi, Kenya |
| WARDA | West African Rice Development Association, Monrovia, Liberia |

Plant Genetic Resources Newsletter will be pleased to consider reports, notes and news from anyone working with genetic resources.

Please send manuscripts, typed in double space. Relevant photographs too, will be greatly appreciated but only if high quality black and white prints rather than colour prints or slides. Colour photographs will reproduce, but not without a considerable loss of quality.

The Newsletter will also review salient books, scientific papers and other publications.

All contributions should be sent to the Editor, AGPE, FAO, 00100 Rome, Italy.

El Noticiario de Recursos Genéticos Vegetales considerará con gusto informes, notas y noticias provenientes de aquellas personas trabajando en recursos genéticos.

Agradecemos el envío de los trabajos mecanografiados a doble espacio. También apreciaremos el envío de fotografías relacionadas con la materia, pero deberán ser impresiones de buena calidad preferiblemente en blanco y negro. Fotografías en color pueden ser reproducidas, pero con una apreciable pérdida de calidad.

El Noticiario también hará revisiones de libros, trabajos científicos y otras publicaciones.

Todas las contribuciones deben ser enviadas al Editor, AGPE, FAO, 00100, Roma, Italia.

Le Bulletin des Ressources Génétiques Végétales apprécierait de connaître les rapports, notes et nouvelles écrits par quiconque travaillant en relation avec les ressources génétiques.

Prière d'envoyer les manuscrits tapés en double interligne, accompagnés le cas échéant de photographies s'y référant, mais de préférence sous forme d'excellents tirages en blanc et noir plutôt que de tirages en couleurs ou de diapositives. Les photographies en couleurs peuvent être reproduites mais sans garantie de perte de qualité.

Le Bulletin passera en revue les livres les plus en vue, les notes scientifiques et autres publications.

Toute contribution sera envoyée à l'Editeur, AGPE, FAO, 00100 Rome, Italie.

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1978

# PLANT GENETIC RESOURCES
# RESSOURCES GÉNÉTIQUES VÉGÉTALES
# RECURSOS GENETICOS VEGETALES

## Newsletter – Bulletin – Noticiario No. 35

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES
L'OFFICE INTERNATIONAL DES RESSOURCES GÉNÉTIQUES VÉGÉTALES
LA JUNTA INTERNACIONAL DE RECURSOS FITOGENÉTICOS

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE
ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

The Plant Genetic Resources Newsletter is published under the joint auspices of the Crop Ecology and Genetic Resources Unit, Plant Production and Protection Division of FAO and the International Board for Plant Genetic Resources. Contributions in English, French and Spanish are considered, and if accepted, will be published in the original language, with a summary in the other two.

Editor: J.T. Williams, AGPE
FAO, 00100 Rome, Italy

AGP/PGR/35
October 1978

# PLANT GENETIC RESOURCES NEWSLETTER

## CONTENTS

THE CROP GENETIC RESOURCES OF TURKEY HAVE BEEN OF MAJOR INTEREST FOR DECADES. SEVERAL PROJECTS HAVE BEEN OPERATIONAL AND THIS ARTICLE SUMMARIZES THE HISTORICAL BACKGROUND AS WELL AS OUTLINING THE CURRENT NATIONAL PROGRAMME.

# The NATIONAL PROGRAMME of TURKEY

H. Ayla Sençer

As early as the 1930's, when the first agricultural research stations of the Turkish Republic were established in Istanbul- Yesilkoy, Eskisehir and Ankara, collections of primitive cultivars of major crops, grown in Asia Minor for thousands of years, were made for the initiation of crop improvement programmes. The very first improved crop varieties distributed to the Turkish farmers were selected from these collections. During a period of 15-20 years, thousands of collections were accumulated and their maintenance became difficult objective.

A group of Turkish scientists, who participated in a EUCARPIA meeting held at Cologne, Federal Republic of Germany, in 1958, brought the subject to the attention of the participants; the value of these collections was recognized and their safe-guarding considered important. Upon the recommendations made, the Turkish Government approached the United Nations Special Fund (UNSF) for assistance in 1961. A consultant was sent to Turkey to study and identify the problem. Following these developments, an agreement was signed between the UNSF and the Turkish Government in 1963, for the establishment of a Crop Research and Introduction Centre at Izmir, Turkey, under the UNSF/FAO/TUR-8 Project.

The purpose of this project was the survey, collection, conservation and evaluation of primitive cultivars of crops grown in Turkey as well as their wild relatives, and wild economic plants, besides the introduction of plant material from outside Turkey for crop improvement programmes. Provision was also made for these activities to be extended to the neighbouring countries.

The project became operational in June 1964 and the first phase was extended to 1973.

In 1971, a review mission made a strong recommendation for the activities of the Project to be followed by a regional one to enable similar operations in neighbouring countries. Actions by the UNDP with SIDA funds and later by the IBPGR through FAO resulted in the TF/REM 5 (SWE) and TF/REM 31 (IBPGR) regional projects.

The "Plant Genetic Resources Project" of Turkey, which was prepared in 1975-76, forms a part of the regional effort for the exploration, documentation and conservation of plant genetic resources in South-west Asia.

The project is located at the Regional Agricultural Research Institute, ARARI, at Menemen, Izmir. Overall planning and coordination of the activities are made by the centre. The programmes of the project are revised annually by the Research Committees of ARARI and the Aegean Region, as well as a Plant Genetic Resources Working Group, which consists of project leaders, directors of crop specific research institutes, representatives from the General Directorate of Agricultural Research and from the Universities.

The activities undertaken by the staff of the project centre include systematic evaluation of the collections; storage and processing of plant genetic resources data; long-term and short-term conservation of seed collections, tissue culture multiplication and conservation and introduction. Project activities such as collection, evaluation, rejuvenation and multiplication of seed collections are coordinated and conducted under eight separate programmes, i.e. cereals, food legumes, forage and fodder plants, vegetables, industrial crops, tree-fruits and vines, ornamental plants and other economic plant genetic resources programmes. These programmes are coordinated by the staff of the centre and conducted in cooperation with scientists engaged with other research programmes carried out at ARARI and other agricultural research institutes. So far, cooperation with scientists from outside Turkey has only been possible for collecting and obtaining seeds from ARARI.

ARARI hosts collectors from outside Turkey every year and sends out sub-samples of its collections upon request. However, it is strongly felt that, so far, ARARI has been giving help to scientists by providing expertise, collections and data without any feed-back. It is planned that cooperation with the on-going Genetic Resources Project of Turkey should be based on joint projects covering not only joint expeditions for collecting but also the subsequent evaluation of the collections, jointly made or received from ARARI, by scientists in and outside Turkey. Through these projects ARARI expects to accumulate evaluation data of its collections and lines with unique characteristics can be identified and selected from the original collections in long-term storage.

The activities (see diagram) of the on-going Plant Genetic Resoruces Project in Turkey from 1976 onwards can be summarized as follows:

Exploration

In June-July and August-September 1976, two expeditions visited the Southeast and Northeast regions of Turkey to collect wild and glumaceous, diploid and tetraploid wheat species. Collections of primitive cultivars of other crops in areas which were inaccessible previously, *Sanguisorba minor* Scop. and *Onobrychis* spp. were also made during these expeditions. During a joint Turkish-Japanese expedition to the Black Sea coast, C. Anatolia and southeastern Turkey in July 1976, additional collections of wild *Triticum* and *Aegilops* spp., *Sanguisorba minor* Scop. and *Onobrychis* spp. were made.

An inventory of the existing tree-fruit and vine collections was made during 1976 by visiting the nurseries of all agricultural institutions and Universities, with a view to bringing the existing tree-fruit and vine collections together in conservation nurseries in the near future.

During a joint Turkish-Japanese expedition in August-September 1977, further collections of *Dactylis glomerata* L. and some other forage species were made in C. Anatolia, northwest of the Black Sea region, Marmara and the Aegean regions.

During June 1978, a joint Turkish-Canadian team visited the Aegean, Mediterranean, southeastern and eastern regions of Turkey, C. Anatolia and collections of *Triticum, Hordeum, Avena* and *Aegilops* spp. were made. During the same period and in the same areas, a joint ARARI-ICARDA team, which was operating in close contact with the Turkish-Canadian team, made further collections of annual forage legumes, i.e. *Medicago, Onobrychis, Vicia, Lathyrus, Trifolium* spp. and a few others. In July-August 1978, a Turkish team visited the southeastern region of Turkey to make further collections of primitive vegetable, food legume and tobacco cultivars.

Survey and preliminary evaluation of native tree-fruit varieties grown in the Aegean region has been going on since May 1978.

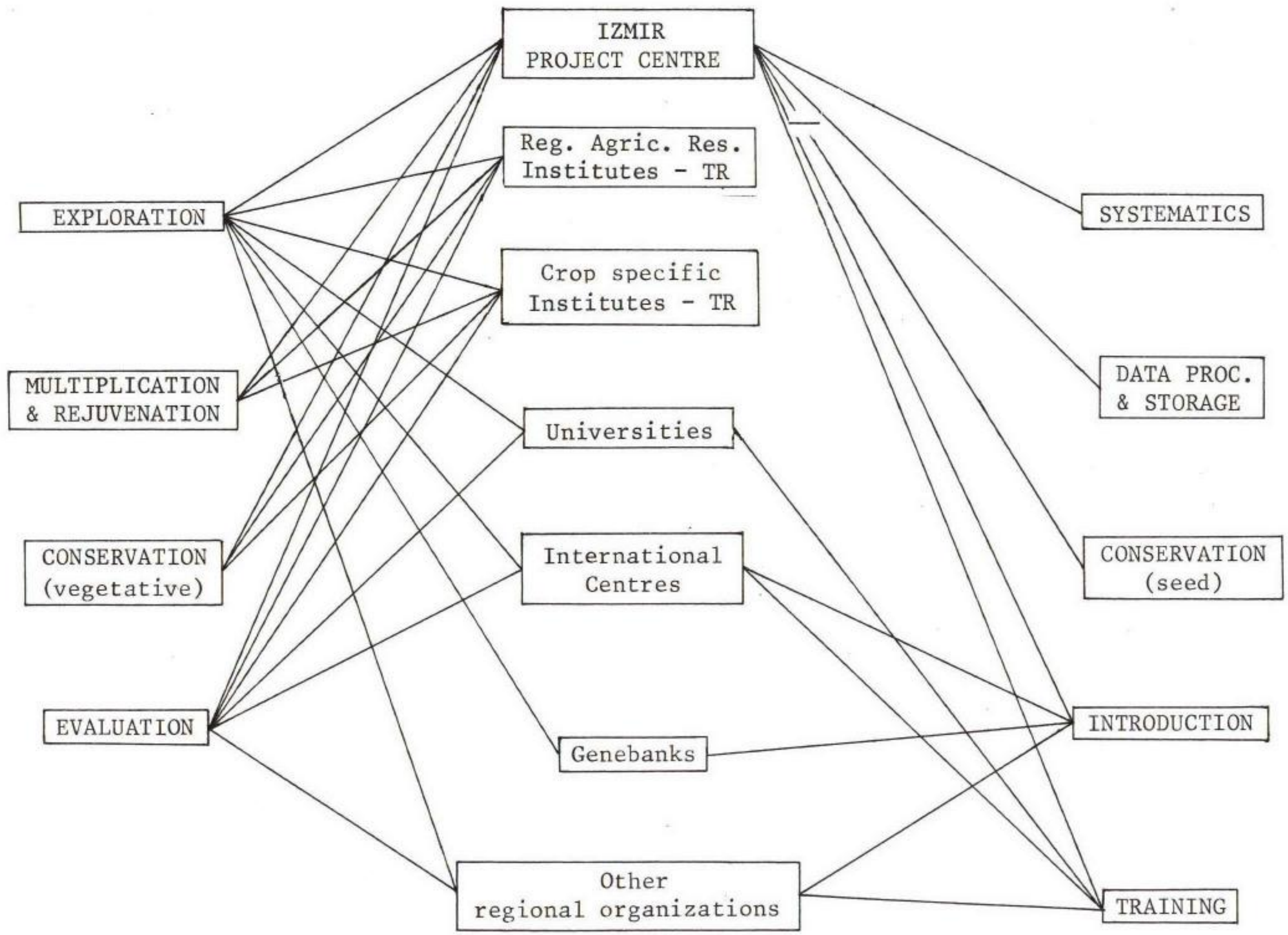

## Résumé

Cet article contient un résumé historique succinct des projets qui ont été mis en oeuvre à Smyrne. Il présente les principales attributions du personnel du programme national, notamment en ce qui concerne les missions d'exploration et les rapports avec d'autres institutions pour les questions d'evaluation et de multiplication.



## Resumen

El artículo ofrece un resumen histórico condensado de los proyectos que se han ido realizando en Esmirna. Se describen en líneas generales las tareas principales del personal del programa nacional, con especial referencia a las misiones de exploración y a los enlaces con otras instituciones para evaluación y multiplicación.




Activities of the Plant Genetic Resources Project of Turkey and the cooperation scheme

# VEGETABLE RESOURCES in IRAN

by Raymond A.T. George

The genetic resources of vegetable crops in Iran include a wide range of local cultivars of sub-tropical and temperate species such as melons and onions as well as important culinary herbs and spice plants.

The author has reported 34 distinct vegetable crops of commercial importance in Iran and 18 species commonly marketed as fresh herbs (George, 1976). Vavilov (1951) included Persia among the countries of the Near-Eastern centre of origin for cultivated plants and especially mentions the "world's wealth" of melons originating from Persia and adjacent geographic areas. He listed also other *Cucumis* spp., *Brassica campestris* var. *rapifera* Metzg., *Beta vulgaris* L., *Daucus carota* L., and *Allium cepa* L. among the cultivated vegetables having secondary diversity in the area.

During recent years, there has been enormous progress in Iran in the production of horticultural crops. The introduction of modern cultural techniques in fruit and vegetable crop production is leading to the widespread adoption of modern high-yielding cultivars which are replacing the locally developed cultivars and cultigens which had become well adapted to the local climate and environment.

Table 1 lists the vegetable crops recorded in Iran together with estimates of the degrees of observed diversity. The table is compiled from observations made in different areas of the country. The range of cultivated herbs and spices observed on sale as fresh vegetable material in markets is listed in Table 2.

## Pressures on local cultivars

The rapid improvement of agricultural and horticultural crop production is being achieved by several technological developments. Large-scale irrigation schemes and increased availability of fertilizers have increased considerably the potential yield per hectare. This is being assisted by the adoption of improved crop protection techniques. All these factors, plus the increased mechanization, improved marketing as well as increasing interest in vegetable quality, are accelerating the adoption of uniform and high-yielding modern cultivars.

The rapidly expanding vegetable processing industry is calling for cultivars suitable for specific purposes in addition to storage. The development of retail sales through supermarkets has increased the demand for pre-packaged and uniform produce. Increased investment in large-scale vegetable production by the development corporations and agri-businesses is stimulating the evaluation of modern cultivars.

The programmes for the development of the seed industry are increasing the establishment of imported cultivars and reducing the demand for the numerous regional and local cultivars. For example, red cored cultivars of carrot have almost completely replaced the diverse local material during the last ten years. The Seed and Plant Improvement Institute (SPII) of the Iranian Ministry of Agriculture has an extensive programme of seed production involving all the commercially important vegetables and growers now put less emphasis on saving their own seed.

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1951 and breeding of cultivated plants, Ronald Press Co., New York, USA.

*FOOTNOTE*

To assist its programme in Southwest Asia, the IBPGR has appointed two technical advisers at the SPII, Karaj, Iran. The Division of Genetic Resources of the SPII assumes responsibility for collecting in the country and some vegetables have been collected during 1978.

TABLE 1. The range and diversity of observed vegetable characters.

(H = high diversity, M = medium diversity and L = low diversity).

| Common name | Botanical name | Observed range of morphological characters | Observed diversity | Some distinct local varieties |
|---|---|---|---|---|
| Broad bean | *Vicia faba* L. | 'Algerian' and 'Holland' types, range of seed size. | M | |
| Beans | *Phaseolus vulgaris* L | Seed colour | H | |
| Cabbage | *Brassica oleracea* L. var. *capitata* | Flat poll and white, green and thick, waxy cuticle. | L | |
| Carrot | *Daucus carota* L. | White, yellow, red and purple root types. | H | |
| Celery | *Apium graveolens* L. | Range of petiole transverse sections. | L | |
| Cucumber | *Cucumis sativus* L. | Spine and mature fruit colour, fruit size. | M | Ghangavar (Kermanshah)<br>Hoomabad (Tabriz)<br>Shendabad (Tabriz)<br>Zarani (Isfahan) |
| Eggplant | *Solanum melongena* L. | Ovoid and oblong fruits, plant height. | M | Kalemi (Varamin) |
| Lettuce | *Lactuca sativa* L. | Range from cabbage to cos types. Some with lyrate leaves. Spines on leaf midrib (possibly some hybrids with *L. scariola* L.) | H | Baboli (cos type) |
| Leek | *Allium porrum* L. | Long petiole, small plant | M | |
| Melon | *Cucumis melo* L. | Fruit shape, colour and size skin texture and flesh colour, sugar content. | H | Abassoori (Evanekeh)<br>Bahar (Hamadam)<br>Gorgab (Isfahan)<br>Karaj (S.P.I.I.)<br>Khakhani (Khorassan)<br>Laki (Mashad)<br>Suski (Evanekeh) |
| Onion | *Allium cepa* var. *cepa* L. | Bulbs red, yellow or white, range of bulb shapes, 'mild' flavour. | H | Azarshah<br>Laleh (Tabriz)<br>Red Rey (Rey) |
| Pea | *Pisum sativum* L. | Range of plant heights and pod characters. | M | |
| Pumpkin | *Cucurbita maxima* Duch. ex Lam. | Fruit shape, long keeping. | M | Asalani (Rezayeh)<br>Hokmabad (Tabriz)<br>Mossamai (Miandoab)<br>Tambal (Tabriz) |
| Radish | *Raphanus sativus* L. | Range of hypocotyl shape and colour. Early flowering. | M | |
| Pepper | *Capsicum annuum* L. var. *annuum* | Small fruited condiment types and large fruited 'sweet' types. | M | |

TABLE 1. (Contd.)

| Common name | Botanical name | Observed range of morphological characters | Observed diversity | Some distinct local varieties |
|---|---|---|---|---|
| Spinach | *Spinacia oleracea* L. | Range of leaf shapes | M | |
| Table beet | *Beta vulgaris* L. | Range of root size and shape from flat Egyptian to globe and cylindrical. | H | |
| Tomato | *Lycopersicon lycopersicum*(L.) Karst | Small and large fruited determinate types. | L | Kebabi |
| Turnip | *Brassica rapa* L. | Root shape flat to oval, root colour from white to purple and bicolours. | H | |
| Watermelon | *Citrullus lanatus* (Thunb.) Mansf. | Fruit size and shape, skin and flesh colour. | M | Mahboobi (Khaveh) |

Table 2. Cultivated herbs and spices as fresh vegetables in markets

*Allium porrum* L. (Leaf leek); *Allium sativum* L. (Garlic); *Apium graveolens* L. (Celery); *Artemisia dracunculus* L. (Tarragon); *Brassica alba* (L.) Rabenh. (White mustard); *Capsicum annuum* L. var. *acuminata* Fingerh. (Chilli); *Cichorium intybus* L. (Chicory); *Coriandrum sativum* L. (Coriander); *Eruca sativa* L. (Rocket salad); *Foeniculum vulgare* Mill (Fennel); *Lepidium sativum* L. (Garden cress); *Mentha x piperita* L. (Peppermint); *Mentha spicata* L. (Spearmint); *Ocimum basilicum* L. (Sweet basil; *Petroselinum crispum* (Mill) Nym. ex A.W. Hill (Parsley); *Portulaca oleracea* L. (Purslane); *Thymus vulgaris* L. (Thyme); *Trigonella foenum-graecum* L. (Fenugreek).

## Résumé

Cet article contient une liste des légumes avec leur éventail de variabilité et souligne la nécessité de recueillir des spécimens représentatifs de la variabilité génétique, en raison des pressions qui s'exercent sur les cultivars locaux.

## Resumen

Se facilita la lista de hortalizas con su grado de diversidad, y el documento destaca la necesidad de coleccionar variabilidades representativas debido a las presiones de que son objeto los cultivares locales.

# GERMPLASM RESOURCES IN ISRAEL*

J. Katznelson

Because Israel lies within the Near-eastern centre of diversity of cultivated plants, it represents an important source of land races of wild species related to cultivated plants. This is exemplified by the research on cytogenetics, evolution and population structure, studies on domestication, and on the use of land races and wild species as germplasm for plant improvement.

Information on germplasm resources in Israel and research in this field, is described below.

## Small grains

*Triticum:* Most of the wheat grown belongs to *T. aestivum;* it is a relatively new crop and it has replaced many *durum* wheat land races. The latter, however, may be found in small areas, and natural gene transfer between wild species of *Triticum* (including *Aegilops*) is often encountered. Research in the country on this genus has covered much wider material than that of local origin and hundreds of collections of wild species from Turkey, Greece, etc., have been studied both cytogenetically and as sources of disease resistance.

*Hordeum:* As in wheat, bred cultivars are used extensively and land races occupy relatively small areas. However, wild *Hordeum spontaneum*, which is the only species closely related to the cultivated one (and according to some criteria they form one species with wild and cultivated forms), is widespread, highly variable in morphology and ecological adaptation and natural gene flow in both directions is often seen. The wild forms can be easily used for improvement of barley, especially for introduction of earliness and disease resistance. Nevertheless, the crop has lately lost its importance in Israel.

*Avena:* Oats, especially foreign cultivars of various ploidy levels, are used on a limited scale, mainly for forage. The few land races used in the past are disappearing. 2x, 4x and 6x *Avena* species are very common, especially the hexaploid *A. sterilis*, which often dominates natural ranges and appears as a weed in graincrops. Both groups of forms, "natural" and "weedy", are rich in proteins and manifest a wide range of resistance to various fungal diseases. The possibility of improving cultivated oats using wild germplasm is obvious, and some work along this line is being done but on a small scale, as oats is a minor crop.

Regarding the three genera mentioned above, the great variability in species and populations suggests that the variability in the wild forms is much greater than in cultivated ones and currently there appears to be little risk of reduction in this variability. At the moment, it can be collected from the wild when necessary.

## Pulses

Most of the pulses commonly grown have their wild relatives in the region and in some cases, introgression is observed. Wild species include *Vicia ervilia, Cicer pinnatifidum, L. ervoides, L. culinaris* subsp. *orientalis, Pisum elatior, P. fulvum, Vicia galilea, V. narbonensis, Trigonella berythea* and several *Lupinus* sp. The existence of land races and wild species of pulses is undoubtedly threatened by the move towards the use of modern cultivars and the disappearance of the wild species due to man's activity. Measures to conserve this group are needed urgently, and should be done either through the conservation of sites or by seed collection and multipli-

* This publication of the Agricultural Research Organization, The Volcani Center, Israel, 1978, no. 177-E, was prepared for a workshop held during the SABRAO Congress, Australia, February, 1977. Dr. Katznelson, prior to his sudden death in June, 1978 had expressed the wish that it should be published in this journal.

cation for long-term storage.

Forage Plants

A generalization that may be made is that, in contrast to many other crops, every sown forage and pasture plant (except multi-use crops, such as maize, oats etc.) represents either ecotypes or cultivars, the variability of which is only a tiny fraction of the variability of the species when it grows in natural (and weedy) stands. The region is extremely rich in wild forage species, the ecotypes and cultivars of which are used commercially. These include nine *Trifolium* species *(T. repens, T. fragiferum, T. resupinatum, T. subterraneum, T. brachycalycinum, T. cherleri, T. alexandrinum, T. berytheum* and *T. purpureum);* four *Medicago* species *(M. polymorpha, M. truncatula, M. rigidula, M. litoralis; Lupinus (L. angustifolius, L. luteus, L. albus); Vicia (V. sativa, V. dasycarpa, V. villosa); Ornithopus (O. pinnatus, O. compressus);* and *Melilotus albus.*

The same generalization may be made in regard to grasses, such as *Phalaris aquatica, Oryzopsis miliacea, O. holciformis, Dactylis glomerata, Cynodon dactylon, Lolium perenne, L. rigidum,* to name only a few. In both legumes and grasses, the variability in the field is extensive. Israeli material is characterized by its earliness, large seeds and leaves; its use as such or as germplasm is common in Israel, the USA and Australia.

Extensive collections of ecoytypes from Israel, Turkey, Greece and other Mediterranean countries, comprising thousands of accessions, are available.

Vegetable Crops

The Mediterranean and Near East centres of domestication have contributed many vegetables. They may be classified into the following groups:

(a) Some species have both cultivated and wild forms - often with quite continuous variation. *Daucus carota* and *Beta vulgaris* are two examples. They grow wild in Israel, are variable, and may be used as germplasm, mainly for disease resistance.

(b) Some cultivated vegetables have closely related species growing in wild and weedy habitats in Israel. These include species of *Lactuca, Sonchus, Raphanus, Rheum,* etc.

(c) Some useful, edible plants were not really domesticated at all, in the sense that they are not sown, but gathered in the wild. In some cases, the same species may be used elsewhere as a crop. The number of species in this category is large; many of them can be found in markets. Probably not all of them will become vegetable crops, as their collection may prove to be uneconomic but they are still potential crops. A few examples in this category are: *Lepidium sativum, Rumex pulcher, R. crispus, Portulaca oleracea, Cinara sp.,* and *Gundelia tourneforti.*

Industrial Crops

As in other crops, the old land races of industrial crops such as *Sesamum indicum,* linseed and lint, *Sorghum* sp., and others, have mostly disappeared, although some may still be found. They were replaced mostly by bred cultivars, or discarded as crops. In the wild flora, however, Israel may contribute suitable germplasm also in this category of plants. The Near East was the centre of domestication of *Linum usitatissimum* and its closely related *L. bienne* and *L. pubescens* are quite common in grasslands. Wild *Carthamus* sp. related to *C. tinctorius* are common. Stands of *Crambe hispanica* can be found in many sites, usually in oak park forests, and germplasm of this species was recently collected for breeding work in the USA. With the current trends of range improvement, the above-mentioned species are in danger of great reduction, and even extinction. In the case of *Linum,* heavy selection towards 2,4-D resistance may considerably reduce the existing variability.

Spices and Medicinal Plants

The local production of spices and some medicinal plants is still based mainly on the gathering stage. Several Labiatae *(Oreganum, Micromeria, Thymus, Mentha)* and Umbelliferae *(Apium graveolens, A. nodiflorum, Ammi visnaga, A. majus, Foeniculum vulgare, Coriandrum, Cuminum)* are common and supply most local needs. There has been almost no attempt made to use the local flora for seeding commercial areas. The same applies also for *Plantago psyllium* and *P. ovata*, which were recently introduced into cultivation in Israel. Some plants such as *Glycyrrhiza*, that grow wild, are gathered from wild stands in other countries such as Iran. Local material should be evaluated as possible germplasm if this plant should be domesticated.

*Laurus nobilis* and *Capparis spinosa* are other species used as spices, which are both uncultivated but are gathered extensively.

Fruits

Compared with the extremely rich herbaceous component of vegetation, there are relatively few woody species native to Israel. All the modern fruit production is based on cultivars, usually developed elsewhere. In a few cases, one may still find "local" material in the Arab sector.

The pattern is different in a few species: grapes, figs, olives, carobs, almonds and pomegranates, where local germplasm is used extensively, with great variability in season, quality, resistance to pests and diseases, and edaphic adaptation. Specific genotypes are registered and used for vegetative propagation. Some of the above-mentioned species have representatives in the wild flora: *Ficus carica*, *Amygdalus communis* and probably *Olea europaea*. In other fruits wild related species are sometimes used as stocks for grafting (*Pyrus syriaca*). Only a few attempts have been made to evaluate the local wild and cultivated species and genotypes as germplasm for further improvement of these crops.

Fruits of the following: *Crataegus*, *Zizyphus* and *Ficus sycamorus* are gathered quite extensively and may be seen in the markets.

Ornamentals and forest plants

The flora is quite rich in geophytes and other ornamental plants, but very little research is done in this respect. Awareness to the possibilities exist, especially in *Lilium candidum*, *Narcissus tazeta* and several species of *Iris* sect. *Oncocyclus* (*I. lorteti*, *I. nazarena*, etc.)

Some wild shrubs and trees are used commercially as ornamentals: *Laurus nobilis*, *Cercis siliquastrum*, several *Tamarix* sp., to name just a few. *Tamarix* is used quite extensively also for afforestation in arid areas. Wild *Pinus halepensis* was used for initiation of pine plantations, but natural stands are decreasing in size.

In all these species, variability in natural stands is considerable and they may be used either as they are, or they may be selected, or they may be used as germplasm for a specific purpose.

Conclusion

The list of species mentioned above is not complete. Basic research in several groups of species is quite extensive, and in these groups (*Triticum*, *Avena*, *Hordeum*, *Medicago*, *Trifolium*, *Phalaris*, *Lactuca*, *Carthamus*, *Vicia*, etc.) thousands of seed accessions are available. In other groups we have only a few accessions, but our knowledge of the geographical and ecological distribution of both land races (when existing) and wild ecotypes, enables relatively easy access to a much wider range of variability.

The awareness of scientists in Israel of the problem of germplasm conservation has led to a decision to widen the scope and activity of the Introduction Service, and to change it to a Genebank that will be of service to other countries as well.

# Solanum Series Etuberosa COLLECTING in CHILE [1/]

by Andrés Contreras [2/] & M. Ramirez [3/]

Some important agronomic characters of potato have been described in the species of the Series Etuberosa which are of interest in breeding programmes, e.g. resistance to frost, to Y and A virus and to leaf roll virus. The Etuberosa Series is included in the Sub-section Hyperbasarthrum Bitt. of the genus *Solanum*. Hawkes (1956) listed the following species in the series: *Solanum brevidens* Phil., *S. etuberosum* Lindl., *S. fernandezianum* Phil., *S. palustre* Poepp., *S. subandinum* Meigen.

Other workers consider *S. palustre* synonymous with *S. brevidens*, as for instance, *S. looseri* Juz. is synonymous with *S. etuberosum*.

There are several other species names considered by Hawkes and others to be synonyms.

These descriptions in the Etuberosa Series have a significant value in the taxonomy of Solanaceae. However, collections of material from the Series are scarce and descriptors have been based mainly on herbarium material; consequently, exact descriptions of the habitats are not always available nor is botanical seed for a more precise characterization.

In order to complement the descriptions, personnel of the Instituto de Producción Vegetal, Universidad Austral de Chile, Valdivia, explored Central Chile for sites in which plants of this Series (especially of *S. brevidens* and *S. etuberosum*) have either been observed or collected (see Fig. 1).

At the sites of Curanilahue, Lebu, Cañete, Contulmo and Traiguen, no specimens of these species were found, although they have been described by Montaldo and Sanz (1962) from these areas. However, they may possibly be found in the mountainous valleys of Nahuelbuta because this area is similar to the sites in which *S. brevidens* was previously located (1, 2, 3, 14, and 15 in the maps).

Plant material was collected for the herbarium, as well as living plants and fruits (Table 1).

Samples 1315 to 1317 had fruits at the same time of collection and were classified as *S. brevidens*. Samples 1318 to 1327, according to their morphology, were classified as *S. etuberosum*. The latter material at the time of collection, was beginning to flower, and plants were collected for the herbarium and were also potted. No. 1344 was collected in Cordillera Pelada, Valdivia Province. Only one living plant was collected. Nos. 1327 and 1344 were found in different habitats to those previously described, and very distant from each other; the first, under a rock fully exposed to the sun, without surrounding vegetation. No. 1344 was located under a dead log in a natural pasture and fully exposed to sunlight.

All the material is being vegetatively reproduced to obtain true seed. No. 1346 was collected by Dr. Schlegel in the site Pirihueico and brought as living material (plant and fruit).

Part of the described items have been shipped to the Department of Botany of the University of Birmingham, UK.

Future explorations will be conducted into other sectors in which previous collections or descriptions have been done of the Series Etuberosa.

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1/ Collecting trip sponsored by the International Board for Plant Genetic Resources (IBPGR), FAO, Rome, and Dirección de Investigación de la Universidad Austral de Chile.

2/ Leader, Chilean Potato Germplasm Programme, Instituto de Producción Vegetal (IPV), Casilla 567, Valdivia, Chile.

3/ Geology and Geography Institute, Austral University, Valdivia, Chile.

Table 1. Specimens and their place of collection

| Trip No. | Sample No. | Latitude | Longitude | Altitude | Place | Collection date |
|---|---|---|---|---|---|---|
| 1 | 1 315 | 38°41' | 71°50' | 850 | Fundo Venecia | 6.1.78 |
| 2 | 1 316 | 38°41' | 71°50' | 850 | Fundo Venecia | 6.1.78 |
| 3 | 1 317 | 38°41' | 71°50' | 835 | Fundo Venecia | 6.1.78 |
| 4 | 1 318 | 36°54' | 71°28' | 1 240 | Las Trancas | 8.1.78 |
| 5 | 1 319 | 36°54' | 71°28' | 1 265 | La Cascada | 8.1.78 |
| 6 | 1 320 | 36°55' | 71°20' | 1 300 | Gruta Los Pangues | 8.1.78 |
| 7 | 1 321 | 36°54' | 71°24' | 1 750 | Term. de Chillán | 9.1.78 |
| 8 | 1 322 | 36°56' | 71°32' | 615 | Estero Ponce | 9.1.78 |
| 9 | 1 323 | 37°22' | 71°34' | 785 | Estero Quillailebu | 11.1.78 |
| 10 | 1 324 | 37°22' | 71°34' | 786 | Estero Quillailebu | 11.1.78 |
| 11 | 1 325 | 37°22' | 71°34' | 786 | Estero Quillailebu | 11.1.78 |
| 12 | 1 326 | 37°29' | 71°20' | 1 780 | Cajón del Pino | 12.1.78 |
| 13 | 1 327 | 37°22' | 71°22' | 1 220 | Refugio Antuco | 12.1.78 |
| 14 | 1 344 | 40°12' | 73°23' | 660 | Roblental | 22.4.78 |
| 15 | 1 346 | 39°50' | 71°50' | 950 | Pirihueco | 12.5.78 |

## Resumen

Se recolectaron 15 muestras de la Serie Etuberosa en el sector Centro Sur de Chile, material del cual se tiene herbario, plantas y semillas de autofecundación.

## Résumé

Quinze échantillons de la série *Etuberosa* ont été récoltés dans le secteur Centre-sud du Chile, matériel dont on dispose d'un herbarium, de plantes et de semences issues d'autofécundation.

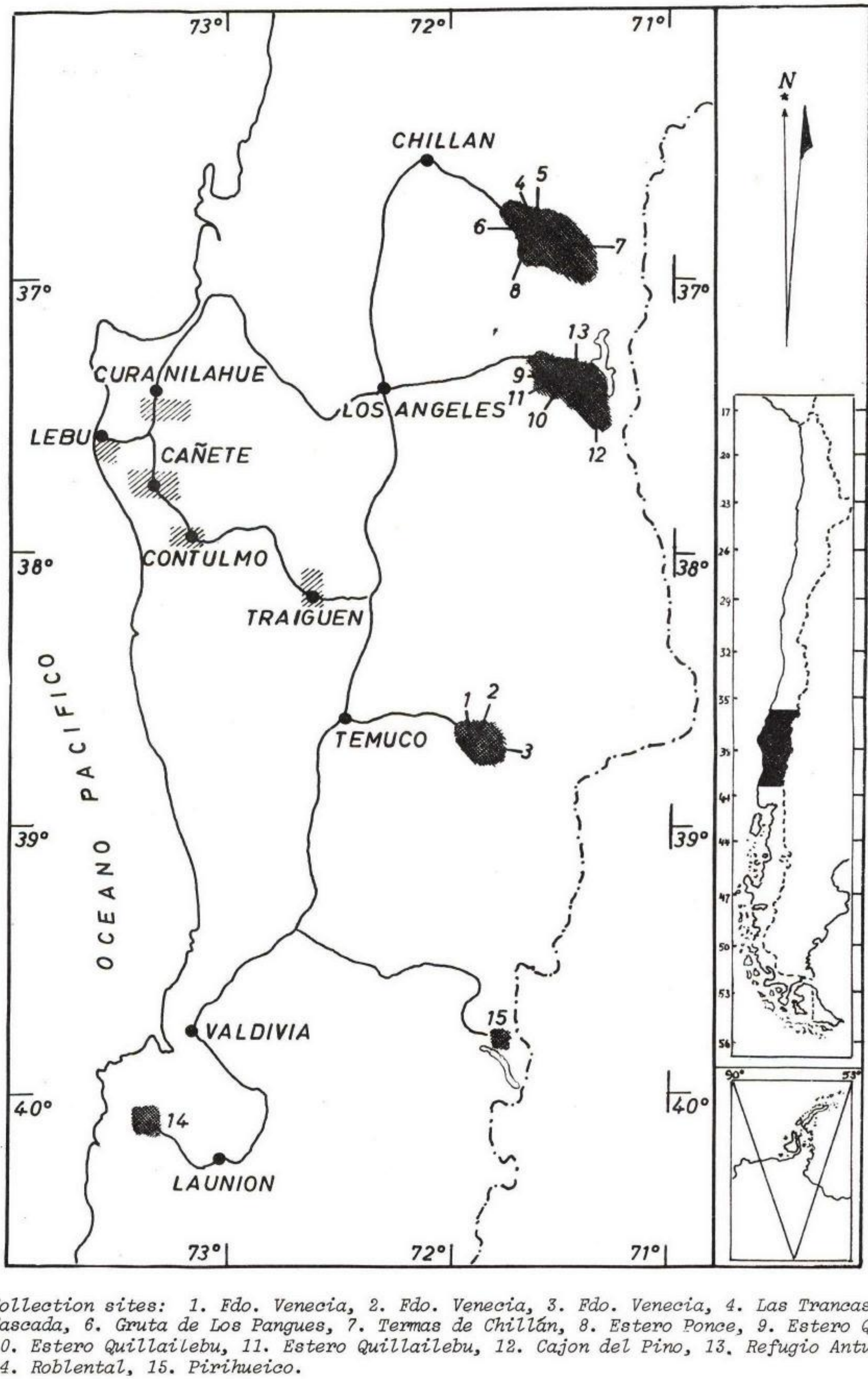



*Fig. 1. Collection sites: 1. Fdo. Venecia, 2. Fdo. Venecia, 3. Fdo. Venecia, 4. Las Trancas, 5. La Cascada, 6. Gruta de Los Pangues, 7. Termas de Chillán, 8. Estero Ponce, 9. Estero Quillailebu, 10. Estero Quillailebu, 11. Estero Quillailebu, 12. Cajon del Pino, 13. Refugio Antuco, 14. Roblental, 15. Pirihueico.*

# WORKSHOP ON SOUTH ASIAN PLANT GENETIC RESOURCES

Following an invitation from the IBPGR, the Government of India agreed that the National Bureau of Plant Genetic Resources, I.A.R.I. Campus, New Delhi, would co-sponsor a Workshop on South Asian Plant Genetic Resources to which the following countries would be invited: Bangladesh, Bhutan, Burma, India, Nepal and Sri Lanka. The Workshop met at Vigyan Bhavan in New Delhi, 9-12 May 1978. Delegates from Bhutan, India, Nepal and Sri Lanka attended but unfortunately Bangladesh and Burma were not represented.

The delegates recommended that cooperation should be encouraged towards a future regional programme including all countries of South Asia. This programme will constitute an important component of the global network of plant genetic resources for the benefit of peoples the world over.

Presentation and discussion of country reports showed that India has a comprehensive programme in which the National Bureau of Plant Genetic Resources, Central Institutes and State Agricultural Universities participate. India has substantial manpower and purposeful plans. Sri Lanka has the basis of a national genetic resources programme following important progress, especially on rice. Bhutan has no existing programme. Nepal, although having no national programme, has initiated action to collect and bring into cultivation medicinal plants. The meeting recommended that genetic resources units be established in Bhutan, Nepal, and Sri Lanka to coordinate genetic resources activities within the countries and to maintain liaison with corresponding institutions elsewhere. The meeting considered national priorities for 66 crops or groups of crops but due to their high priority in several countries - or throughout the region - it was agreed that the following crops require immediate action for their collection and conservation:

Rice
Maize
Soyabean
Oilseed brassicas
*Citrus* species
Cinnamon
Medicinal plants

In the case of rice, a 5-year programme for the region had been formulated at an IRRI/IBPGR Workshop held in December 1977, and these plans were endorsed with the addition of Bhutan as a participant.

Although the crops listed above were considered to be of highest priority for action, on a regional basis the following require second consideration: wheat, *Eleusine*, coconut, banana, cotton, jute, tea, pepper *(Piper)*, ginger and large cardamom.

It was understood that the action proposed above should not detract from action on other crops of high priority to individual countries nor from cooperation on a more restricted scale in the following three sub-regions: Nepal, Bhutan and northeastern India; South India and Sri Lanka; and the rest of India.

It was proposed that a long-term seed storage facility be established to serve as a base collection for the region. The intention of the Government of India to build such a facility was welcomed.

Since vegetatively propagated crops are among those of high priority in the region, including sugarcane, *Citrus* sp., bananas, mango and many other horticultural, forest and medicinal plants. In several countries of the region there are important existing collections which it is hoped will become fully representative of the germplasm of the region. The workshop recommended that appropriate collections be established in participating countries, especially in view of essential quarantine barriers which may restrict the free exchange of vegetative material between countries. Cooperation between countries is urgent in maintaining genetic stocks which are exposed to virus attack and which will require maintenance under virus-free conditions elsewhere. An example is the world sugarcane collection at Cannannore (Kerala State) where stocks are kept free from mosaic virus. There is an immediate need for a virus-free site for the *Citrus* material to be collected in Sri Lanka.

There is also an apparent need for the conservation of natural areas especially those containing species of actual importance. Examples of species now threatened in their natural state include important medicinal plants (*Dioscorea* sp., *Ephedra*, *Aconitum*, *Rauwolfia*) in India and Nepal, and wild relatives of sugarcane (e.g. *Sclerostachya* and *Ripidium*) in Northeast India. These and many others should be preserved in appropriate sanctuaries. The meeting noted with satisfaction the intention of the Government of India to declare a sanctuary for *Citrus* and the wild relatives of sugarcane in the Northeast Himalayas, and the 50-acre plot proclaimed a national reserve for medicinal herbs by the Government of Sri Lanka in the Kurunegala District.

The importance of continuing liaison between participating countries was recognized but the establishment of a formal regional liaison committee was considered to be premature. In the meantime, liaison officers could be designated by governments to act as points of contact between workers and institutions within their own countries and with those of other countries in the region, especially in relation to exchange of material and information; and the planning and execution of plant collecting.

A full report, including the reports on activities in the countries is available from the IBPGR Secretariat.

## Résumé

En mai 1978, le conseil international des ressources phytogénétiques (CIRPG) a coparrainé avec le gouvernement de l'Inde une session d'étude sur les ressources génétiques végétales du sous-continent. Cet article résume les principales recommandations de la réunion, qui ont été approuvées par les délégués du Bhutan, de l'Inde, du Népal et du Sri Lanka. Le rapport complet peut être obtenu auprès du secrétaire du CIRPG au siège de la FAO à Rome.

Les principales recommandations de cette réunion concernaient les priorités régionales en matière de cultures, et l'établissement d'une base pour une future oeuvre de coopération entre les pays. Malheureusement, le Bangladesh et la Birmanie n'étaient pas représentés à cette session d'étude mais on espère qu'ils pourront en examiner le rapport.

## Resumen

En mayo de 1978, la Junta Internacional de Recursos Fitogenéticos (IBPGR) patrocinó juntamente con el Gobierno de la India, un Cursillo sobre Recursos Genéticos Vegetales del subcontinente. En este artículo se resumen las recomendaciones más importantes de la reunión. Estas recomendaciones fueron aprobadas por delegados de Bhutan, India, Nepal y Sri Lanka. Se puede obtener el informe completo solicitándolo a la Secretaría de la IBPGR, en la sede de la FAO, Roma.

Las principales recomendaciones de la reunión se refieren a las prioridades regionales para los cultivos y al establecimiento de las bases para futuras actividades de cooperación entre los países. Desafortunadamente, no asistieron a la reunión representantes de Bangladesh y Birmania, pero se espera que estos países examinen el informe.

# Forage Plants of South America

A workshop to coordinate and programme the collection, preservation, distribution and characterization of germplasm resources of tropical forage plants, sponsored by CIAT, the University of Florida and USAID, was held simultaneously with a workshop on forage plant genetic resources of South America, the latter under the auspices of IBPGR, CIAT, INTA (Argentina) and EMBRAPA (Brazil). It was held at CIAT, Cali, Colombia, from 11-15 April 1978.

The first joint session discussed a handbook for collection, preservation, distribution and characterization of germplasm of tropical forage plants, being prepared by an international team of specialists, under the leadership of Dr. G. Mott.

Through small working groups, the meeting identified all on-going work, the collections available and the priorities for collecting. The latter are listed below:

Tropical South America

Priority 1. Legumes: *Stylosanthes, Centrosema, Zorina, Phaseolus, Macroptilium, Aeschynomene, Clitoria, Vigna, Leucaena, Desmodium, Calapogonium, Crotolaria, Indigofera.*

Priority 2. Grasses: *Brachiaria, Hemarthria, Digitaria, Rottboelia, Axonopus.*

Temperate South America

Priority 1. Grasses: *Bromus auleticus, Paspalum dilatum, Bromus catharticus, Agropyrou scarbifolium.*

Priority 2. Grasses: *Paspalum notatum, Bromus brevis, Poa lanigera, Elymus patagonicus, Setaria fiebrigii, Sorghum almun, Trichloris crinita, Paspalum urvillei, Sorghastrum pellitum.*

Priority 3. Legumes: *Desmodium, Trifolium, Vicia, Lathyrus.*

The following institutions act as a focus for the work on forages:

ARGENTINA: Secretaria de Estado de Agricultura y Ganaderia through the Instituto Nacional de Tecnología Agropecuaria (INTA). It is planned to organize, within INTA, five working centres corresponding to the five agro-economic areas, i.e. the experiment stations at Mercedes (subtropical humid), La Banda (subtropical semi-arid), Pergamino (temperate humid), Anguil (temperate semi-arid) and Trelaw (Patagonia).

BRAZIL:

1. Instituto de Zootecnia de la Secretaria de Agricultura del Estado de São Paulo - Nova Odessa (SP).

2. Empresa Estadual de Pesquisa Agropecuaria del Estado de Minas Gerais (EPAMIG) - Belo Horizonte.

3. Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA) a travês del Centro Nacional de Recursos Genêticos (CENARGEN); Bancos Activos de Germoplasma de Forrajeras (BAGS) con sus sedes locales:

BRAZIL: (cont'd)

(a) Centro de Pesquisa Agropecuaria de Trópicos Húmedos (CPATU)-Belém (PA)

(b) Centro de Pesquisa Agropecuaria del Cerrado - Brasília (DF)

(c) Centro Nacional de Pesquisa de Ganado Lechero - Coronel Pacheco (MG)

(d) Centro Nacional de Ganado de Carne - Campo Grande (MS)

(e) Unidad de Experimentación y Pesquisa - Bagé (RS)

(f) Centro de Pesquisa del Trópico Semiárido - Petrolina (PE).

BOLIVIA: Action in the future could be taken by the Instituto Boliviano de Tecnología Agropecuaria and the Centro de Investigación Agrícola Tropical.

CHILE: Work is being conducted by the Facultad de Agronomía de la Universidad de Chile and in the future will be developed by the Instituto de Investigaciones Agropecuarias.

PARAGUAY: Research is carried out by the Ministry of Agriculture through its Department of Agricultural and Livestock Research.

PERU: There are 2 institutions which since 1961 have undertaken the collection of native grasses and legumes. These are: Universidad Agraria La Molina & Centro Regional de Investigaciones Agro-Pecuarias del Centro del Peru. Besides these two institutions, there is the Oficina Nacional de Recursos Naturales (ONERN) which has carried out several studies on the different soils of the country, their utilization, and also has made surveys on the vegetation. The following projects are also relevant: the project of the Universidad Agraria La Molina to be carried out through its three regional institutes (Costa, Sierra, Selva) which encompasses the collection, preservation and evaluation of native species germplasm and the University of Ayacucho, with technical assistance of the Swiss government has programmed the collection and conservation of native Andean cultivated plants and grasses of the high Andes.

URUGUAY: Germplasm conservation and improvement of certain native forage plants is carried out by the Universidad de la República through its Facultad de Agronomía, its experimental stations, and the Ministerio de Agricultura y Pesca through the Centro de Investigaciones Agrícolas "Alberto Boerger".

VENEZUELA: The collection, maintenance and evaluation of germplasm are in an initial stage. They are being carried out by the Fondo Nacional de Investigaciones Agropecuarias (FONIAP) through the Instituto de Investigaciones Zootecnicas and five regional centres. Also the Facultad de Agronomía of the Universidad Central de Venezuela has a plan of introduction and improvement of forage species.

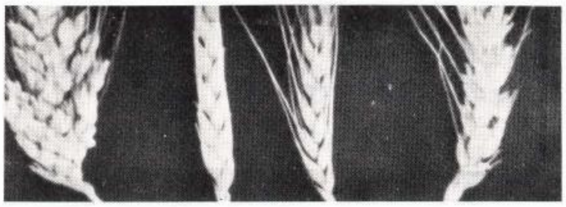
## Résumé

Une session d'étude organisée en avril 1978, a étudié le ramassage et la conservation des plantes fourragères en Amérique latine et rédigé un rapport sur la question. Celui-ci contient une liste de priorités pour les différents types de fourrages et les institutions qui pourraient permettre de centraliser les travaux proposés.

## Resumen

En abril de 1978 se celebró un cursillo para tratar sobre la recolección y conservación de plantas forrajeras de Sudamérica y presentar un informe. Se preparó una lista de prioridades de los géneros y de las instituciones que podrían servir de centros de coordinación para la actividad propuesta.

# WHEAT :



# ~ NEW PRIORITIES

At its second meeting held in September 1978, the IBPGR Wheat Advisory Committee reviewed the priority areas for collecting in the light of the activities which have taken place in the past two years. Priorities discussed at the Leningrad Wheat Symposium 1975 and the first meeting of the IBPGR Wheat Committee, have now been considerably revised as follows:

Priority 1:

| | |
|---|---|
| Turkey: | southeast and east. |
| Caucasus: | especially Armenia and Georgia. (The Committee thought that the collections of the Vavilov Institute are relatively comprehensive, but until full information is available, this region must remain a high priority). |
| Syria: | particularly the north of the country. |
| Iraq: | particularly the Zagros mountains. |
| Iran: | mountainous regions, eastern oases and a plateau to the west. |
| Afghanistan: | the north and mountains of Hindukush across the centre of the country. |
| Albania: | |
| Greece: | Northern Pelopponese. |
| Egypt: | Upper Egypt. |
| Northern Yemen: | mountainous area bordering on Saudi Arabia. |
| Saudi Arabia: | region along the Red Sea, adjacent to North Yemen. |
| People's Republic of China: | especially the mountains in the west and Tibetan regions. |

Priority 2:

| | |
|---|---|
| Spain: | |
| Portugal: | |
| Yugoslavia: | (especially for *T. monococcum*). |
| Morocco: | |
| Libya: | coastal highlands and wadis, south of Tripoli. |

| | |
|---|---|
| Sudan: | Jebel Marra region. |
| Ethiopia: | |
| Pakistan: | south Baluchistan, borders of Afghanistan and the edge of Kashmir. |
| Nepal: | hill regions. |
| Bhutan: | |
| India: | hills of Uttar Pradesh, Himachal Pradesh, Madya Pradesh and Kashmir; and some parts of peninsular India. |
| People's Republic of China: | regions other than those mentioned above. |
| Mongolia: | |
| Brazil: | improved descendants of European varieties selected for acid soils. |

Priority 3:

| | |
|---|---|
| Tunisia: | |
| Algeria: | |
| Italy: | |
| France: | |
| Mexico: | northern plateau and in the south in Oaxaca. |
| Paraguay and Uruguay: | |
| Bolivia: | |
| Peru and Ecuador: | old *durum* from Spanish colonial introductions (in the highlands). |
| Chile: | |

Priority 4:

| | |
|---|---|
| Burma: | |
| Korea: | northern region. |
| Mozambique: | |
| Angola: | |
| Chad: | |

The following regions and countries require the material which is scattered in collections gathering together: Northwest Europe, Eastern Europe, Eastern Europe and temperate USSR, USA, Canada, Kenya, South Africa and Rhodesia, Australia and New Zealand, and Japan.

## Résumé

Cet article énumère les régions dont la liste a été récemment révisée - qui sont prioritaires pour la collecte de matérial génétique de blé.

## Resumen

El artículo enumera las zonas prioritarias revisadas últimamente para la recolección de germoplasma de trigo.

# genetic resources information and the computer

CROP DESCRIPTORS

In order to have effective international communications, recording schemes need to characterize samples using descriptors and descriptor states which are clearly defined. There needs to be agreement on the descriptor states; and for exchange purposes, a limited number should accompany material. FAO and the IBPGR is particularly interested in standardization and the development of minimum lists for major crops. The notes below provide information on recent catalogues employing descriptors received and meetings to agree on standardization.

Catalogues

1. The Cambridge *Phaseolus vulgaris* L. germplasm catalogue by A.M. Evans, Dept. of Applied Biology, University of Cambridge, CB2 3DX, UK.

Lists 6 241 accessions evaluated for 28 characters (The IBPGR *Phaseolus* Advisory Committee is currently working on the recommendations for a minimum list).

2. A catalogue of Papua New Guinean germplasm of the winged bean (*Psophocarpus tetragonolobus*) by T.N. Khan and W. Erskine, Faculty of Agriculture, University of Papua New Guinea, Occ. paper series No. 1.

Lists 122 accessions and evaluations based on two seasons' study in 1974 and 1976.

Working Groups

SORGHUM : The IBPGR is organizing a Working Group to decide on a minimum list of descriptors. The Group will meet in December 1978.

WINGED BEAN: The Southeast Asia Regional Committee is organizing a regional Working Group to meet in Thailand, November 1978 to draw up a list of descriptors.

TROPICAL FRUITS: (Rambutan, durian, mango): The Southeast Asia Regional Committee is organizing a regional Working Group to meet in Indonesia, in November 1978 to discuss a list of descriptors for these tree fruits.

RESUME

Les notes ci-dessus fournissent des informations sur les catalogues de descripteurs des principales cultures et sur les sessions d'étude qui se sont intéressées à la question.

RESUMEN

Las notas anteriores proporcionan información sobre catálogos y grupos de trabajo para descriptores de cultivos importantes.

# MORE NEWS ABOUT CROPS

## New crop priorities in Southeast Asia

In Newsletter No. 34 (p.10) the crops for priority cooperative action in countries of Southeast Asia were listed. The first meeting of the Regional Committee for this area took place in July 1978 and it re-considered the list of crops agreed in Manila in December 1976. In the light of recent information it was found necessary to up-date the list as follows:

Rice in Thailand

Durian in Indonesia, Malaysia and Thailand

Rambutan in Indonesia, Malaysia and Thailand

Soyabean in Indonesia, Philippines and Thailand

Coconut in all countries but especially Malaysia and Philippines

Mango in Malaysia, Philippines and Thailand

Banana in Indonesia, Malaysia, Philippines and Thailand

Indigenous vegetables, especially:

(i) Wingbean in Thailand and Papua New Guinea; and

(ii) *Vigna* sp. in Indonesia, Philippines and Thailand.

Tuber crops, especially wild species (Dioscoraceae, Araceae and Zingiberaceae), in Indonesia, Malaysia and Thailand.

On-going activities are in progress on many of these crops and reports will appear in this Newsletter when available. Of particular importance are projects for: the collection of fruits in Thailand (mango and durian) and Indonesia (durian, rambutan, mango and *Canarium* sp.), tuber crops in Indonesia (especially in Sumatra, Bangka and Belitung) wingbean in Thailand, and banana surveys in several parts of the region.

# Collecting Sorghum & Millets in Kenya

During the period June-August, 1978, FAO/IBPGR carried out a collecting mission in Kenya in close collaboration with the Ministry of Agriculture of the Government of Kenya and the FAO Sorghum and Millet Development Project, Nakuru, Kenya. The collection team comprised two consultants, personnel from the local Agricultural Research Stations, District Agricultural Officers of Kenya and personnel of the FAO Sorghum and Millet Development Project, Nakuru, Kenya.

The map overleaf shows the areas of collection. Material was collected during the harvesting period after the long rains in western, eastern and coastal Kenya. The former area still maintains a strong tradition of sorghum and millet cultivation and the latter regions cultivate them in marginal conditions.

The samples collected, include cultivated, wild and weedy types and totalled: sorghum 602, finger millet 258, pearl millet 47. Samples of sorghum included accessions of races *durra, caudatum, guinea,* and *bicolor*, and hybrid combinations of these as well as occasional samples of race *nervosum*. Several indigenous landraces possessing twin seeds in each spikelet were also encountered. The wild sorghums were almost exclusively of race *verticilliflorum*, often appearing in huge stands, whereas the weedy shattercanes of race *drummondii* were comparatively infrequent.

Sorghum was collected from a wide variety of soil types - ranging from the black cotton soils bordering Lake Victoria to the light sandy soils of much of the Eastern province. Altitudes raised from sea level to 1 550 m in the foothills of Mount Elgon.

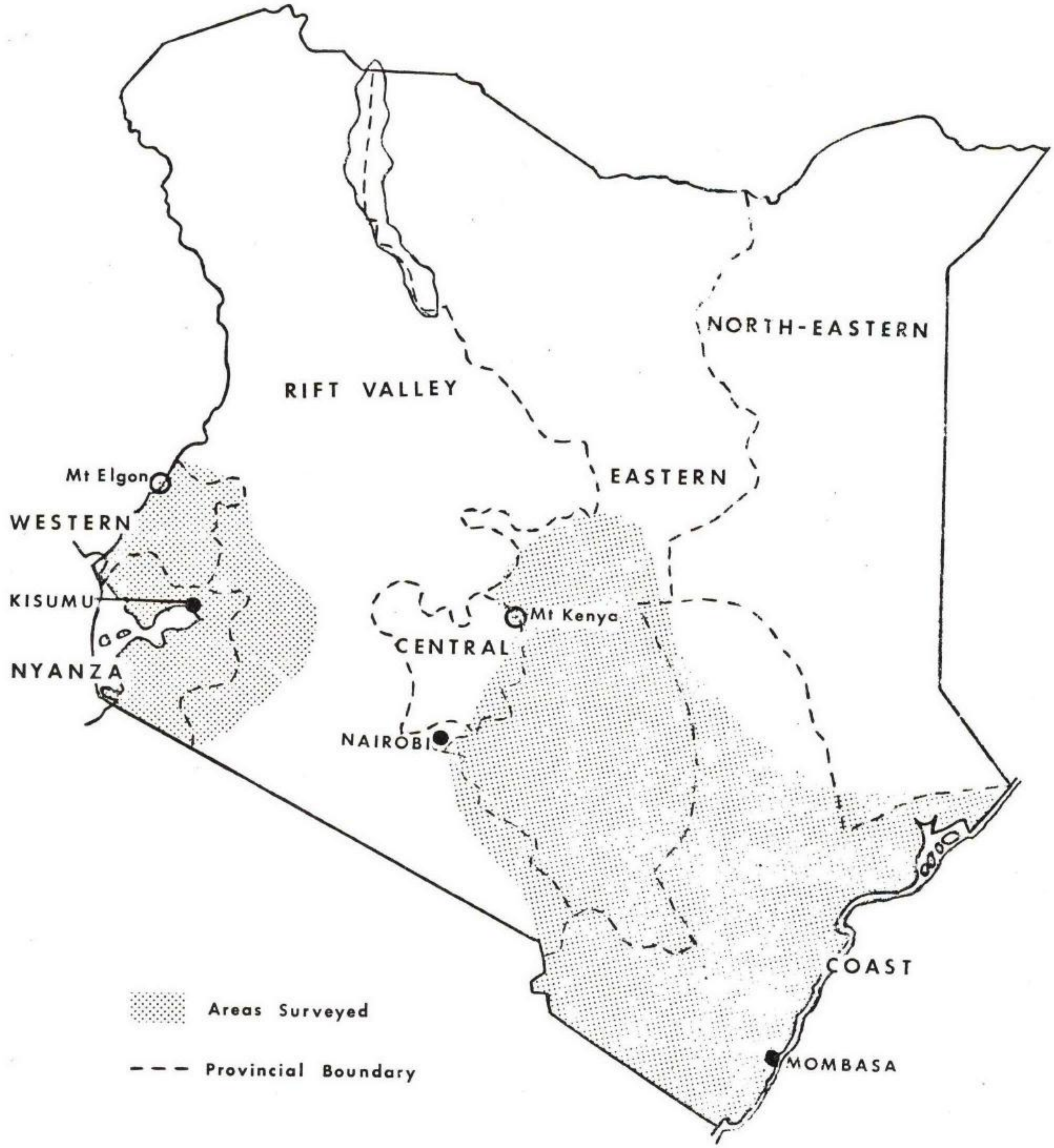
Finger millets were more variable and widespread in Western Kenya, particularly in Western Province, the sampling frequency decreasing towards the coast. *Eleusine indica* was often found in association with cultivars of finger millet. Generally, the distribution of finger millet corresponded with that of sorghum. Pearl millet was encountered mainly in the extremely dry areas of Eastern Province and to a lesser extent in the hinterland of Coast Province and it was not observed in Western Province. The shattering types, "shibras", invariably accompanied the local land races in their areas of cultivation.

The sorghum and millets displayed wide variability in respect of the following traits: time to maturity, height, degree of tillering, head shape and size, grain colour, size, texture and threshability.

The most serious pest affecting sorghum and millets in Kenya is the red-billed weaver (*Quelea* sp.) which was frequently encountered in huge flocks throughout the target areas. Sorghum with white grains and soft floury endosperm is preferred both by birds and the local farmers; varieties sampled, possessing darkly pigmented astringent grains or opaque corneous endosperm and gooseneck heads however, displayed varying degrees of bird resistance. Bird-resistant pearl millet varieties possessed obviously protruding spikelet bristles and those of finger millet, hard, black grains. The serious incidence of witch weed (*Striga* sp.) was ubiquitous among the sorghums in western Kenya and several landraces sampled performed well despite serious attack. Other accessions included sorghum and millets with varying degrees of resistance to shootfly, stalk borer, aphids, rust, honeydew disease and smut and also to such storage pests as weevils, flour beetles and grain moths.

Of the accessions collected, a proportion of each was retained by the Sorghum and Millet Development Project in Kenya to be made available to national institutions, duplicates being distributed to the active and base collections in ICRISAT and to the base collections at NSSL, Fort Collins, Colorado, USA for long-term storage.

I.R. DENTON




**KENYA** Map showing areas of collection

# Forage Legumes in Libya

The Agricultural Research Centre, Tripoli, organized the first stage of a forage legume collection programme in Libya in 1978 with support for the missions being provided by IBPGR and EMASAR.

A reconnaissance mission visited the middle zone (Syrte area) during early March 1978 to explore the requirements for the collection. This was followed by a series of trips to various zones in Jaffara area (Northwestern Libya) and Jebel El Akhdar area (Northeastern Libya) by 16 collecting teams comprising 21 persons belonging to various organizations working in Libya collecting more or less at the same time. In all, collecting was done in 64 days, from April to June 1978. 513 populations, representing approximately 1 500 ecotypes were collected.

Emphasis was placed on annual *Medicago* spp., but there was also a wide range of other species collected which belonged to 16 different genera.

All material collected was deposited in a seed storage room, a temporary facility offered by the ARC at Sidi El Mesri, Tripoli. The seed storage room is located in a prefabricated trailer equipped with an air-conditioner. One third of the samples to remain in Libya had been separated into genera, species and varieties as far as this was possible. The remaining two-thirds samples for storage at Bari have yet to be sorted. Of these, half would be for long-term storage and half for later return to Libya when adequate storage facilities are available.

A full report by G. Gintzburger is available from the Agricultural Research Centre, P.O. Box 2480, Tripoli, Libya.

# Maize in Argentina

INTA organized four collection expeditions in different areas of Argentina during 1977 with financial support from the IBPGR. Personnel from the Agricultural Experiment Station, Pergamino, collected from three areas covering the provinces of La Rioja, Catamarca, Calchaqui valleys of Salta and Tucumán, western Santiago del Estero, sub-tropical lowlands of Jujuy, Central and Western provinces of Misiones and the northern province of Corrientes. Members of the Faculty of Agronomy, University of Buenos Aires collected from the Humahuaca Valley, province of Jujuy and the northwestern border of Salta.

As a result of the missions, a total of 1 005 samples were collected and stored in an ancillary cold room located at the Pergamino Experimental Station pending transfer to long-term and medium-term storage facilities being inaugurated.

Collecting in other areas is continuing during 1978.

# Expediciones Maiceras en Peru

La Costa Peruana es una región de gran tradición e importancia en la producción maicera de Peru. Gran variabilidad genética ha estado presente en sus variedades de maiz hasta fecha reciente. En los ultimos años la expansion de los híbridos ha provocado una reciente erosión genética de sus variedades nativas. Algunas de estas variedades habían sido ya colectadas y almacenadas en el Banco de Germoplasma de la Universidad de La Molina. La salvaguarda del valioso material indigena no representado en las colecciones existentes en La Molina hacía necesario la immediata organización de una ó varias expediciones que colectasen muestras de estas poblaciones en la zona de la Costa Peruana.

Una propuesta del Dr. W. Salhuana solicitando una ayenda de 1 756 000 soles peruanos para llevar a cabo dichas expedicciones fué discutida y aprobada en la 4ª Reunión del Comité Ejecutivo del IBPGR, que tuvo lugar en Roma entre el 22 y el 24 de Febrero de 1977.

Para obtener la máxima eficacia la Costa de Perú fué dividida en cuatro zonas:

- Zona Norte, Departamentos de Tumbes, Piura y Iambayeque,
- Zona Norte Chico, Departamento de La Libertad y Ancash,
- Zona Central, Departamentos de Lima e Ica,
- Zona Sur, Departamentos de Arequipa, Moquega y Tacna.

Las fechas de las expediciones en cada zona, debían coincidir con las fechas de la recolección en la misma, estando estas comprendidas entre los meses de Abril y Junio para la siembra de verano y entre los meses de Agosto y Octubre para la siembra de invierno.

Siguiendo los criterios precedentes, varias expediciones a las distintas zonas han sido llevadas a cabo hasta la fecha, siendo el material recogido el siguiente:

| Departamento | No. Registro | No. Colecciones |
|---|---|---|
| Arequipa | 46 - 244 | 199 |
| Ica | 3 - 14 | 12 |
| Lambayeque | 25 - 154 | 130 |
| La Libertad | 135 - 171 | 37 |
| Lima | 67 - 89 | 23 |
| Moquegua | 5 - 14 | 10 |
| Pieura | 131 - 135 | 5 |
| Tacna | 7 - 28 | 22 |
| | | 438 |

Cada colección consiste en un minimo de 15 mazorcas. Los datos de localización, suelo, clima y ecología de la zona se han tomado en el momento de la colecta; los datos de mazorca y grano son tomados posteriormente en La Molina; por último, los datos relacionados con la planta, así como la multiplicación de semillas se llevará a cabo en la progenie de parte del material colectado.

Para terminar el programa se proyectan nuevos viajes a los departamentos de Arequipa, Moquegua, Tacna, Ancash, La Libertad, Piura y Tumbes.

# NOTES FROM GENETIC RESOURCES CENTRES

## ARGENTINA

The Faculty of Agronomy at the University of Buenos Aires holds 4 000 accessions of maize from Argentina. This material has been collected from the provinces of Jujuy, Salta, Tucumán, Catamarca, La Rioja, Misiones and Corrientes.

## CHINA (PEOPLE'S REPUBLIC OF)

The NAS publication (p.26) informs us that in 1955 a programme was initiated to systematically collect, document and preserve wheat cultivars. Genebanks have been established at the province level. A collection of *ca.* 4 000 samples is held at Wukung, Shensi Province Academy of Agricultural and Forestry Sciences, but this is grown out regularly for maintenance.

## COSTA RICA

The Genetic Resources Center, CATIE, Turrialba, is working on the physiology of seeds which cannot be stored dried in cold conditions. Experiments have been initiated with seeds of *Antidesma bunius* (China laurel), *Psidium guajava* (guava), *Carica papaya* (papaya), *Bixa orellana* (annato), *Solanum topiro* (ibara). Work is proposed on *Passiflora edulis, Rubus* spp., several *Solanum* spp., *Manihot esculenta* and *Physalis* spp. all as first priority and *Annona* spp. *Pimenta dioica, Prunus serotina* and *Cereus* spp. as second priority.

Some data have already been obtained for *Bixa orellana* as well as *Pouteria zapote Melicoccus bijugatus* (mamōn), *Eugenia dombeyana* (grumichana), *E. uniflora* (pitanga) and *arabica* coffee.

## CZECHOSLOVAKIA

In Czechoslovakia, investigations on genetic resources have many years' tradition. The collection, evaluation and maintenance of domestic and foreign cultivars was started as early as 1903. With the re-organization of the Agricultural Research Institutes in 1951, the germplasm collections have become more effective. The initial total of 6 000 cultivars in 1951 was expanded to 18 600 by 1960, to 35 636 by 1970 and to 40 274 by 1977. This total of 40 274 accessions belongs to various groups of crops. The accessions are maintained by 14 Agricultural Research Institutes working on individual groups of crops. The Institute of Genetics and Plant Breeding of the Research Institutes of Plant Production, Praha-Ruzyne, coordinates the work of various centres on crop improvement.

At present, the Institute of Genetics and Plant Breeding has two projects:

(i) establishing a data bank system for genetic resources in cooperation with COMECON countries,

(ii) expansion of genebank facilities. The project proposes to construct eight chambers, each of 50 $m^3$, with a total capacity of storing 120 000 samples. Four chambers will be for long-term storage maintained at $-18^{\circ}C$ and the other four for medium-term storage maintained at +2 to $3^{\circ}C$ with 20-30% RH. In the medium-term store, the samples will be stored in paper bags and in the long-term store, in metal containers.

## INDIA

### ICRISAT

Samples collected in West Africa by ORSTOM in 1976-77 have been planted out by the ICRISAT breeder at Kamboinse in Upper Volta and will be planted in October 1978 at ICRISAT for seed increase and preliminary cataloguing.

INDONESIA

The National Committee on Plant Genetic Resources has its Secretariat at the National Biological Institute, Bogor, and acts as a national coordinating body for genetic resources.

IRAQ

The Plant Genetic Resources Unit is now the sole responsibility of the Directorate of the Ministry of Agriculture, whereas previously, supervision of the Unit was shared with the Seed Testing and Certification Division.

Two collecting trips of 10 days duration were made in April and May. One from Baghdad to Basrah through the desert and back through the cultivated lands. On the outward trip, plants of botanical interest were collected and on the return journey, vegetable seeds particularly. Farmers are discarding local varieties in favour of imported seeds. The second trip was to the northeast where cereal varieties and their wild relatives were the main target.

IRAN

The Seed and Plant Improvement Institute, Karaj, Division of Genetic Resources, has been collecting in several parts of Iran in 1978. The following missions have been organized by the two IBPGR/FAO Field Officers posted at Karaj: to Baluchistan (for all crops), to the Rasht area (for rice), to Damavand area (all crops), and the Zagros mountains (for cereals and their wild relatives).

A start has been made to document, and prepare for storage, samples of various collections, i.e. 2 500 accessions of Iranian wheats held by the Cereals Division, collections of wheat and barley made by the Director of the Division (Dr. P. Parvaneh), 2 800 accessions of Iranian safflowers and a 'working collection' of pulses. The last three sets of collections were made a few years ago and some of the seed samples are two or more years old, so germination tests are being made. If germination is satisfactory, material will be processed this year. Otherwise, fresh seed from next year's rejuvenation will be used. It is of particular interest to note that there are excellent evaluation data for the safflower material that are being processed by computer in the University of Ahwaz.

JAPAN

The Ministry of Agriculture and Forestry, Japan, plans to collect soybean and leaf and/or root vegetables from West Asia covering India, Pakistan, Afghanistan and Sri Lanka. They will also send another team to the Assam State of India to study material for work on the origin of rice.

KENYA

The Coffee Research Station, Ruiru, has recently been working on the temperate and seed moisture content affecting the longevity of *arabica* seed - It is now possible to extend the viability of seed from 4 months to 2 years. The work has been carried out by Dr. H.A.M. van der Vossen and will be published early in 1979.

MALAYSIA

MARDI (Malaysian Agricultural Research and Development Institute) has assumed national responsibility for genetic resources activities.

NIGERIA

The International Institute of Tropical Agriculture (IITA) has recently appointed two post-doctoral fellows to the staff of the Genetic Resources Conservation Unit, Dr. Taysir Badra (Egypt) and Dr. Quat Ng (Malaysia).

The IITA Unit has been collecting in Nigeria (early cowpea), Tanzania (mainly legumes), Togo and Benin (late season crops) Egypt and North Sudan (rice and legumes), and will also collect in Upper Volta, Guinea, Gambia and Cameroon in 1978.

THAILAND

Thailand has inaugurated a National Plant Genetic Resources Coordinating Sub-Committee in the National Research Council.

UNITED KINGDOM

The Commonwealth Potato Collection held at the Scottish Plant Breeding Station, Pentlandfield, Roslin EH25 9RF, has been duplicated in the German-Dutch Collection.

# NEWS ABOUT PUBLICATIONS

*Conservation and Agriculture* (1978), edited by J.G. Hawkes, Duckworth, London, 286 pp. £14.

This book results from a Symposium held as part of the centenary celebrations of the University of Birmingham, UK. Although it explores man's interaction with the environment, there are sections on gene pool conservation in agriculture and foresty. The following papers will be of interest: Erna Bennett: "Threats to crop plant genetic resources"; O. Frankel: "Conservation of crop genetic resources and their wild relatives: an overview"; K.F.S. King: "Development and conservation of forest resources"; and, R.H. Kemp and J. Burley: "Depletion and conservation of forest genetic resources".

*Tropische Nutzpflanzen* (1977) by H. Brücher. Springer-Verlag, Berlin, New York, 600 pp. US$ 109.20. Based on a consideration of the seriously low number of plants available for world nutrition, the economic significance and future domestication of tropical plants for this purpose are presented. The book gives an insight into phylogenetic processes, and levels criticism at the gene-centres theory which has predominated to the present.

*Principles and Practices of Seed Storage* (1978) by O.L. Justice and L.N. Bass, USDA Agriculture Handbook No. 506, 289 pp.

There is a long history of work on seed storage, starting in the second quarter of the 19th century. This book reviews the whole subject and discusses commercial practices and engineering aspects of drying. As a general source of information it is a useful book but cannot be recommended as the major work due to a somewhat superficial treatment in some sections, e.g. seed ageing, cytological changes, viability equations, and the emphasis on packaging relating too strongly to US conditions.

In association with the other standard texts, however, this is a useful publication. The other texts are:

1. E. Biasutti Owen (1956). The Storage of Seeds for the Maintenance of Viability. C.A.B., Farnham Royal, UK.
2. Lela V. Barton (1961). Seed Preservation and Longevity. Leonard Hill Ltd., London; Interscience Pub. Inc., New York, USA.
3. E.H. Roberts (ed.) (1972). Viability of Seeds, Chapman & Hall, London, UK.
4. T.T. Kozlowski (ed.) (1972). Seed Biology. 3 vols. Academic Press, New York, USA.

*Wheat in the People's Republic of China* (1977) V.A. Johnson & H.L. Beemer (ed.) CSCRPC Report No. 6., National Academy of Sciences, Washington, D.C. USA.

Due to the long and extensive cultivation of wheat in diverse climatic regions of China much variability has resulted. The report suggests that many of the land races have been lost. A programme for preservation of material is outlined in Notes from Genetic Resources Centres (p.26).

*Report of the Fourth Session of the FAO Panel of Experts on Forest Genetic Resources* held 9-11 March 1977. FAO, Rome, 75 pp.

This will be of interest to readers especially in relation to the project on Conservation of Forest Genetic Resources, which is being financially supported by UNEP.

The Plant Genetic Resources Newsletter will be pleased to consider reports, notes and news from anyone working with genetic resources.

Please send manuscripts, typed in double space. Relevant photographs too, will be greatly appreciated, but only if high quality black and white prints rather than colour prints or slides. Colour photographs will reproduce, but not without a considerable loss of quality.

The Newsletter will also review salient books, scientific papers and other publications.

All contributions should be sent to the Editor, AGPE, FAO, 00100 Rome, Italy.

Le Bulletin des Ressources Génétiques Végétales apprécierait de connaître les rapports, notes et nouvelles écrits par quiconque travaillant en relation avec les ressources génétiques.

Prière d'envoyer les manuscrits tapés en double interligne, accompagnés le cas échéant de photographies s'y référant, mais de préférence sous forme d'excellents tirages en blanc et noir plutôt que de tirages en couleurs ou de diapositives. Les photographies en couleurs peuvent être reproduites mais sans garantie de perte de qualité.

Le Bulletin passera en revue les livres les plus en vue, les notes scientifiques et autres publications.

Toute contribution sera envoyée à l'Editeur, AGPE, FAO, 00100 Rome, Italie.

El Noticiario de Recursos Genéticos Vegetales considerará con gusto informes, notas y noticias provenientes de aquellas personas trabajando en recursos genéticos.

Agradecemos el envío de los trabajos mecanografiados a doble espacio. También apreciaremos el envío de fotografías relacionadas con la materia, pero deberán ser impresiones de buena calidad preferiblemente en blanco y negro. Fotografías en color pueden ser reproducidas, pero con una apreciable pérdida de calidad.

El Noticiario también hará revisiones de libros, trabajos científicos y otras publicaciones.

Todas las contribuciones deben ser enviadas al Editor, AGPE, FAO, 00100 Roma, Italia.

G-12

1978

# Programme and Budget Proposals for 1979/80

International Board for Plant Genetic Resources

AGPE:IBPGR/78/11
May 1978

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

# PROGRAMME AND BUDGET PROPOSALS FOR 1979-80

IBPGR SECRETARIAT

Rome, 1978

IBPGR Secretariat
Crop Ecology and Genetic Resources Unit
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, Rome 00100, Italy

# TABLE OF CONTENTS

# I OBJECTIVES AND MANDATE OF THE IBPGR*

The major task of the IBPGR is to organize an international network of plant genetic resources centres, to ensure that the genetic diversity of important food crops and other plants -- which represents one of the world's major natural resources -- is adequately collected, is satisfactorily conserved, evaluated and documented, and is made available for use by plant breeders and other scientists. The successful accomplishment of this task will prevent the threatened loss of significant genetic diversity of many crops in a time of great change and development in agriculture and land use, including the introduction of new varieties, and will provide genetic resources for future progress in plant improvement.

The emerging IBPGR network includes centres concerned with specific crops or groups of crops, and centres concerned with all crops in a particular geographical area, national or regional. The IBPGR has accepted the responsibility assigned to it by the CGIAR to encourage and, where necessary, support an appropriate and coordinated global programme of genetic resources activities by these various centres, and to foster collaborative efforts among them.

More specifically, the IBPGR seeks:

- to identify the needs for exploration, collection, evaluation and conservation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities, and to ensure that the materials conserved are made available for plant breeding and other specific activities as required

- to establish standards, methods and procedures for exploration and evaluation and to determine minimum standards for conservation and regeneration of stocks of both seeds and vegetative material

- to arrange for duplicate storage of seed and vegetative stocks

* Since the objectives and mandate of the IBPGR have not changed over the past year, this section of the Board's Programme and Budget Proposals for 1979-80 is essentially the same as the comparable section in the Programme and Budget Proposals for 1978.

- to promote technical meetings on crop genetic resources

- to promote relevant training at all levels

- to develop a world-wide network of institutions, organizations and programmes able to contribute to the Board's objectives

- to promote the coordination of programmes to avoid unnecessary duplication and fill in gaps

- to strengthen the programmes of existing institutions and, where necessary, to encourage the establishment of new organizations, institutions and programmes, particularly in areas of major diversity

- to promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections

- to encourage the development and implementation of appropriate information storage and retrieval systems, linking together the genetic resources centres in the Board's international network

- to help finance those parts of priority genetic resources programmes not adequately supported by other sources of finance

Since these terms of reference were adopted in 1974, the Board's links with crop improvement and plant breeding have developed substantially, and it seems evident that this trend will continue.

As set forth in IBPGR's Annual Report for 1977, the Board's work falls into four principal categories: (1) activities designed to assist in strengthening the genetic resources programmes of specific countries and regions, particularly centres of genetic diversity; (2) activities designed to encourage and support collection, conservation and other measures necessary to assure the availability for future breeding programmes of the genetic diversity of specific crops of major importance; (3) information activities designed to assure that all major genetic resources collections are so documented, in computer-readable form, that at least the minimum necessary information about the accessions in those collections can be made readily available to potential users; and (4) training programmes of various kinds designed to assure that trained personnel are available for the foregoing activities.

The Board's work in each of the four categories consists primarily of providing encouragement and technical and financial support for the work of other organizations, national, regional and international, on plant genetic resources. Essentially, the IBPGR sees itself as an institution of limited life which will establish a global network of plant genetic resources centres, ensure that it works, and then withdraw. By the same token, much of the Board's expenditure is designed to prime pumps and to help to set activities in motion which are then handed over for future funding to those who benefit from them. It is for this reason that the Board expects that, after its present period of maximum growth is concluded by around 1980 or 1981, its budgetary requirements, now at a level of around $2 million, will level off at around $3 million (in 1977 dollars).

In connection with one aspect of its mandate, however -- the evaluation of collected materials -- the Board has only recently begun to consider the extent of its responsibilities and how best they might be discharged. The Board believes that in general its task will be to assist plant breeders and others to develop uniform procedures for evaluation and for recording and communicating the results.

Before the Board can decide how it should eventually handle the problem of evaluation, it is seeking advice from its crop committees. It has also instructed its Secretariat to organize a pilot evaluation of wheat genetic resources held in several major collections, as proposed by its Wheat Committee, in the belief that this will help to identify the problems likely to be encountered. Until a final decision is reached on this matter, the Board intends to seek assurance, in connection with all IBPGR-supported collections, that a preliminary evaluation of the material collected will be undertaken by an institution identified as responsible for this work. The Board recognizes that the world community of plant breeders will meet substantial difficulties in designing procedures for the many different kinds of evaluation which will be required and in ensuring that these procedures are carried out; and it stands ready to assist in all ways open to it.

## II FUNDS REQUESTED FOR THE 1979-80 BIENNIUM

The total budget proposed for the 1979-80 biennium is $5,207,000 in 1978 dollars ($5,977,000 after provision for inflationary price increase of 10% each year). This biennial budget reflects requirements, expressed in 1978 dollars, of $2,489,000 for 1979 ($2,738,000 after provision for price changes) and $2,718,000 for 1980 ($3,239,000 after provision for price changes). Compared in terms of 1978 dollars, the proposed budget for 1979 represents an increase of 26% over the approved budget for 1978 (24% over currently estimated expenditures in 1979) and the proposed budget for 1980 represents an increase of 9% over the budget proposed for 1979.

The proposed increases are designed largely to finance expanded collection, conservation, evaluation and other genetic resources activities in those regions of the world identified by the Board as having priority for its work, particularly through strengthening the national programmes of the countries comprising those regions. This does not represent any shift in the emphasis of the Board's programme; rather, it represents the Board's expectation that, in the 1979-80 biennium, it will be able to realize more fully than heretofore its often-expressed intention to use the greater part of its resources to support field activities primarily through help to develop national programmes. The other significant increases in the proposed budget are for the development of conservation facilities and for training.

Only three new items of any size appear in the proposed budget. One is the provision of $56,000 for the first (reconnaissance) phase of a forest genetic resources project. This is discussed in some detail below (p.15 ). The second is the provision of $30,000 for a Technical Conference in 1980; this is also discussed below (p.18). Finally, an item of $35,000 has been included for the TAC Quinquennial Review scheduled for 1979.

The Board has undertaken, to the best of its ability, to make projections of its likely budgetary requirements for 1981 and 1982. In real terms, these projections show little increase over the proposed budget for 1980. The Board wishes to underline, however, the provisional character of these projections and urges that they be regarded not as firm estimates, but simply as indications of possible orders of magnitude which may well need substantial modification in the future.

## III SUMMARY OF ACHIEVEMENTS AND RESULTS*

The most significant result of the Board's work during its first few years has been the remarkable catalytic effect which its establishment and operations have had upon the genetic resources activities of many nations around the world and of many international, regional and national agricultural research centres. The agricultural research community has responded promptly and effectively to the lead which the Board has provided.

In several countries, new national organizations have been created to accelerate genetic resources programmes; in a number of others, new or increased funding has been provided for genetic resources work. The International Agricultural Research Centres,

* As in the case of Section I, this portion of the Programme and Budget Proposals for 1979-80 covers much of the same ground as was covered in the comparable section of the Programme and Budget Proposal for 1978.

which since their inception have been active in building up their germplasm collections, have now, for the most part, assumed a more general responsibility for promoting genetic resources activities in relation to the crops for which they have research responsibility. In addition, most of them have either established new germplasm units, or expanded their collection and evaluation programmes, or improved their seed storage facilities, or have taken action in several of these respects. On the regional level, in addition to the establishment of the new regional genetic resources centres in Turrialba and Addis Ababa, the countries of Southeast Asia and of the Mediterranean area are expanding and accelerating their genetic resources activities, and the foundations have been laid for similarly increased efforts by the countries of Southwest Asia.

Among the Board's own activities, the following may be singled out as particularly noteworthy:

(a) Further progress of the work of five crop Germplasm Advisory Committees -- for wheat, maize, rice, sorghum and millets, and *Phaseolus* beans -- in cooperation (except for wheat) with the appropriate International Agricultural Research Centre. Each of these Committees serves as a bridge between the Board and the global community of scientists working on the particular crop. Each Committee has met at least once and each has provided the Board invaluable information with respect to the priority actions needed for the satisfactory collection, conservation, evaluation, documentation and use of the genetic diversity of the crop or crops with which the Committee is concerned. For rice, wheat and maize (and also for potatoes) substantial progress has been made in drawing up internationally accepted systems of descriptors and in assembling lists of accessions at the particular genetic resources centre concerned with these crops;

(b) Convening of two Working Groups to advise the Board on action for Bananas and Plantains, and Coconuts. Both of these Working Groups produced recommended plans of action which were approved by the Board and are being carried out;

(c) Support by the Board for intensified collection efforts in the Mediterranean region, particularly of cereals and other crops in North Africa where the risk of loss is substantial. Algeria, Greece, Italy, Libya, Portugal, Spain and Tunisia are all participating in collecting expeditions and preparations have been made for other countries to take part in 1978. Duplicates of all seeds collected are being stored, for the time being, for all the countries at the Germplasm Laboratory at Bari, Italy. In 1978 a meeting will be held to discuss regional organization and formulate a longer-term regional programme;

(d) Revision by the Board of its plans to accelerate collection and conservation activities in Southwest Asia, where important genetic diversity is also in danger of being lost. Two experts recruited by the IBPGR have been stationed in the region to assist in the expansion and execution of the national genetic resources programmes of Afghanistan, Iran, Pakistan and Syria. Assistance for the Turkish and Iraqi programmes will be provided by a senior officer located at FAO headquarters in Rome. In addition, substantial help is being provided by the Board in the form of training fellowships and equipment;

(e) Formulation by the countries of Southeast Asia, under the sponsorship and with the help of the Board, of a regional plan of action and an organizational framework to assure its implementation. The governments of Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand have approved this plan and work started in 1977. The Board has stationed an officer in the region to assist the participating governments in carrying out their programmes;

(f) Intensification of Board support for collection activities not undertaken within the framework of a regional programme, to collect particularly sorghum and millets in the Sahelian zone, rice, roots and tuber crops and legumes in various parts of Africa, forage legumes in Latin America, potatoes in Chile and Argentina, and groundnuts and maize in several countries of South America. These are examples of major missions; in addition, a range of crops have been collected in many parts of the world at the instigation or with the support of the Board;

(g) Designation by the Board, in consultation with the centres concerned, of the institutions responsible for maintaining the world's major base collections of seeds of the principal food crops. These centres form part of the Board's emerging global network, in which some 60 national, regional and international research institutions now participate;

(h) Development and publication by the Board of recommended standards for the engineering and design aspects of long-term seed storage facilities;

(i) Support by the Board for the development and installation of appropriate computerized systems to deal with information concerning genetic resources collections and their documentation, storage and retrieval;

(j) Support by the Board for the expansion of training programmes designed to provide adequate numbers of personnel in the developing world trained for genetic resources work.

## IV PROGRAMME ELEMENTS

A summary of costs by programme activity is shown in the appended tables:

| | | |
|---|---|---|
| Table I | - | Summary of Costs by Programme and Activity 1976-1982 |
| Table II | - | Summary of Sources and Application of Funds |
| Table III | - | Breakdown of Costs by Items: 1977-1982 |

### 1. Information and Documentation Activities

The proposed 1979-80 budget provides for continuation of support, at a level only slightly above 1978, for the Information Sciences/Genetic Resources (IS/GR) Program at the University of Colorado in Boulder. Despite the very modest increase, the Board hopes and expects that the IS/GR Program will expand substantially over the biennium, but with a larger share of the costs borne by the users of the Program's services and with the IBPGR, accordingly, bearing a gradually declining share.

During 1977-78 the IS/GR Program shifted the emphasis of its work from the development of the EXIR (Executive Information Retrieval) system for the recording and management of information about the accessions in genetic resources collections to the provision of assistance to international and other centres in the installation and use of EXIR or other appropriate computerized systems. The Program has prepared and made available manuals dealing with data preparation for use in EXIR, with graphic and other visual displays of EXIR outputs, and with the EXIR report generator. It is expected that, during the 1979-80 biennium, the IS/GR Program will continue to emphasize and expand its help to centres in installing and using appropriate computerized information management systems for their genetic resources collections.

A significant recent development in the IS/GR Program has been extension of its activities from work on the assembly, communication and retrieval of information to work on systems for the management of genetic resources information and also for the management and use of the collections. This reflects the needs and pressures of the users.

In addition, the Program, with funding from FAO and supplemental funding from the IBPGR, organized for the first time in 1977 a short technical training course for scientists from developing countries. This course is being repeated in 1978, also with FAO funding, and is expected to be continued during the 1979-80 biennium. Other types of training of longer duration are also expected to be inaugurated.

Through such training, and through providing technical expertise, the IS/GR Program is helping a number of international institutions (including particularly those of the CG system) and national centres in preparing the data about their germplasm collections for machine processing, in identifying duplicates, and in building up data bases. The Program now holds duplicates of considerable amounts of genetic resources information on a wide range of crops. In addition, the Program has been cooperating and will continue to work closely with the IBPGR Crop Advisory Committees and other expert Advisory Groups to work out agreed lists of descriptors. Such lists have already been agreed upon for wheat, maize and potatoes, and work is continuing on similar lists for other crops.

A new dimension was added to the work of IS/GR Program in late 1977, when arrangements were completed under which the Program staff will help the Agricultural Research Service of the U.S. Department of Agriculture to assemble and organize information about genetic resources held in the United States, in a manner compatible with the international system of the Board. It is contemplated that this work will be spread over five years at a cost likely to exceed $2.5 million.

The IBPGR recognizes that to assemble, manage and use information about genetic resources effectively is expensive. The numbers of species, of individual accessions and populations within species, and of centres interested in holding and using collections, are large. Two somewhat disparate consequences flow from this. First, IBPGR cannot, and will not attempt to, finance all operations relating to genetic resources information; in general, as already noted, it expects the IS/GR Program to recover the costs of its work from users, particularly those within the CG system or in developed counties, who can afford to pay for what they need. Second, it is important that systems be developed which are as simple as possible for the users to operate and which do not require installation of large, costly computers. To this end, IS/GR is seeking to develop systems which minimize computer-programming requirements and is investigating the technical and economic usefulness, in work on genetic resources information, of the newer types of small and inexpensive computers.

The IBPGR has created an Advisory Committee to advise both the Board and the Director of the IS/GR Program with respect to the genetic resources information work being carried out at Boulder. The University of Colorado has designated the members of this Advisory Committee to serve, together with members of the faculty, as a Program Committee to oversee the work of the IS/GR group on behalf of the University itself. The chairman of the IBPGR Advisory Committee also serves as chairman of the University's Program

IBPGR Secretariat
30 June 1978

This Programme and Budget document of the IBPGR includes proposals for 1979 and 1980 and forward projections to 1982.

The TAC has endorsed the proposals for 1979 only because the IBPGR will be undergoing a quinquennial review in the first part of 1979. TAC will then consider proposals for 1980 in the light of any recommendations to be made by the review.

The proposals for 1980 should therefore be read as forward projections.

Committee. This rather unusual arrangement has operated effectively, and the Program Committee has assisted the IS/GR group both in achieving a sharper focus for its activities and in developing tighter budgetary controls.

2. Regional Activities

The Board has identified the following regions for priority action: Mediterranean, Southwest Asia, South Asia, Southeast Asia, Western Africa, Ethiopia, Meso-America and Brazil. In 1978 the Board also intends to provide support in modest amount for national programmes in other countries of Eastern Africa and for activities in the Andean zone of South America. In 1979 the Board hopes to be able to extend assistance to other parts of South America and to support some work in the Far East/Pacific Islands.

With encouragement from the Board, new regional genetic resources centres were established in 1976 in Turrialba and Addis Ababa, with financial support from the Federal Republic of Germany. These two centres are expected to take the lead in formulating and implementing regional programmes for Ethiopia and Meso-America. In Brazil, a large coordinated national genetic resources programme is underway with Brazilian government funding.

Direct IBPGR financing has in the past gone, and will continue in 1978 to go, for work in the Mediterranean, Southwest Asia, South Asia, Southeast Asia and Western Africa regions. Three of these regions (the Mediterranean, Southwest Asia and Southeast Asia) account for the largest part of the total allocations for regional activities in the proposed budget for 1979-80 ($1,475,000 out of a total of just over $2 million). The regional programme in South Asia has yet to develop but, under the leadership of the newly established Indian National Bureau of Plant Genetic Resources, a meeting of representatives of countries in the South Asia region will be convened in May 1978 to formulate proposals for cooperative action. Support of $120,000 is proposed to continue this development in 1979-80, with the expectation that effective implementation of a regional programme will start in 1979.

By 1979, too, the Board expects genetic resources activities to have accelerated in other priority regions, particularly Western Africa (with a lead being provided already by the Germplasm Collection Unit of IITA).

The proposed budget for 1979-80 allocates the funds for genetic resources activities in each priority region under certain headings for which regions the programme is reasonably well defined. These include: support to national programmes; training; documentation/information; storage; and personnel and associated costs (i.e. operating expenses) where IBPGR staff have been appointed. In the case of Southwest Asia, FAO is executing the programme on behalf of IBPGR and hence a project servicing cost is included.

As far as possible, the funds allocated for each region represent a package containing elements of support for work on collection, evaluation, conservation, documentation and training. However, each region will require a different mix of assistance, depending on the strength of the national programmes, the expertise and physical facilities available within the countries of the region, the specific crops which characterize the area, and the work already accomplished.

The six major regional efforts to be supported in 1979-80 are:

2.1 Mediterranean: Collections have been undertaken in this region since 1975, first with UNEP support and subsequently with IBPGR financing. The collections in the earlier years concentrated on the countries of North Africa, particularly Algeria and Tunisia, with emphasis on the traditional varieties of wheat and barley which are rapidly being displaced by the spread of new varieties. Since 1976, this work has been based on the Germplasm Laboratory of the Italian National Research Council at Bari, Italy. Beginning in 1977, with a substantially greater involvement by FAO, the work has been expanded to take in other crops, especially forage and grain legumes, and to involve more countries: Spain, Portugal, Greece and Libya as well as Algeria and Tunisia.

In addition, in 1976-78, several of the IBPGR Crop Advisory Committees recommended specific collections in this region, especially wheat in many parts of the region, maize and *Phaseolus* in Spain, and millets in southern Spain and the oases of North Africa. Accordingly, in 1978, a series of collecting missions is being undertaken in countries of the region, with other crops in addition to wheat and barley being collected. The Germplasm Laboratory at Bari is continuing to play a key role in this expanded effort, and the scientists in each of the countries where collections are being made are participating fully. The Board has reallocated the amount budgeted for 1978 to support the increased exploration effort, and has provided for substantially increased funding for this region in the proposed budget for 1979-80.

At present, regional documentation is centred on Bari, which also plays a central part in evaluation. Also, for the time being, the Bari Laboratory is storing samples of all the seed material collected. However, as the programme develops, it is envisaged that there may be two or three regional centres, each with responsibility for conserving and evaluating the seeds of certain crops. Accordingly, the proposed budget for 1979-80 provides for the expenditure of $50,000 each year for improvement of seed storage facilities in the region.

In September 1978 a first regional meeting will be held at FAO, Rome, at which government representatives will be present. The Board expects that a more formal programme will be produced at that meeting. However, the Board foresees the major part of the collecting work being done in the next two years and thereafter the funds needed should level off. They are not likely to decrease until after 1982, however, because, as the exploration activities slow down, there will be need for increased support, for a few years, for conservation, evaluation, documentation and other activities important to plant breeders. As the European programme (see p. 13) becomes operational in 1978, links will need to be created with the activities being supported by the IBPGR in the Mediterranean region, particularly the activities in the countries of southern Europe. At the same time, the Board intends to ensure that the genetic resources activities financed by it in North Africa complement any collection programmes proposed for specific crops in that area by ICARDA. Moreover, arrangements have been made to assure the availability to ICARDA of duplicates of all seeds collected in the Mediterranean region under IBPGR-sponsored programmes. However, at least until ICARDA becomes fully operational, the IBPGR will have to continue to support collections in North Africa, since genetically diverse materials are still being rapidly lost there through changes in agricultural practices.

2.2 Southwest Asia: The Board assumed financial responsibility as of 1 July 1976 for the support of genetic resources work in six countries of Southwest Asia (Afghanistan, Iran, Iraq, Pakistan, Syria and Turkey) which had previously participated in a regional project based at Izmir, Turkey, funded by SIDA and operated by FAO. The Board originally proposed to support the national programmes of these six countries through the establishment of a Genetic Resources Support Unit (GRSU) with headquarters at Izmir, Turkey, and a sub-station at Karaj, Iran. Unfortunately the negotiations with the two governments took longer than anticipated and during 1977 the situation was reassessed. As a result the Board decided not to establish a GRSU but to place two field officers in Karaj to assist not only the Iranian national programme but also the national programmes of Afghanistan, Pakistan and Syria. These officers were both in post by March 1978. Their work is to be supervised by a senior officer to be located in the IBPGR Secretariat at FAO headquarters, who will himself collaborate especially with the Turkish and Iraqi programmes*.

* Originally four field experts were to be appointed to work in this region, but it has been decided that a cold-store engineer is not required because most of the seed stores will be functional in 1978, and a documentation specialist is not required before 1979.

The proposed allocation of $760,000 for Southwest Asia for the 1979-80 biennium represents an increase from the level of $288,000 currently expected to be spent in 1978 to $380,000 for each of the years 1979 and 1980. This increase is primarily for expanded support to national programmes. It will pay for the continuation of the Board's technical experts in the field, provide funds for fellowships for scientists of the region to receive post-graduate training abroad, support some local training, and enable the Board to provide other help for collection, conservation and evaluation efforts, as may prove necessary. Although the project is to be operated by FAO, the IBPGR Secretariat will closely follow developments in order to ensure that the Board is able to support as fully as possible the development in the region.

The Board recognizes that support to the Southwest Asia region is critical and time is fast running out. This accounts for the high level of funding proposed. The Board hopes and expects that formal approval of all governments for the project will be received shortly.

The Board will continue to follow the development of ICARDA, which has research responsibility for certain of the Board's priority crops in parts of the Southwest Asia region. Contacts will also be sought with the proposed Genetic Resources Section of the Arab Centre for the Studies of Arid Zones and Dry Lands at Douma in Syria, to see whether collaborative efforts can be developed.

2.3 South Asia: As stated above, a regional programme in South Asia has yet to develop but, following the meeting to be convened in India in 1978 to formulate proposals for cooperative action, the Board anticipates the need to support activities in Bangladesh, Bhutan, Burma, Nepal and Sri Lanka as well as the need to work closely with the Indian National Bureau of Plant Genetic Resources. However, the IBPGR does not envisage a rapid growth of activities in this region at least before 1980-81. Thus, only modest budgetary provision -- $40,000 for 1979 and $80,000 for 1980 -- has been made for this region.

2.4 Southeast Asia: The countries of Southeast Asia (Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand) have moved faster than those of any other region in developing a specific plan of action for their genetic resources activities. Late in 1976, technical experts from these countries, with help and encouragement from the Board, agreed on a plan of action for the region and on organizational arrangements to implement the plan.

The governments of the participating countries have all appointed representatives to a regional committee, which will meet in July, 1978. They will be assisted by a regional genetic resources officer appointed by the IBPGR and stationed, since early 1978, at FAO regional headquarters in Bangkok. Support is being given in 1978 to exploration and collection as part of the activities of national programmes; indeed, the Board has increased its 1978 budgetary allocation for Southeast Asia from $140,000 to $162,000, primarily to finance expanded field activities. The priorities for action relate to the following crops: rice, durian, rambutan, soyabean, coconut, mango, banana and indigenous vegetables, especially winged bean and *Vigna* sp. However, this does not exclude action on other indigenous species which will be undertaken by national programmes.

The Board believes that some further modest increases in support of regional activities in Southeast Asia will be necessary in the 1979-80 biennium. Accordingly, budgetary provision of $175,000 has been made for 1979 and $185,000 for 1980. A further slight increase to $200,000 is projected for each of the years 1981 and 1982. These projected increases assume that other countries of the region, such as Viet Nam, Democratic Kampuchea and Lao, will join in the regional effort.

2.5 Western Africa: Collections in Western Africa, especially of sorghum and millets, have been supported by the IBPGR since 1976 and further collections of these two important crops will need to be financed in the 1979-80 biennium. In addition, the work of the Germplasm Collection Unit of IITA has begun, with emphasis on grain legumes, roots and tubers, and *glaberrima* rice and its associated wild species. The Board has allocated $50,000 in its 1978 budget for such regional activities, as well as for emerging national programmes in the countries of Western Africa. Because these national programmes are likely to be slow to emerge, the Board proposes that the allocation for Western Africa in 1979 should be at the same level as in 1978, with a modest increase to $60,000 in 1980. Requirements are projected to increase to a level of $80,000 in each of the years 1981 and 1982.

2.6 Eastern Africa: In 1977 the Board supported, along with UNEP, the collection of sorghum and millets in the Sudan, and this work is being continued in 1978. In the forthcoming biennium, it is expected that these crops will be collected in other Eastern African countries as well, as part of their national programmes. The budget provision of $115,000 which the Board has allocated for Eastern Africa for the 1979-80 biennium is primarily to support such national programmes.

2.7 Europe: The Board has followed with interest, and endorsed, the initiative taken by EUCARPIA (European Association for Research on Plant Breeding) to encourage a European Cooperative Programme for the exchange of genetic resources material and of information about it which is now being developed and financed (for a take-off period) by UNDP with FAO as Executing Agency. FAO exercised this responsibility from the Crop Ecology and Genetic Resources Unit which also provides the Secretariat for IBPGR. By this means the Board is kept in touch with the development of the European programme and can help to ensure that the work in Europe is properly linked with the global network of genetic resources centres. The European programme has the added significance that it embraces countries from the USSR to Ireland and from Scandinavia to the Mediterranean so that its success is essential to the development of genetic resources work on a world-wide scale.

2.8 Latin America: The Genetic Resources Centre funded by the Federal Republic of Germany, became fully operational in 1977 at the Centro Agronomico Tropical de Investigación y Enseñanza (CATIE) in Turrialba, Costa Rica. The IBPGR has stimulated collecting expeditions in South America; for small grains and tubers in the Andean region, for groundnuts in Brazil, Paraguay and Argentina, for maize and *Phaseolus* in Peru, and for maize and potatoes in Argentina. The Board has also provided financial assistance for storage facilities at CIAT; Puno and Cuzco, and for maize at La Molina, Peru. These activities are paving the way for cooperative action within the region which is expected to increase in 1979 and 1980.

The regions itemized above along with the development of active links with Australia, proposed exploration in the Pacific and other activities means that all the regions of the earth are associated with the work of the Board.

## 3. Other Exploration and Collection Activities

This item includes exploration and collection activities not included under regional activities (item 2 above).

The Board has always regarded support for collecting activities as one of its primary responsibilities. In formulating its 1977 budget, the Board under-estimated the extent to which collection activities were accelerating and accordingly had to revise upward the original budgetary allocation. In the event, even the revised amount was overspent by approximately $23,000. The increase served primarily to finance additional collections recommended by the IBPGR Crop Advisory Committees.

For 1978, collection work in the Mediterranean, Southwest Asia, Southeast Asia, Western Africa, Eastern Africa and the Andean zone regions is provided for under budget item 2 ('Regional activities'), but $200,000 is provided for under budget item 3 to support collection activities in other parts of the world.

For the 1979-80 biennium, it is proposed that $475,000 ($225,000 for 1979 and $250,000 for 1980) be allocated for collecting work not included in regional activities. Taken together with the increases in item 2, this will allow collection of priority crops in many different parts of the world to proceed at an accelerated pace.

4. Forest Genetic Resources

In 1976 the IBPGR considered the need for action in connection with forest genetic resources. In addition to food trees (e.g. fruits, and nuts) which clearly fall within its remit, the Board was of the view that support should be given to the conservation of other species of trees which are of importance in agricultural development, such as those useful for fuel for cooking and those used for environmental stabilization. At its fourth meeting in February 1977, the Board agreed that support should be given to these areas of forest genetic resources but that it should remain limited to $50,000-$100,000 per annum. It requested the FAO Forest Resources Division, in consultation with the FAO Panel of Experts on Forest Genetic Resources, to formulate a specific proposal for Board consideration.

In the light of the Board's guidelines, the Panel recommended that *Eucalyptus microtheca, E. camaldulensis* and several species of *Acacia* and *Prosopis* should be given priority. For most of these species it has not yet been possible to explore the ecological or genetic variation within their natural range, nor to carry out comparative testing to identify promising provenances for given sites. Therefore, the operations to be carried out must include exploration, collection and evaluation as well as, and in most cases preceding, conservation and utilization.

The Board proposes to fund in 1979 in-depth reconnaissance surveys in Africa, Asia and Latin America. These surveys are necessary to prepare a realistic programme of work based on the needs and possibilities for exploration and conservation of these three continents and to identify, and secure support and cooperation from, suitable local institutes to undertake the work.

The surveys would form the first phase of a forest genetic resources project, for which a budget allocation of $55,640 is required in 1979.

After the surveys have been completed and their findings evaluated, the Board will decide what, if any, support it should provide in 1980 or subsequent years for the programme of work which is expected to be prepared. Since there is no way of judging at this time what the Board's decision is likely to be, the Board has been unwilling to make budgetary provision now for a second phase of this project in 1980, or to project expenditures for such a second phase in 1981 or 1982. Nonetheless, the Board, after considering the results of the reconnaissance missions, may well decide to propose, a year or so hence, funding for an operational phase of this forestry project, which might include exploration and collection, distribution of provenance seed collections and coordinating the activities of the cooperating local institutes. Moreover, if such a second phase is approved, technical assistance will also need to be extended to participating countries on the establishment and management of provenance trials, and action plans will need to be elaborated for the establishment of *in situ* and *ex situ* conservation/selection stands. There is no present intention, however, of changing the ceiling of $100,000 per annum for forestry projects imposed in 1977.

## 5. Conservation

The Board has surveyed the availability and adequacy of seed storage facilities for long-term conservation at genetic resources centres in different regions. It is important that adequate seed stores be available at centres near where the seed is collected, because they are best suited for evaluation and for the necessary periodic regeneration and increase of seed stocks. On the other hand, long-term storage of duplicate samples of material can be undertaken satisfactorily far from the original sources of the material. Bearing these two points in mind, the Board, with the advice of its Crop Advisory Committees, has started to designate various centres, with their approval, as responsible for maintaining the major base collections of specific important crops, within the IBPGR global network. Such responsibility has already been assigned for the following crops: chickpeas, cowpeas, groundnuts, maize, millets, oats, *Phaseolus* beans, pigeon peas, rice, sorghum and wheat.

Following agreement on standards for seed storage and on the engineering, design and cost aspects of long-term seed storage facilities, the Board intends to continue to encourage the upgrading of storage facilities where necessary.

Costs for seed storage equipment have escalated in the past two years and the Board has therefore included budgetary provision of $250,000 for the development and improvement of storage facilities during the 1979-80 biennium, as compared with a total of $180,000 spent or provided for in 1977-78. (See item 5.1 in Table III.)

However, seed storage is far from the full answer to maintenance and conservation of genetic stocks. Many crops must be maintained as living collections in plantations or short-term stores of roots and tubers. This is because such plants produce what are called 'recalcitrant' seeds which do not survive drying and the freezing temperatures which are standard for the storage of 'orthodox' seeds. In tropical areas, such species present problems which have not yet been solved. Moreover, the longevity of different orthodox seeds in cold stores remains uncertain. Hence, the Board proposes to continue to support the investigations on seed physiology being carried out for it under the supervision of

Professor E.H. Roberts of Reading University, U.K., one of the world's leading experts in seed physiology. These investigations should enable the Board to determine whether better methods of conservation can be recommended to gene bank managers.

In 1977-80 the Board also proposes to support collections of crop plants which must be maintained in plantations or grown out as vegetative material. A number of the Board's priority crops are of this type and centres, particularly in the tropics, are presently faced with the cost of preserving stocks in this way. This method of conserving material is an interim measure until better and safer methods of conservation have been perfected. In 1977-78 the Board considered coconuts and bananas and foresees the need to make adequate provision for regional collections. For this reason a total of $150,000 is budgeted for 1979-80. The Board is likely to turn its attention, in this period, to other important vegetative crops - already it is planned to convene in 1979 a working group on coffee.

## 6. Crop Advisory Committees and Working Groups

As already noted, the Board has organized five Crop Advisory Committees, in co-operation (except for wheat) with the appropriate International Agricultural Research Centre. They consist of a Rice Committee, co-sponsored by IRRI; a Maize Committee, co-sponsored by CIMMYT; a Sorghum and Millets Committee, co-sponsored by ICRISAT; a *Phaseolus* beans Committee, co-sponsored by CIAT; and a Wheat Committee, the organization of which was undertaken by the Board's Secretariat. Each of these Crop Advisory Committees held its first meeting in 1976, some have already had a second meeting, and all will meet again as necessary. These Crop Committees are an invaluable aid to the Board in obtaining the views of the scientific community working on each of the major crops concerning the priorities for action to collect, conserve and make available for use the genetic diversity of these crops.

In addition to the Crop Advisory Committees, the Board has established Working Groups, as necessary, to advise it on other specific crops. Coconuts were reported on in 1976 and 1978, bananas and plantains in 1977 and a Working Group on forage plants in South America will meet in 1978. It is proposed that a Working Group on coffee be organized in 1979. Moreover, the Board has also found it necessary from time to time to convene meetings of experts to agree on descriptors for particular crops.

In the proposed budget for the 1979-80 biennium, provision has been made for the allocation of $55,000 per year to support continuation of this work, so that the Board may be advised by the communities of breeders with respect to the action needed on specific crops. The same level of expenditure is projected for 1981 and 1982 for activities of this type and for the commissioning of special studies.

Item 6 of the proposed budget also includes provision of $30,000 for a Technical Conference to be organized by the IBPGR, in association with FAO, in 1980. This proposed Conference would follow on similar Technical Conferences held by FAO in 1967 and 1973, to which all governments were invited to send representatives. The IBPGR has not considered the proposal for a 1980 Technical Conference in any detail, but expects to do so during the course of 1978 or early 1979, and will report the result in its mid-term presentation next year. In the meantime, the $30,000 item in the biennial budget, which is scheduled for expenditure only in 1980, should be treated as provisional.

7. Training

The 1979-80 budget proposes to continue support to the University of Birmingham to pay for the additional staff necessary to expand the University's International Training Course in Conservation and Utilisation of Plant Genetic Resources, so as to allow more nationals of developing countries to attend than would otherwise be able to do so. Support is expected to be at the level of $30,000 in 1979 and $35,000 in 1980.

In 1978, an additional $25,000 is being used to finance short practical training courses. The Board proposes to increase such support during the biennium 1979-80 to a level of $50,000 in 1979 and $75,000 in 1980, and to continue support at the $75,000 per annum level in 1981 and 1982. The 1978 courses will be on collecting techniques for tropical crops and on seed technology for gene bank workers, the latter in collaboration with the University of Edinburgh, U.K. The funds budgeted for regional activities in the Mediterranean, Southwest Asia and Southeast Asia regions include funds to pay for post-graduate training for a few scientists from those regions and to support short technical courses. A short course on collecting techniques was organized for the Southeast Asia region in 1977 and this will be repeated in 1978.

As already noted, some provision for training is also included in the total sum budgeted for the IS/GR Program.

8. General Administration and Other

As far as possible, the Board wishes to see its budget allocated to pay for field activities rather than administration. Thus, the item for general administration accounts for only about 12% of the Board's 1978 budget. In 1979, only 11.3% is proposed for this item, and in 1980 only 10.1%. In the projections for 1981 and 1982 this item remains at about 10%.

The funds allocated are for the following purposes:

Board Meetings and Missions (items 8.1 and 8.2 in Table III): The 1978 approved budget includes an item of $95,000 to cover meetings of the Board and of its Executive Committee, and specific assignments undertaken by the Chairman and members of the Board. It should be noted in connection with this item that, in contrast to the IARC's, members of the board of IBPGR undertake extensive executive functions because IBPGR has only a skeleton scientific staff. Modest increases of $5,000 per annum are estimated for specific assignments in the years 1979-81 in order for the work to keep pace with the growing network.

Publications (item 8.3, Table III): Provision of $20,000 per annum has been made in the budget for 1979-80 and in the projections for 1981 and 1982 to cover the cost of normal Board publications and any forthcoming as a result of the work of the Crop Committees and Advisory Groups.

Secretariat (items 8.4 - 8.6, Table III): The Secretariat expenses are estimated to include the cost of three secretaries necessary for the work of the Secretariat. Although in earlier years the professional members of the Secretariat were provided by FAO, the increased work of the Board necessitated provision for an additional professional staff member in 1978 to be financed from the Board's own budget. A slight increase in Secretariat travel is also required to enable the staff to discharge its functions of investigating all proposals to the Board and of supervising projects funded by the Board. The proposed budget for the biennium provides a total of $309,000 for Secretariat expenses, an average of $154,500 per year, as compared with $130,000 for 1978.

Quinquennial Review: In accordance with CG procedure, the IBPGR is due for review in 1979, and initial steps have been taken by TAC to discuss the mechanism for this. The review will, of necessity, differ from those of the IARC's. TAC and the Board have agreed that it can be carried out by a three-man team, aided by consultants. The team is expected to meet with the Executive Committee (possibly together with the chairmen of the five Crop Germplasm Advisory Committees), visit the Secretariat, and review important field projects. The cost of the review is estimated to be $35,000 and budgetary provision in this amount is proposed.

Contingency: In 1978 it is estimated that most of the $100,000 contingency item will be used, primarily to finance field work. Despite the Board's expanded programme for 1979-80, the contingency item has been set at the same level in the proposed 1979-80 budget and in the projections for 1981 and 1982. This is believed to be a reasonable minimum in view of the Board's continuing need for flexibility and to seize opportunities which arise.

Provision for Future Price Changes: A provision of 10% per year has been included in the proposed biennial budget for 1979-80 to cover future price changes. No comparable provision has been included in the projections for 1981 and 1982 because the Board has no basis whatsoever for estimating at this time the extent to which prices may increase in 1981 and 1982.

Capital Expenditures: The Board does not have any separate item in its budget for capital expenditures since, unlike the IARC's, the Board has no buildings or other capital facilities of its own. Moreover, the Board has not financed the construction of capital facilities and is unlikely to do so unless, under exceptional circumstances, some limited amount of such financing should prove to be necessary for seed storage in a developing country. On the other hand, a number of the Board's grants for exploration, conservation and other genetic resources activities have contained and will continue to contain modest amounts for equipment, such as vehicles and refrigeration equipment, where necessary to carry out programmes approved by the Board. It is estimated that about 8-10% of the proposed budget for 1979-80 will be used for this purpose, and that expenditures for equipment will stabilize at about this level.

TABLE I

1979-1980 BUDGET

SUMMARY OF COSTS BY PROGRAMME ACTIVITY 1976-1982
(US$ thousands)

| | Actual 1976 | Actual 1977 | Approved Budget 1978 |
|---|---|---|---|
| 1. Information and documentation activities | 412 | 412 | 471 |
| 2. Regional activities | 103 | 185 | 620 |
| 3. Other activities | 79 | 220 | 200 |
| 4. Forest genetic resources | - | - | - |
| 5. Conservation | 32 | 131 | 122 |
| 6. Crop Advisory Committees, Working Groups, studies, etc. | 39 | 64 | 55 |
| 7. Training | 54 | 68 | 55 |
| 8. General administration | 156 | 166 | 240 |
| 9. All other: | | | |
| - Plant health | 10 | - | - |
| - *Arachis* information service | 29 | 12 | - |
| - Quinquennial review | - | - | - |
| - Contingency | | | 100 |
| - Provision for price changes in 1978 | | | 106 |
| 10. TOTAL CORE BUDGET IN 1978 DOLLAR TERMS | 915 | 1,258 | 1,969 |
| 11. Provision for Price Changes In 1979 In 1980 | | | |
| 12. GRAND TOTAL | 915 | 1,258 | 1,969 |
| Categories of expense: | | | |
| - Personnel services | 70 | 118 | 269 |
| - Contracts with others | 659 | 958 | 1,159 |
| - Equipment, Supplies and Materials | 21 | 25 | 45 |
| - Travel | 152 | 138 | 250 |
| - General operating expenses (including project servicing costs) | 13 | 19 | 40 |
| - Contingency | | | 100 |
| - Provision for Price Changes in 1978 | | | 106 |
| Total in 1978 Dollar Terms | 915 | 1,258 | 1,969 |
| - Provision for price changes in 1979-80 | | | |
| GRAND TOTAL | 915 | 1,258 | 1,969 |

1/ An additional budgetary provision may have to be requested at mid-term following the results of the exploratory phase.
2/ To be estimated after the results of the exploratory phase in 1979 are known but unlikely to exceed $100,000 in any one year.
3/ Plus provision for price changes in 1981.
4/ Plus provision for price changes in both 1981 and 1982.

| Current Estimate 1978 | Proposed Budget 1979 | 1980 | TOTAL | Projections 1981 | 1982 |
|---|---|---|---|---|---|
| 501 | 511 | 511 | 1,022 | 511 | 511 |
| 681 | 930 | 1,080 | 2,010 | 1,180 | 1,180 |
| 200 | 225 | 250 | 475 | 275 | 275 |
| - | 56 | 1/ | 56 | 2/ | 2/ |
| 122 | 220 | 295 | 515 | 275 | 250 |
| 65 | 55 | 85 | 140 | 55 | 55 |
| 55 | 80 | 110 | 190 | 115 | 115 |
| 240 | 277 | 287 | 564 | 297 | 297 |
| - | - | - | - | - | - |
| - | - | - | - | - | - |
| - | 35 | - | 35 | - | - |
| 68 | 100 | 100 | 200 | 100 | 100 |
| 76 | | | | | |
| 2,008 | 2,489 | 2,718 | 5,207 | 2,808 | 2,785 |
| | 249 | 249 | 498 | 249 | 249 |
| | | 272 | 272 | 272 | 272 |
| 2,008 | 2,738 | 3,239 | 5,977 | 3,329[3/] | 3,304[4/] |
| 350 | 450 | 430 | 880 | 430 | 430 |
| 1,159 | 1,524 | 1,773 | 3,297 | 1,864 | 1,838 |
| 45 | 65 | 65 | 130 | 65 | 65 |
| 250 | 280 | 280 | 560 | 280 | 280 |
| 60 | 70 | 70 | 140 | 70 | 70 |
| 68 | 100 | 100 | 200 | 100 | 100 |
| 76 | | | | | |
| 2,008 | 2,489 | 2,718 | 5,207 | 2,809 | 2,783 |
| | 248 | 521 | 770 | 521 | 521 |
| 2,008 | 2,738 | 3,239 | 5,977 | 3,330[3/] | 3,304[4/] |

TABLE II

1979-1980 BUDGET

SUMMARY OF SOURCES AND APPLICATION OF FUNDS
(US$ thousands)

| | Actual 1976 | Actual 1977 | Approved Budget 1978 |
|---|---|---|---|
| SOURCE OF FUNDS | | | |
| 1. Core operations | | | |
| a. Unrestricted: | | | |
| - Australia | | | 80 |
| - Belgium | 0 | 55 2/ | 60 |
| - Canada | 103 | 95 | 140 |
| - Germany | 39 | 47 | 145 |
| - Netherlands | 125 | 100 | 100 |
| - Norway | 75 | 94 | 120 |
| - Saudi Arabia | 10 | 10 | - |
| - Sweden | 95 | 92 | 310 |
| - UK | 53 | 52 | 190 |
| - UNEP | 100 1/ | 200 2/ | 75 |
| - USA | 80 1/ | 400 | 460 |
| - World Bank | - | - | 185 |
| - Unidentified sources | - | - | - |
| - Unexpended balance from previous year | 185 | -48 | - |
| - Earned income applied in year | 2 | 14 | 11 |
| sub-total | 867 | 1,111 | 1,876 |
| b. Restricted: | | | |
| - Sweden | - | 229 | - |
| - Unexpended balance from previous year | - | - | 50 |
| - Less: Earned income from Restricted Grants applied to core unrestricted above 4/ | - | - | - |
| sub-total | | 229 | 50 |
| c. Total core operating funds | 867 | 1,340 | 1,926 |
| 2. Capital | - | - | - |
| 3. Special projects | - | - | - |
| 4. TOTAL FUNDS | 867 | 1,340 | 1,926 |

1/ Refer to 1975 pledges
2/ Refers to 1976 pledges
3/ Including 1977 pledge or part of it
4/ Interest included under 'Unrestricted' above
5/ Plus provision for price changes in 1981
6/ Plus provision for price changes in both 1981 and 1982

| Current Estimate 1978 | Proposed Budget 1979 | Proposed Budget 1980 | TOTAL | Projections 1981 | Projections 1982 |
|---|---|---|---|---|---|
| 80 | | | | | |
| 110[3/] | | | | | |
| 140 | | | | | |
| 145 | | | | | |
| 100 | | | | | |
| 120 | | | | | |
| – | | | | | |
| 310 | | | | | |
| 215[3/] | | | | | |
| 75 | | | | | |
| 460 | | | | | |
| 185 | | | | | |
| – | 2,720 | 3,219 | 6,939 | 3,310[5/] | 3.322[6/] |
| -99 | 0 | 0 | 0 | 0 | 0 |
| 15 | 18 | 20 | 38 | 20 | 18 |
| 1,856 | 2,738 | 3,239 | 5,977 | 3,330 | 3,304 |
| – | – | – | – | – | – |
| 179 | 0 | – | – | – | – |
| – | – | – | – | – | – |
| 179 | 0 | – | – | – | – |
| 2,035 | 2,738 | 3,239 | 5,977 | 3,330[5/] | 3,304[6/] |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| 2,035 | 2,738 | 3,239 | 5,977 | 3,330[5/] | 3,304[6/] |

TABLE II (Continued)

| | Actual 1976 | Actual 1977 | Approved Budget 1978 |
|---|---|---|---|
| APPLICATION OF FUNDS | | | |
| a. Core operations | 915 | 1,258 | 1,969 |
| b. Capital | - | - | - |
| c. Special projects | - | - | - |
| d. Unexpended balances: | | | |
| - Unrestricted core | (-48) | -99 | - |
| - Restricted core | - | 179 | |
| - Capital | - | - | - |
| - Working funds | - | - | - |
| - Special projects | - | - | - |
| - Total | (-48) | 80 | - |
| e. TOTAL APPLICATIONS | 867 | 1,338 | 1,969 |
| MEMO: | | | |
| Total core operating funds required | 915 | 1,258 | 1,969 |
| Less: Unexpended balances from previous year | (185) | (-48) | 50 |
| Less: Earned income applied from current year (excluding earned income included in core restricted grants) | (2) | 14 | 11 |
| Net core operating funds required from CG donors | 728 | 1,292 | 1,908 |

1/ Plus provision for price changes in 1981

2/ Plus provision for price changes in both 1981 and 1982

| Current Estimate 1978 | Proposed Budget 1979 | 1980 | TOTAL | Projections 1981 | 1982 |
|---|---|---|---|---|---|
| 2,008 | 2,738 | 3,239 | 5,977 | 3,330 1/ | 3,304 2/ |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| – | – | – | – | – | – |
| 2,008 | 2,738 | 3,239 | 5,977 | 3,330 1/ | 3,304 2/ |
| 2,008 | 2,738 | 3,239 | 5,977 | 3,330 1/ | 3,304 2/ |
| 80 | 0 | 0 | 0 | 0 | 0 |
| 15 | 18 | 20 | 38 | 20 | 18 |
| 1,913 | 2,720 | 3,219 | 5,939 | 3,310 1/ | 3,286 2/ |

TABLE III

BREAKDOWN OF COSTS BY ITEMS

1977 - 1982

1977 EXPENDITURE, CHANGES WITHIN THE 1978 BUDGET, BUDGET PROPOSALS FOR 1979 AND 1980 AND PROJECTIONS FOR 1981 AND 1982

| Activities | Actual 1977 | Approved Budget 1978 |
|---|---|---|
| 1. Information and documentation activities 1/ | | |
| 1.1 Contractual services with the University of Colorado (IS/GR) | | |
| - Data services | | |
| - Development and Information Management System | | |
| - Education and training | | |
| - Planning and programme development | | |
| sub-total | 400,000 | 450,000 |
| 1.2 Advisory Committee | 11,718 | 11,500 |
| 1.3 Other documentation activities | - | 10,000 |
| 1. TOTAL | 411,718 | 471,500 |
| 2. Regional activities 2/ | | |
| 2.1 Mediterranean | | |
| - Support to national activities and exploration missions | 65,553 | 30,000 |
| - Training | 6,031 | 20,000 |
| - Storage | 1,227 | 50,000 |
| - Data services | 2,550 | 5,000 |
| - Travel and meetings | - | 15,000 |
| sub-total | 75,361 | 120,000 |

1/ Should it turn out that the Board may need to promote preliminary evaluation the figures for future years may have to be revised

2/ Regional activities include some provision within regions for seed stores. Other provision is made under Item 5. Similarly training in the regions is identified in 2.1, 2.2 and 2.4, but the Board's support to training includes a sub-item of 1.1 and Item 7.

| Current Estimate 1978 | Proposed Budget 1979 | 1980 | TOTAL | Projections 1981 | 1982 |
|---|---|---|---|---|---|
| 167,300 | | | | | |
| 166,600 | | | | | |
| 65,300 | | | | | |
| 80,750 | | | | | |
| 479,950 | 500,000 | 500,000 | 1,000,000 | 500,000 | 500,000 |
| 11,500 | 11,500 | 11,500 | 23,000 | 11,500 | 11,500 |
| 10,000 | - | - | - | - | - |
| 501,450 | 511,500 | 511,500 | 1,023,000 | 511,500 | 511,500 |
| 50,000 | 70,000 | 80,000 | 150,000 | | |
| 10,000 | 30,000 | 30,000 | 60,000 | | |
| 45,000 | 50,000 | 50,000 | 100,000 | | |
| 5,000 | 5,000 | 10,000 | 15,000 | | |
| 10,000 | 10,000 | 20,000 | 30,000 | | |
| 120,000 | 165,000 | 190,000 | 355,000 | 200,000 | 200,000 |

TABLE III (Continued)

| Activities | Expenditure 1977 | Approved Budget 1978 |
| --- | --- | --- |
| 2.2 Southwest Asia | | |
| - Support to national programmes | 8,126 | 15,000 |
| - Personnel | 26,496 | 180,000 |
| - Travel | 4,425 | 15,000 |
| - Training | 4,592 | 10,000 |
| - Documentation/Information | - | 5,000 |
| - Project Servicing costs 1/ | 6,109 | 25,000 |
| sub-total | 49,748 | 250,000 |
| 2.3 South Asia | | |
| - Regional Workshop | - | 20,000 |
| - Support to national programmes | 1,004 | - |
| sub-total | 1,004 | 20,000 |
| 2.4 Southeast Asia | | |
| - Support to national programmes | 37,022 | 48,500 |
| - Personnel | 3,000 | 25,000 |
| - Training | 5,000 | 40,000 |
| - Documentation/Information | - | 5,000 |
| - Storage | 10,000 | - |
| - Travel and Committee meeting | 1,229 | 10,500 |
| - Operating expenses | 2,850 | 11,000 |
| sub-total | 59,101 | 140,000 |
| 2.5 Western Africa | | |
| - Support to national programmes and regional activities | | 50,000 |
| 2.6 Eastern Africa | | 20,000 |
| 2.7 Andean zone | | 20,000 |
| 2.8 Latin America | | - |
| 2.9 Far East/Pacific Islands | | - |
| 2. TOTAL | 185,214 | 620,000 |

1/ FAO is executing this regional programme on behalf of IBPGR.

2/ The increase in 1978 will be financed out of the carryover from 1977 restricted core funds

3/ The increase to be funded from contingency

| Current Estimate 1978 | Proposed Budget 1979 | Proposed Budget 1980 | TOTAL | Projections 1981 | Projections 1982 |
|---|---|---|---|---|---|
| 58,328 | 96,000 | 118,000 | 214,000 | | |
| 134,800 | 182,000 | 160,000 | 342,000 | | |
| 15,000 | 15,000 | 15,000 | 30,000 | | |
| 40,000 | 40,000 | 40,000 | 80,000 | | |
| 5,000 | 5,000 | 5,000 | 10,000 | | |
| 35,438 | 42,000 | 42,000 | 84,000 | | |
| 288,566[2/] | 380,000 | 380,000 | 760,000 | 380,000 | 380,000 |
| | – | – | – | – | – |
| | 40,000 | 80,000 | 120,000 | 100,000 | 100,000 |
| | 40,000 | 80,000 | 120,000 | 100,000 | 100,000 |
| 60,000 | 75,000 | 75,000 | 150,000 | | |
| 35,500 | 43,500 | 48,500 | 92,000 | | |
| 40,000 | 40,000 | 35,000 | 75,000 | | |
| 5,000 | 5,000 | 5,000 | 10,000 | | |
| – | – | – | – | | |
| 10,500 | 10,500 | 10,500 | 21,000 | | |
| 11,000 | 11,000 | 11,000 | 22,000 | | |
| 162,000[3/] | 175,000 | 185,000 | 360,000 | 200,000 | 200,000 |
| | 50,000 | 60,000 | 110,000 | 80,000 | 80,000 |
| | 50,000 | 65,000 | 115,000 | 80,000 | 80,000 |
| | 30,000 | 40,000 | 70,000 | 60,000 | 60,000 |
| | 20,000 | 60,000 | 80,000 | 60,000 | 60,000 |
| | 20,000 | 20,000 | 40,000 | 20,000 | 20,000 |
| 680,566 | 930,000 | 1,080,000 | 2,010,000 | 1,180,000 | 1,180,000 |

TABLE III (Continued)

| | | Expenditure 1977 | Approved Budget 1978 |
|---|---|---|---|
| 3. | Other activities | | |
| | including collection recommended by Crop Advisory Committees and Working Groups (not included in regional activities) | | |
| 3. | TOTAL | 220,415 | 200,000 |
| 4. | Forest Genetic Resources | - | - |
| 5. | Conservation | | |
| | 5.1 Development and improvement of storage facilities | 108,324 | 72,000 |
| | 5.2 Investigations of seed longevity | 22,500 | 50,000 |
| | 5.3 Support to vegetative collections 2/ | - | - |
| 5. | TOTAL | 130,824 | 122,000 |
| 6. | Crop Advisory Committees, Working Groups and Studies | | |
| | - Rice | 8,100 | 7,000 4/ |
| | - Maize | 16,381 | - |
| | - Wheat | 5,918 | 12,000 |
| | - Sorghum/Millets | 10,440 | 10,500 |
| | - *Phaseolus* | 7,867 | 8,000 |
| | - Coconut | - | - |
| | - Forage plants | - | - |
| | - Coffee | - | - |
| | - Technical Conference 1980 | - | - |
| | - Other | 14,889 | 17,500 |
| 6. | TOTAL | 63,595 | 55,000 |

1/ An additional budgetary provison may have to be requested at mid-term following the results of the exploratory phase.

2/ To be estimated after the results of the exploratory phase in 1979 are known:

3/ It is expected that this item will be broken into regional components and hence this item will later be redistributed under regional activities.

4/ 1977 expenditure.

| Current Estimate 1978 | Proposed Budget 1979 | Proposed Budget 1980 | TOTAL | Projections 1981 | Projections 1982 |
|---|---|---|---|---|---|
| | 225,000 | 250,000 | 475,000 | 275,000 | 275,000 |
| | 55,640 | 1/ | 1/ | 2/ | 2/ |
| | 100,000 3/ | 150,000 | 250,000 | 150,000 | 150,000 |
| | 70,000 | 45,000 | 115,000 | 25,000 | |
| | 50,000 | 100,000 | 150,000 | 100,000 | 100,000 |
| | 220,000 | 295,000 | 515,000 | 275,000 | 250,000 |
| - | - | 7,000 | 7,000 | - | |
| - | 10,000 | - | 10,000 | 10,000 | |
| 12,000 | - | 9,000 | 9,000 | - | |
| 10,500 | 8,500 | - | 8,500 | 10,500 | |
| 8,300 | - | 9,000 | 9,000 | 9,000 | |
| 10,000 | - | - | - | - | |
| 12,200 | 12,500 | - | 12,500 | - | |
| - | 7,000 | - | 7,000 | - | |
| - | - | 30,000 | 30,000 | - | |
| 12,000 | 17,000 | 30,000 | 47,000 | 34,500 | |
| 65,000 | 55,000 | 85,000 | 140,000 | 55,000 | 55,000 |

TABLE III (Continued)

| | Expenditure 1977 | Approved Budget 1978 |
|---|---|---|
| 7. Training | | |
| 7.1 University courses | 25,821 | 30,000 |
| 7.2 Short technical courses 1/ | 22,993 | 25,000 |
| 7.3 Other | 18,777 | |
| 7. TOTAL | 67,591 | 55,000 |
| 8. General administration | | |
| 8.1 Meetings of Board and its Executive Committee | 44,320 | 55,000 |
| 8.2 Specific assignments undertaken by Chairman and Board members | 33,683 | 40,000 |
| 8.3 Publications | 20,433 | 15,000 |
| 8.4 Travel (Secretariat and consultants) | 20,695 | 30,000 |
| 8.5 Personnel (Secretariat) | 30,477 | 80,000 |
| 8.6 Miscellaneous (including duplicating expenses) | 16,576 | 20,000 |
| 8. TOTAL | 166,184 | 240,000 |
| 9. All other | | |
| 9.1 *Arachis* Information Service | 12,464 | |
| 9.2 Quinquennial review | - | - |
| 9.3 Contingency | - | 100,000 |
| 9.4 Provision for price changes in 1978 | - | 105,810 |
| 9. TOTAL | 12,464 | 205,810 |
| 10. TOTAL CORE BUDGET IN 1978 DOLLAR TERMS (Rounded) | 1,258,000 | 1,969,000 |
| 11. Provision for Price Changes | | |
| In 1979 2/ | | |
| In 1980 2/ | | |
| 12. GRAND TOTAL (Rounded) | 1,258,000 | 1,969,000 |

1/ Technical courses not included in regional activities
2/ Proposals include provision for future price changes at 10% per annum in 1979-80.
3/ The additional amount of $39,000 will be funded by a carry-over of 1977 restricted core funds.
4/ Before provision for price changes in 1981.
5/ Before provision for price changes in both 1981 and 1982.

| Current Estimate 1978 | Proposed Budget 1979 | Proposed Budget 1980 | TOTAL | Projections 1981 | Projections 1982 |
|---|---|---|---|---|---|
| | 30,000 | 35,000 | 65,000 | 40,000 | 40,000 |
| | 50,000 | 75,000 | 125,000 | 75,000 | 75,000 |
| | 80,000 | 110,000 | 190,000 | 115,000 | 115,000 |
| | 60,000 | 60,000 | 120,000 | 60,000 | 60,000 |
| | 45,000 | 50,000 | 95,000 | 55,000 | 55,000 |
| | 20,000 | 20,000 | 40,000 | 20,000 | 20,000 |
| | 35,000 | 40,000 | 75,000 | 45,000 | 45,000 |
| | 97,000 | 97,000 | 194,000 | 97,000 | 97,000 |
| | 20,000 | 20,000 | 40,000 | 20,000 | 20,000 |
| | 277,000 | 287,000 | 564,000 | 297,000 | 297,000 |
| | 35,000 | - | 35,000 | - | - |
| 68,000 | 100,000 | 100,000 | 200,000 | 100,000 | 100,000 |
| 75,860 | | | | | |
| 143,860 | 135,000 | 100,000 | 235,000 | 100,000 | 100,000 |
| 2,008,000 | 2,489,000[3/] | 2,718,000 | 5,207,000 | 2,809,000 | 2,783,000 |
| | 249,000 | 249,000 | 498,000 | 249,000 | 249,000 |
| | | 272,000 | 272,000 | 272,000 | 272,000 |
| 2,008,000[3/] | 2,738,000[3/] | 3,239,000 | 5,977,000 | 3,330,000[4/] | 3,304,000[5/] |

the consultative group on international agricultural research
technical advisory committee

G12

1980



# report of
# the tac quinquennial review
# of the
# international board for plant genetic resources
# (IBPGR)

tac secretariat

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

AGD/TAC:IAR/80/2 Rev. 1
Restricted

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Twenty-Fourth Meeting, Lima (Peru) - 1-8 July 1980

# REPORT OF THE

# TAC QUINQUENNIAL REVIEW OF THE

# INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES (IBPGR)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1980

# THE EDINBURGH SCHOOL OF AGRICULTURE

Principal: Professor N. F. ROBERTSON, B.Sc., M.A., Ph.D., Dip. Agric. Sc., F.R.S.E.

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Dr. R.W. Cummings,
Chairman TAC,
c/o TAC/CGIAR Secretariat,
FAO,
Via delle Terme di Caracalla 0100,
Rome.

13 May 1980

Dear Dr. Cummings,

I have pleasure in sending you herewith the report of the Quinquennial Review Panel of the International Board for Plant Genetic Resources.

As you know the TAC Secretariat had some difficulty in assembling the Panel and our deliberations were complicated by the complexity of the responsibilities of the Board. We were sorry to have lost the help of Dr. Blumenschein late in the proceedings, due to his illness. Dr. Åberg and I were most appreciative of the excellent way in which Dr. Zheni addressed himself, at very short notice, to the formidably complicated business before the Panel and of his valuable contributions to its deliberations. I had had, as you know, the good fortune to work with Dr. Åberg on the TAC mission to the Boulder Programme and express here my personal appreciation of his counsel. The whole Panel, and the Chairman especially, would also express very warm appreciation of the excellent services of Mr. Risopoulos of the TAC Secretariat; we owe him a great deal for his very competent help and guidance.

As you know, the IBPGR is a somewhat unusual component of the CG system. It has had to tackle a very wide mandate on a world-wide basis, with but little previous experience to guide it. It is, the Panel thought, greatly to its credit that it has done much of value in its first quinquennium, operating, of necessity in a practical, empirical sort of way. The Panel is in no doubt that TAC should reaffirm its confidence in the Board in its execution of a task that all agree to be of basic importance for the long term future of agriculture. At a more detailed level, as you will see, the Panel makes some suggestions as to ways in which it thinks that the Board might usefully revise its structure and methods of operation; it hopes that these proposals will commend themselves both to TAC and to the Board and, in particular, that the structural analysis and functional accounting that are described in the report will be useful. The Panel lays great stress on the value of the linkage between the IBPGR and FAO.

The frank and lively discussion with TAC during its 23rd meeting on the first draft of the Review report called attention to a few points which deserve a little elaboration here. The comments which follow may be regarded as a supplement or addendum to the report, clarifying some of the points raised by the TAC.

Dr. R.W. Cummings,
Chairman TAC.

13 May 1980.

continued

First, there is the question of the degree of assimilation by the Board of the recommendations of the Boulder Panel. I believe - and explained in the TAC meeting - that this assimilation is, in effect, complete. The Boulder contract has been terminated, expenditure on computerized documentation has declined and the Board, in its current draft programme of work, has shifted its emphasis decisively to the development of descriptor systems and directories and the provision of *ad hoc* professional help to those in need. So far as one can judge, all this accords very well with both the spirit and letter of the review recommendations.

Second, the Panel's proposal concerning the appointment of a Strategy Advisory Committee generated the most discussion. It was pointed out that strategy could be regarded as a prime function of the Board itself so what need was there for such a committee? The point is taken but the Panel thought (and would adhere to the view) that: (a) the Board is beset by the manifold problems of resource allocation and decision-making which inevitably make the first call on the attention of any body, such as this, that has to run a complex and wide ranging operation; (b) scientifically the field is a diverse and changing one and it is hardly to be expected that the Board, impressive as is its range of technical expertise, could fully cover it; (c) such a committee would be advisory, it would have a questioning-provoking-stimulating role and it would in no way detract from the Board's ultimate authority. The Panel remains persuaded that such a Committee - which need not meet frequently - could be genuinely helpful to the Board.

The third point was this; TAC asked for clarification of the IBPGR proposals for extra Regional Officer posts. Drawing together what I said and Dr. Williams later amplified, the justification lies in the vital importance of influence and promotion as, in a sense, the central element in the Board's activities. A continued Board "presence" will be of increasing importance in initiating GRC activities and in sustaining momentum. There is already enough experience of one such officer to show that the right man in a receptive environment can be very valuable. As the work develops, Dr. Williams himself and his senior colleagues, already hard-pressed by much travel, will simply not be able to maintain the essential "presence". But the Panel, of course fully accept the point made in discussion: that a programme precedes a budget - any IBPGR proposals for new posts of this nature must first be argued on their merits in relation to the demands of the programme.

In addition to the points discussed above, I now wish to refer to the summary, presented by Dr. Williams of the views of his Chairman and members of the Executive Committee (but not of the Committee as a body, nor of the Board *per se*). First, I was pleased to note that the report was evidently regarded as being broadly, acceptable. Second, I note that doubts were expressed about the proposed strategy committee; but I think the Panel would wish to adhere to its views (amplified above). Third, the Panel would observe that Working Groups can be made to meet as often or as rarely as necessary and it would, I believe prefer to retain its recommendations despite the doubts about the change of title that had been expressed by some Committee members. Fourth, I was pleased to learn that there are no evident obstacles to the proposed change of title of the Executive Secretary. Fifth, it is good to learn that the "characterization"-"evaluation" distinction is acceptable and the Panel would adhere to the points made in para 4.3.4 that the former is basic to collection information, while the latter is a matter for the plant breeders: the two kinds of information

Dr. R.W. Cummings,
Chairman TAC.

13 May 1980

continued

may occupy the same data base but they need not and often probably should not. We have added a sentence of elaboration on this point in our final report. Sixth, Dr. Williams said that his Executive Committee was satisfied that the Secretariat had adequate financial authority for the work in hand; with the information before it, the Panel, with respect, would disagree and would adhere to its recommendation. Seventh, the statement by Dr. Williams to the effect that the Board has already begun to develop a definite publications policy is satisfactory. Eighth, on research, it appeared that the Board had already appreciated the desirability of moving its selective support progressively toward the problems of perennial crops and so-called "recalcitrant seeds" and this, too, is clearly satisfactory.

I turn now to your own very useful notes on our report. Some of the main points are referred to above; others, of a more editorial nature, have been incorporated in the report as corrections. I would pick out for special reference your observation that the problems of quarantine and the need for an international legal framework for plant exchange might merit reference in the initial list of recommendations. I agree and feel sure that my Panel colleagues will also accept this useful suggestion. The problems are not yet clearly delimited because GRC work has yet to explore clonal crops on any considerable scale and because the idea of international legal commitment is yet only an idea. The Panel foresaw this as one of the several areas in which FAO support would be especially valuable (paras 4.5.4, 5.5.2).

May I conclude by reiterating my best thanks to colleagues on the Panel and to the TAC Secretariat, and my hope that the report will be useful to the Board, to TAC, and to CGIAR.

Yours sincerely,

NWSimmonds

N.W. Simmonds,
Chairman,
IBPGR Quinquennial Review Panel.

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REPORT OF THE

TAC QUINQUENNIAL REVIEW OF THE IBPGR

3 - 8 December 1979

## 1. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

### 1.1 General Conclusions

In general, the IBPGR has fulfilled its remit well, having: generated interest in and awareness of genetic resource conservation in many countries; furthered the cause at the technical level by means of meetings and publications; supported collecting and conservation activities in diverse crops, especially the staple cereals. It has done these things on a comparatively modest budget, building on foundations laid by FAO but without having detailed precedents to guide it in its operations; thus, it has essentially had to find its own way in the first quinquennium. The Board's role is catalytic and must remain so; it can promote, encourage, initiate and help but could not (with any conceivable funding) itself build and sustain the developing genetic resource conservation network. The IBPGR's functions are thus international in the widest possible sense; this being so, the Panel has identified the position of the Secretariat within FAO as a factor of great value, both in the past and for the future.

The IBPGR's achievements in the past quinquennium owe much to the efforts of Board members themselves, to a vigorous Executive Committee and, perhaps above all, to the devoted labours of the Secretariat.

With the benefit of historical hindsight, the Panel thinks it has identified a number of ways in which the Board's activities may be expedited in the coming years. These are set out in Section 5 of this report and summarized briefly below.

### 1.2 Summary of Recommendations

(1) The grand objective of the IBPGR should remain the development of a worldwide genetic resource conservation network devoted to the needs of world agriculture.

(2) CGIAR should reaffirm its interest in and continued support of the work of the Board.

(3) The IBPGR Secretariat should remain within FAO Headquarters and continue the close and fruitful collaboration that has obtained in recent years.

(4) The IBPGR should be encouraged to bring forward proposals for a modest enhancement of programme and consequently of expenditure during the next quinquennium.

(5) The Terms of Reference of the Board should be revised to take account of the experience of the past quinquennium and the contents of this report.

(6) Executive Committee meetings should be reduced in frequency and some of its too numerous responsibilities devolved, as indicated below.

(7) The Board should appoint a small Advisory Committee on Strategy/Programme to maintain a constant review of its programme; this Committee should include independent chairman and members.

(8) Other committees should be re-designated as working groups and invited to meet only when there is specific business to engage them.

(9) There should be no standing information-documentation committee (in contradiction of a recommendation of the Boulder report); necessary advice in this area of work should be had from consultants or appropriate working groups.

(10) The Board and its Strategy/Programme Committee (however entitled) should adopt, and be guided in their deliberations on resource-allocation by, the "functional accounting" proposed in this report.

(11) The post of Executive Secretary should be re-titled "Director"; the incumbent should be a full member of the Board and should have greater executive-financial responsibility.

(12) The Director should be encouraged to bring forward proposals for up to four new Field Officer posts and one Publications Officer when circumstances can be shown to justify the proposals.

(13) On planning and promotion aspects of its activities, the Board should: make a systematic effort to enhance awareness of and practical commitment to genetic resource conservation at government level; support appropriate professional meetings; develop a systematic publications policy; support a markedly enhanced training programme.

(14) In anticipation of foreseeable problems of exchange of plant materials, the Board should explore, in consultation with FAO, the idea of an international legal framework that would secure free access to collections and also the question of quarantine controls in relation to genetic resource conservation work.

(15) On research and action aspects of its activities, the Board should: continue its selective support of research but more towards the problems of perennial crops that are either clonal or have short-lived seeds; continue to support collecting activities on priority crops (and on minor ones when there is specific reason to do so) but be prepared to reduce somewhat its collecting effort in favour of conservation activities; enhance its support of conservation, emphasizing, as it does now, the provision and maintenance of equipment within building provided locally; reduce its commitment to information/documentation work (in line with the main findings of the Boulder report), emphasizing the development of descriptor lists along with the related idea of "characterization".

## 2. INTRODUCTION

### 2.1 Background

2.1.1 This report is addressed to the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR). The Panel notes that CGIAR, an international consortium of governments, banks and foundations, funds the International Agricultural Research Centres (IARCs) and associated institutions, under the technical advice from TAC. The above centres and institutions are subject to quinquennial review by independent panels which report to TAC and so to the CGIAR. Terms of reference are given below; briefly they are to assess the achievements of the first five years of the IBPGR and to make recommendations for future policy.

2.1.2 One area of work of the IBPGR has already been reviewed and will not be the subject of detailed report here. This is the documentation work (IS/GR programme) commissioned by the IBPGR at the University of Colorado at Boulder, Colorado, USA. The TAC Panel which reviewed this work (Prof. E. Åberg, Chairman, Dr. J. Warren, Dr. N.W. Simmonds) visited Boulder in April 1979 and their report (Appendix V) was substantially accepted by the Executive Committee of the IBPGR (Refs 9 and 10) but has yet to be discussed by the Board as a whole.

2.1.3 The Quinquennial Review Panel was finally composed of Prof. N.W. Simmonds (Chairman), Prof. E. Åberg and Dr. M.S. Zehni. The Panel went through several late changes of membership before it was finally constituted. Earlier, it had been hoped that it would be led by Dr. M.S. Swaminathan, who had to withdraw because of his important new functions with the Government of India. Later, Dr. A. Blumenschein unfortunately had to withdraw because of illness and his place was taken, as short notice, by Dr. Zehni. Mr. S.A. Risopoulos, Deputy Executive Secretary, TAC, acted as secretary to the Panel.

## 2.2 Terms of Reference

Terms of reference may, as noted above, be briefly paraphrased by saying that they are to assess the performance of the past five years and to make recommendations for such changes as may be desirable. There follow the terms of reference verbatim:

*"On behalf of the Consultative Group, to assess the content, quality, impact and value of the overall programme of the Board 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 Board itself in planning its programmes and ensuring the validity of its research priorities.*

*In pursuance of the main objective, defined above, the Mission is requested to give particular attention to the following aspects:*

*(i) The mandate of the Board, its appropriateness and the interpretation thereof 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 programme of work and budget of the IBPGR and of its forward plans for the next five years in relation to:*

- *(a) its mandate and the criteria for the allocation of resources as defined by TAC;*
- *(b) the ongoing activities of other international institutes and organizations, and of relevant national institutes in co-operating countries and in others where the work of the Board has bearing;*
- *(c) the policy, strategy and procedures adopted by the Board in carrying out its mandate, and the mechanisms for their formulation;*
- *(d) the Board's rationale for its present allocation of resources, its present and future overall size, and the composition and balance of the programme in the fields of exploration, collection and conservation, training, documentation, information exchange and related cooperative activities.*

(iii) *The content and quality of the scientific and related work of the Board with particular reference to:*

- (a) *the results of past exploration, collection and conservation;*
- (b) *the current and planned work on collection and conservation;*
- (c) *the documentation, information exchange and training programmes, their methodologies and the participation of genetic personnel therein;*
- (d) *the adequacy of the support and other facilities;*
- (e) *the management of the scientific and financial resources of the Board and the coordination of its activities.*

(iv) *The impact and usefulness of the Board's activities in relation to:*

- (a) *the present and potential impact of the exploration, collection and conservation work conducted by the Board;*
- (b) *its information exchange and training programmes;*
- (c) *cooperation with national genetic resources, plant breeding and development programmes;*
- (d) *cooperation with other international institutes and organizations.*

(v) *Constraints on the Board's activities which may be hindering the achievement of its objectives and the implementation of its programmes, and possible means of reducing or eliminating such constraints.*

(vi) *Any specific questions which concerned members of the CGIAR, cooperating institutions, the Chairman or Executive Committee of the Board may request TAC to examine.*

*On the basis of its review, the Mission will report to the Chairman of TAC its findings and its views on the need for any changes in the basic objectives or orientation of the Board's programme elements, and on means of improving the efficiency of operations, and will make proposals for overcoming any constraints identified under item (iv).*

*While the Mission should feel free to make any observations or recommendations it wishes, it must be clearly understood that the Mission cannot commit the sponsoring organization, viz. the CGIAR/TAC."*

To these terms of reference TAC has added the following specific questions:

(i) *What is the long-term future of the Information Science/Genetic Resources programme at Boulder, Colorado and the level of Board investment for its services in the light of:*

*(a) the likelihood or otherwise of continuing validity and use by the IARCs of the EXIR programme for genetic resources and taxonomic data;*

*(b) the rate of issue and acceptance of the programme;*

*(c) the cost to users of the service, once initiated with IBPGR funds;*

*(d) the need for the Board to maintain an Advisory Committee to IS/GR;*

*(e) the requirements for advising and consulting on the use of the system and of continuing research, respectively;*

*(f) the extent to which the programme may perform services for the storage and retrieval of genetic information as compared to its advisory services to other centres in establishing systems for storage and retrieval of genetic data.*

*(ii) A. Are the priorities for collection and other activities, as accepted by the Board, in terms of countries/regions and crops still valid?*

*B. What are, or should be, the responsibilities of the Board with respect to:*

*(a) Forest genetic resources?*

*(b) Genetic resources of industrial crops for which international research and production provision exist e.g. cotton, jute, etc.?*

*(c) Commercial crops for which no such international bodies exist, e.g. oil palm and coconut (cf. Board's preliminary consultations), tea, rubber, cocoa, etc.?*

*(d) Neglected species of known or suspected economic potential, e.g. cereals, roots, pulses, etc. of limited current utility - many medicinals - fibres of restricted use, etc.?*

*(iii) (a) How effective has the Board been in activating/catalyzing national programmes of collection, conservation and other activities rather than the regional centres and programmes originally foreseen in its early Terms of Reference?*

*(b) If the Board is sponsoring, or contemplates sponsoring, regional genetic resources centres, what complementarities exist between these and others sponsored by national or bilateral initiative?*

(c) *If part of the Board's role is to set standards through catalytic activity only, and then re-direct its funds elsewhere, what will be its remaining needs for continuing long-term financing?*

(iv) *What is the Panel's view on the possible long-term role of the IARCs as genetic resources centres?*

(v) *What should be the role of the Board (if any and bearing in mind the sovereign rights of cooperating countries) with respect to the plant quarantine/phytosanitary aspects of international germplasm transfer?*

(vi) *The possible long-term needs of staffing for the Board both at Headquarters and in the field?*

(vii) *Is the present structure, with a permanent Secretariat but no full-time Executive Director, the most satisfactory form of organization of this activity?*

2.3 Operation of Panel

The Secretariats of IBPGR and TAC provided the Panel with extensive documentation during the summer of 1979. Some of it referred to the Board per se and its workings (listed in Section 8 herein); the rest referred to local or regional activities in the field and is enumerated separately in the three regional reports (Appendices I-III). The three regional reports refer to: (i) Southwest Asia and the Mediterranean area (Prof. E. Åberg, Dr. K.S. Dodds and Mr. L.H.J. Ochtman); (ii) Latin America and North America (Dr. W.F. Kugler and Mr. P.J. Mahler); (iii) South and Southeast Asia (Prof. N.W. Simmonds and Mr. S.A. Risopoulos). It will be understood that the three regional reports present facts and opinions as found, so that views expressed there need not necessarily coincide with the collective findings of this Panel. These journeys were of great value, not only for the factual information obtained, but also for the 'feel' that they afforded of genetic resource conservation activities at the working level.

Besides the documentation mentioned above, the Panel also had before it the report of the Boulder Mission (Appendix V) and of a short visit by Prof. N.W. Simmonds to Birmingham University, U.K., to learn about the M.Sc. course in Conservation and Utilization of Plant Genetic Resources (Appendix IV).

The Panel met in FAO, Rome, on 3-8 December 1979, to prepare this paper. It had a valuable collective discussion with the Executive Committee of the IBPGR, namely: Mr. R.H. Demuth (Chairman of the Board), Dr. G. de Bakker

(Vice-Chairman), Dr. O. Brauer, Dr. A.B. Joshi, Prof. L. Kåhre and Ir. W.F. Kugler. In preliminary discussions, the Panel had several talks with the Executive Secretary of the IBPGR (Dr. J.T. Williams) and a collective discussion with the staff of the IBPGR Secretariat.

The Panel had a most useful and instructive exchange of views with the Assistant Director-General of the Agriculture Department, FAO, Dr. D.F.R. Bommer, and met with Dr. O. Brauer and Mr. R. Pichel, Director and Deputy Director of the Plant Production and Protection Division of FAO, and with Mr. R.L. Willan, Senior Officer, Plantation Forest Tree and Gene Resources, Forestry Department, FAO. The Panel had the benefit of the guidance of the TAC Executive Secretary, Mr. P.J. Mahler, and Deputy Executive Secretary, Mr. S.A. Risopoulos.

On the last day the Panel met with the Chairman and Executive Secretary of the IBPGR. The Panel Chairman outlined the main conclusions that had been reached and a very useful discussion ensued.

## 3. THE FUNCTIONS OF THE IBPGR

### 3.1 Historical

The fact of genetic erosion and the consequent need for conservation was becoming apparent to a few perceptive workers from the late 1940s onwards. But it was not until the 1960s that FAO initiatives brought the matter to public consciousness and generated both understanding and a sense of urgency.

Many people contributed, none more so than Sir Otto Frankel, Prof. J.R. Harlan, Prof. J.G. Hawkes and Dr. J. Vallega, sometime Director of the Plant Production and Protection Division of FAO, working through meetings and publications largely sponsored by FAO. The first international meeting on plant exploration and introduction was held in Rome in July 1961. The FAO Panel of Experts on Plant Exploration and Introduction was officially established in 1965 pursuant to a decision of the Governing Bodies of FAO.

Two conferences on crop genetic resources were held in 1967 and 1973 at FAO Headquarters and led to a recommendation that a global network of crop genetic resources centres should be established.

In the sixties FAO published a series of books and reports on genetic resources (some with the assistance of the International Biological Programme), developed a regional project for genetic resources conservation in Southwest Asia with the assistance of UNDP and began to compile inventories of the major collections. A post-graduate training course on Conservation and Utilization of Plant Genetic Resources was inaugurated at the University of Birmingham, U.K., and received its first students in 1969.

A key event of the first decade of international concern for plant genetic resources was the establishment by FAO of a Crop Ecology and Genetic Resources Unit in 1968.

A plan of action to collect, conserve and document genetic resources failed to receive support from UNDP, but FAO's concern for genetic resources preservation was reflected in the recommendations of the United Nations Conference on the Human Environment held in Stockholm in 1972. This Conference gave FAO a responsibility to assist in the establishment of an international resources programme and UNEP (the United Nations Environment Programme) a partial responsibility for plant resources and called for all countries to participate in it.

Under joint sponsorship of FAO, the World Bank and UNDP, CGIAR (with a provision for a Technical Advisory Committee) was formed in 1971 with responsibility for the nascent chain of IARCs. On an invitation from FAO to consider the possibility of establishing a network of genetic resource centres, TAC convened the Beltsville meeting of 1972 under the chairmanship of Sir Otto Frankel. The result was, ultimately, not the network of nine centres that the Working Party proposed but the foundation of the IBPGR as a new component of the CGIAR system. The IBPGR was founded in 1974 and its progress over the quinquennium to 1979 is charted in its annual reports (Refs 2-6).

From its first effective year of operation (1975) it spread the net of its activities fairly widely over the general field of promoting interest and awareness by way of meetings, publications and training: five Crop Advisory Committees and two Working Groups were established, systems of descriptors initiated, training courses and attendance at the M.Sc. course on Conservation and Utilization of Plant Genetic Resources promoted, technical reports and newsletters published; the Board also started what was to become a major commitment to information/documentation systems, drawing in Dr. D. Rogers (then with FAO), and his colleagues at Boulder, Colorado, for the purpose. At the more practical level, since the immediate establishment of a network of centres was plainly infeasible (and would have been premature anyway), the IBPGR concentrated on supporting collecting activities on priority crops, on the encouragement of cooperative regional activities and, where suitable, on the development of regional storage systems (or national ones serving in a regional capacity).

Administratively, the Board was serviced by a small Secretariat (supported in and by FAO) under Mr. R. Pichel (Chief, Crop Ecology and Genetic Resources Unit, Plant Production and Protection Division) and, later, with a Deputy Executive Secretary, Dr. J.T. Williams, in charge of day to day affairs. Subsequently (1978) Dr. Williams became Executive Secretary, with somewhat enhanced staff and responsibilities but the office remains physically in, and substantially supported by, FAO Headquarters.

Over the years, expenditure has grown from 53 k$ (1974) to about 2.8 M$ (prov., 1979), as shown by the summary breakdown in Table 1. Aspects of this table will be examined later and the Panel merely note here that it gives a useful general picture of the rather wide span of activities adopted from the outset, of the rapid growth of the operation as a whole and an indication of priorities as measured by expenditure.

### 3.2 Terms of Reference

The Board's Terms of Reference are given below verbatim and the Panel notes that they can be briefly paraphrased as follows: to do anything, within the limits of available resources, to promote, in a wisely balanced fashion, the conservation of genetic resources of useful plants throughout the world, with special reference to important economic plants.

The following is quoted from ref. (8):

*"The Board will have responsibility, under the authority of the Consultative Group on International Agricultural Research, for recommending policies and developing programmes in close collaboration with and with the help and advice of FAO to meet the following objectives:*

1. *To identify general and specific needs for exploration, collection, conservation and evaluation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities among them, and to ensure to the fullest possible extent that the materials conserved are made available for plant breeding and other scientific activities as required;*
2. *To establish standards, methods and procedures for exploration and evaluation and to determine minimum standards for conservation and regeneration of stocks of both seeds and vegetative material;*
3. *To arrange for replicated storage of seed and vegetative stocks;*
4. *To promote technical meetings;*
5. *To promote training activities at all levels;*
6. *To develop a world-wide network of institutions, organizations and programmes able and willing to contribute to the above objectives;*
7. *To promote the articulation of ongoing programmes so as to avoid unnecessary duplication and to fill in gaps;*

8. *To strengthen the programmes of existing institutions and to encourage the establishment of new organizations, institutions and programmes to the above ends, where necessary, particularly in the areas of major genetic diversity;*

9. *To promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections;*

10. *To make appropriate recommendations with respect to computerized information storage and retrieval systems, taking into account their suitability for an effective international genetic resources network, and their compatibility with existing systems already in operation at some regional and national centres;*

11. *To estimate the annual financial requirements of those parts of genetic resources programmes not already adequately covered.*

*The Board's activities will be confined exclusively to achievements of the foregoing objectives."*

### 3.3 Classification of Functions

The Panel understood that TAC had had some difficulty in following the logical sequence and progress of IBPGR activities, when using the budget breakdown as reflected in Table 1, whereby regional activities (item 2) would in fact include conservation, meetings and training activities, which are also recorded under items 5, 6 and 7. A more logical classification was indeed necessary for the Panel's purpose but none was available. Accordingly, one is presented here (Figures 1 and 2 and Table 2) and is made on the basis of the subsequent analysis (Chapter 4). It will also (para 5.2) form the basis for suggestions as to how the Board might help both itself and TAC by enhancing the clarity of formulation of priorities and of annual reporting.

The Panel believes that the content of Figure 1 and Table 2 will be self-explanatory but recognizes: (a) that the arrowed relationship in the Figures could readily (but not usefully) have been made more complicated; and (b) that the nine functions listed in Table 2, though reasonably discrete, cannot be absolutely so; thus there will sometimes be some doubt as to whether a given Secretariat activity bears on the work of the Board itself or on an outside function or, again, there may be a question as to whether a given publication is designed to inform and influence or to train; but the Panel thinks that such uncertainties will prove to be few and unimportant.

Table 1. Historical Budget Analysis 1/

| Item | Actual, k$ | | | | | Ests. k$ | | Totals 2/ | |
|---|---|---|---|---|---|---|---|---|---|
| | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 74/78 | 79/80 |
| 1. Information | - | 193 | 413 | 412 | 452 | 475 | 336 | 1470 (33) | 811 (16) |
| 2. Regional | - | - | 104 | 185 | 642 | 930 | 1095 | 931 (21) | 2025 (39) |
| 3. Other activities | - | 82 | 79 | 220 | 190 | 200 | 220 | 571 (13) | 420 (8) |
| 4. Forestry | - | - | - | - | - | 56 | (80) 3/ | 0 (0) | (136) 3/ (3) |
| 5. Conservation | - | - | 32 | 130 | 73 | 200 | 265 | 235 (5) | 465 (9) |
| 6. Meetings | - | 45 | 39 | 64 | 60 | 80 | 100 | 208 (5) | 180 (4) |
| 7. Training | - | 22 | 54 | 68 | 61 | 95 | 110 | 205 (5) | 205 (4) |
| 8. Administration | 53 | 143 | 157 | 166 | 237 | 372 | 377 | 756 (17) | 749 (14) |
| 9. Miscellaneous | - | 4 | 39 | 12 | - | 115 (249) 4/ | 100 (521) 4/ | 55 (1) | 215 (4) |
| TOTALS | 53 | 489 | 917 | 1257 | 1715 | 2772 (2523) 5/ | 3124 (2683) 5/ | 4431 - | - 5206 5/ |

Notes: 1/ From Review and Mid-Term Report, 1979 (Refs. (8) - (11)).

2/ With rounded percentages in brackets.

3/ Guesstimates.

4/ Inflation provision, unallocated.

5/ Totals, <u>less</u> inflation provision.

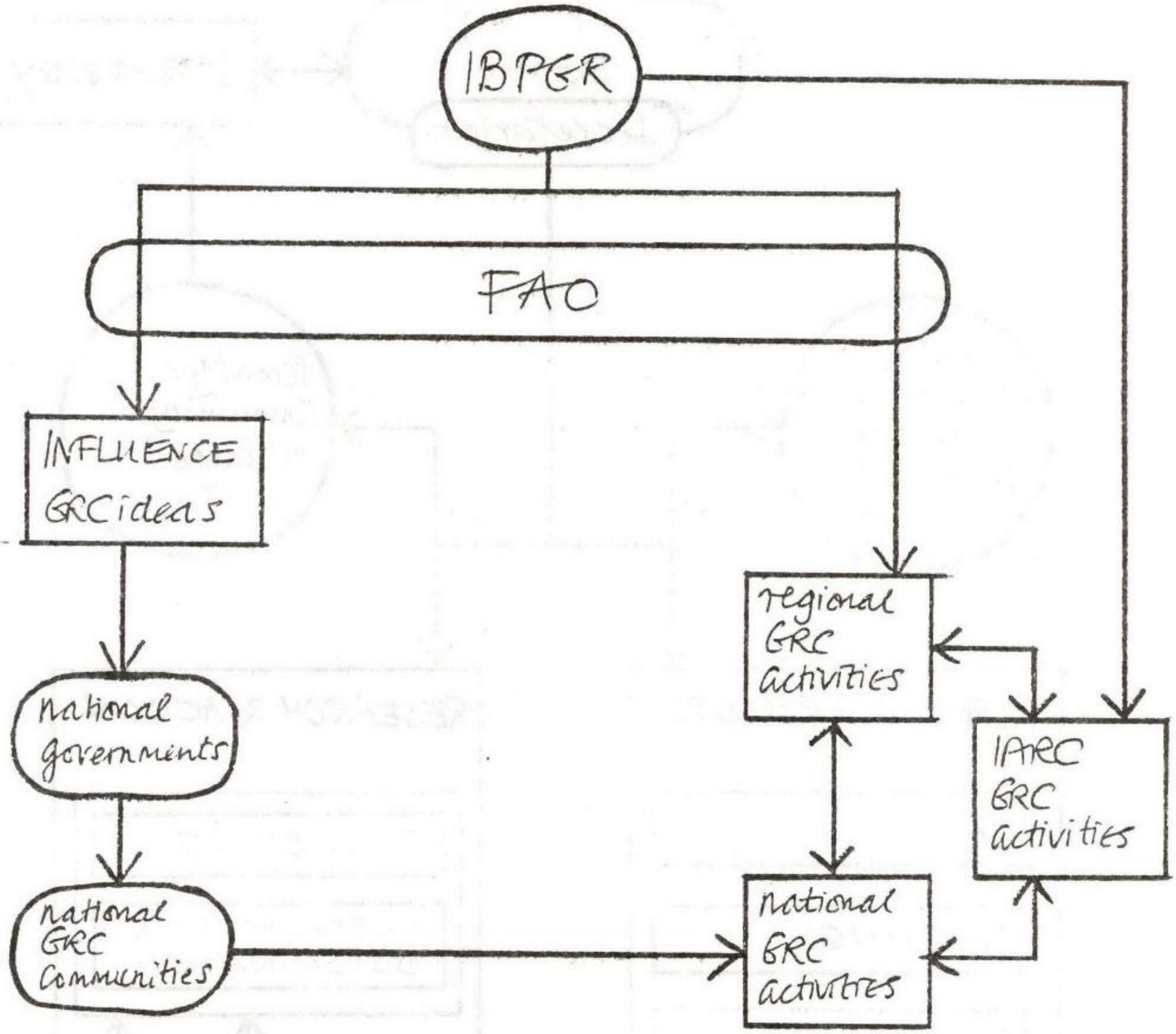


FIGURE 1. Functions of the IBPGR, (1) INFLUENCE
(GRC = genetic resource conservation)

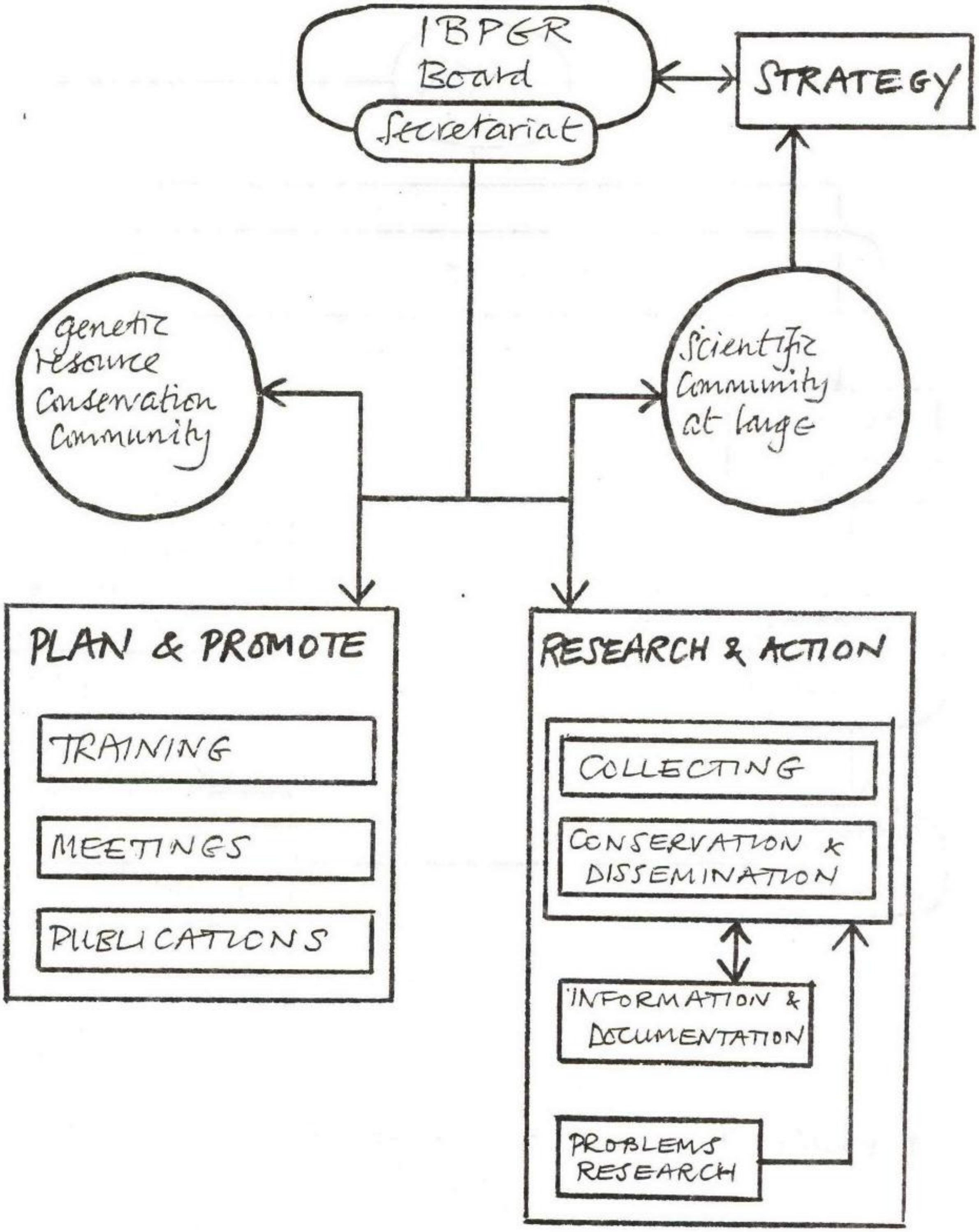


FIGURE 2. Functions of the IBPGR (2).

Table 2. Classification of IBPGR Functions

(Refer to Figures 1 and 2)

| Heading | Item | Observations |
|---|---|---|
| Plan and promote | 1. Influence | Promote GRC concepts at government level, invoke FAO guidance and help in doing so; seek to influence national policies; promote regional and IARC activities. |
| | 2. Meetings | Scientific gatherings; committees and working groups, whether *ad hoc* or recurrent; essentially technical in character (e.g., descriptor lists). |
| | 3. Publications | Designed to inform (technical reports, directories, descriptor lists, etc.); admin. reporting excluded. |
| | 4. Training | Support of long courses (e.g. M.Sc.), short *ad hoc* courses, individual study, wholly or partly funded by Board. |
| Research and action | 5. Research | Grants to support research on technical GRC problems (e.g. storage mechanics, seed physiology, clonal meristems, etc.). |
| | 6. Collecting | Organization and support of and direct participation in collecting expeditions. |
| | 7. Conservation & dissemination | Provision of grants for facilities or staff for maintenance of collections and distribution of materials. |
| | 8. Information & documentation | *Ad hoc* support of research on and implementation of appropriate DSR systems in relation to characterization of collections. |
| Strategy & support | 9. Administration | Board and Committee meetings not directly assignable to the functions above; strategy and programme formulation; routine reporting; Secretariat "housekeeping". |

Abbreviations: GRC = Genetic Resource Conservation
DSR = Data Storage and Retrieval

# 4. SURVEY OF PAST PERFORMANCE

## 4.1 Introduction

### 4.1.1 General

In this section the Panel sets out its thoughts on performance to date, using the classification of functions given above (Table 2) as a logical review framework. It is realized that because of the mainly catalytic role of the Board, useful quantitative measures of performance are not always evident in this chapter. It follows that, in reviewing the past performance of the Board, measurable results will have to be assessed as well as less tangible effects. However, the Panel had had extensive regional travel which had put it in contact with national and regional research institutions, international research centres, high level government officials and scientists. It had also had the benefit of extensive discussions with the IBPGR Executive Committee and Secretariat, with FAO Directors and Technical Officers. This made the dual assessment referred to above, if not easy, at least possible.

### 4.1.2 Preliminary observations

In five years the IBPGR has made good progress on the foundations laid by FAO. It has generated awareness at all levels from governments to workers in the field; has promoted training, collecting, conservation and research; and it has helped to spread the idea that genetic conservation, if it is to be effective, must be truly international in character but built on secure national foundations. In general, it has operated in the only possible way, by what might be called enlightened empiricism, defining priorities to be sure, but putting its money where results could be expected. All this is a substantial achievement which deserves praise. The Panel assumes that the one substantially misplaced effort in relation to documentation work has now been corrected and devotes this chapter to a more detailed review of achievements, reserving recommendations for Chapter 5. As a broad indication of the disposition of resources over crops, areas and activities Table 3 will be found helpful. It refers to 1978 but it may be taken as indicative of the historical patterns of resource allocation.

## 4.2 Plan and Promote

### 4.2.1 Influence

The Panel has come to view influence as a vital function, indeed the most important single function of the Board, because it is only by deep commitment of the institutions concerned that enduring programmes can be developed. The importance of this activity cannot be over-emphasized. The

Board has not the resources to do more than initiate and catalyse. Furthermore, some constraints to the development of collections and the free exchange of materials can only be mitigated at government level: thus, some poor countries with potentially valuable genetic resources (e.g. in Africa and Latin America) feel increasingly unhappy about permitting the export of such resources without a visible quid pro quo; and the emerging problems of international quarantine (especially for clonal materials) have yet to be fully appreciated. Influence, at all levels, but especially at that of government, is therefore, vital.

It would seem that the Board has had some difficulty in finding the proper balance of its activities in this respect. The Beltsville proposals, because they envisaged the immediate establishment of regional centres prior to national interest and commitment were unrealistic and recognized to be so by TAC and IBPGR. So far, the Board has largely approached the matter at the technical level of influencing knowledgeable scientists and civil servants by way of meetings and publications. This has worked very well in Southeast Asia where governments are aware and there is excellent regional commitment; but it has had less success elsewhere (e.g. in Latin America) and some regions are yet essentially untouched (e.g. tropical Africa).

Thus the Board has undoubtedly had some success in this area but the Panel thinks that the time is ripe for a more systematic approach. It was greatly encouraged in this belief by the strong support given to the idea of genetic conservation by weighty speakers and national governments at the 1979 FAO (General) Conference.

### 4.2.2 Meetings

The great majority of the meetings organized by the IBPGR over the years have been of a technical-professional nature and they have undoubtedly done much good in four respects, namely: (1) in promoting awareness of the needs and problems of genetic conservation (though sometimes the preaching must have been to the already converted); (2) in disseminating technical information that was not otherwise readily available; (3) in provoking useful action, such as collecting, storing, assembling descriptor lists etc.; and (4) in making fruitful personal contacts between workers who might otherwise have had little chance to meet. That the genetic resource community of the world really is becoming a community owes not a little to these meetings.

A classification of meetings may be helpful. They are of several kinds: (1) management meetings, with the Board itself meeting annually and its Executive Committee meeting at least three times a year; (2) recurrent meetings of established Advisory Committees devoted to specific crops: there are five of these which meet, on an average, every two years; collectively there have been eleven meetings of this kind; (3) ad hoc working groups designed to assemble advice on crops not covered by the previous Committees; there have been 15 meetings of this kind; (4) ad hoc working groups devoted to specific tasks such as initiating descriptor lists; 10 such working groups met during the last three years; (5) regional meetings, which can be subdivided into meetings of scientists devoted to particular crops, preparatory workshops and full regional committee meetings; twelve such meetings were held; and (6) there were three sessions of the Advisory Committee on Information (shortly the Programme Advisory Committee, PAC) which reviewed the Board's commitment to the Boulder programme until 1978.

Collectively, these meetings have surely been very valuable, both as agents of awareness, planning, information-transmission, and collaboration among genetic conservation workers and as sources of guidance for the Board. There is no doubt that they must continue. The Panel noted, however, that all Committees tend to be self-sustaining and that these, being widely international, are expensive. Meetings should, therefore, it thinks, be held whenever possible, on the basis of perceived need rather than on routine time schedules and recommends accordingly.

4.2.3 Publications

The IBPGR has produced and distributed widely a number of publications (listed in ref. 8) which, like the meetings, are of various nature and address themselves, by and large, to professional workers in the genetic resources field. They are all of a more or less technical nature. They can be classified as follows: annual reports of which four have been produced since the initial report of 1974; descriptor lists, of which seven have been produced; and technical reports which total six; and substantial numbers of mimeographed technical reports for more restricted audiences. In addition, four technical reports have been published in collaboration with other institutions. And the IS/GR programme workers at Boulder were commissioned to produce several brochures on genetic data retrieval. Since 1978, the Secretariat has been producing, in collaboration with FAO, a quarterly Newsletter conveying current information about the GRC field as a whole, including the work of the Board; it is evidently widely appreciated.

The Panel has the impression that the Board has proceeded so far on an ad hoc basis, publishing when there was an evident need to do so, rather than on a systematic programme. The Panel thinks that the time is now ripe for a more definite attack and recommends accordingly. Publications policy is significantly linked with the idea of influence, besides having a more obvious bearing on scientific information (e.g. descriptor lists and directories) and training. So far, documentation aimed at influencing policy makers and raising public awareness has been deficient. The Panel notes the interesting example set by the Indonesian National Biological

Institute (see Appendix III) which has produced attractive public relations and educational materials.

4.2.4 Training

Training has been a significant though not large item of expenditure from 1975 onwards (Table 1). Its importance as an instrument of awareness as well as of technical competence is widely understood in the genetic resource community and the Board's activities in this respect seem to be universally appreciated. The training programme of the IBPGR has had two main aspects: initiation and/or support of short technical training courses with strong emphasis on field activities and support of the M.Sc. course (one year) at Birmingham University, U.K. Among the former, the ones initiated at Bogor, Indonesia, in 1975 by FAO/UNEP/UNESCO are the most prominent (and very successful) examples. Three subsequent ones were held (1977-79), attended by 50 trainees from Southeast Asia. Similarly, a regional training course run at New Delhi in 1979 by the Indian NBPGR in collaboration with the IBPGR (attended by 13 trainees) was evidently also much appreciated (Appendix III). Other such courses supported by the Board are listed in ref. 8.

Courses on GRC information systems have also been encouraged. Thus IBPGR gave support to some of the 41 participants attending short courses at the University of Colorado, Boulder, in 1977 and 1978. A course on Genetic Resources Documentation was held at Los Baños, Philippine Islands, in 1979, with 16 trainees from the Southeast Asian region participating.

Two training courses on seed technology for genebanks assembled 19 trainees at Edinburgh University in 1978 and 1979.

The Birmingham M.Sc. course in genetic conservation which the Board has supported for several years requires separate consideration (Appendix IV). Since 1969 it has trained 133 students, a majority from less developed countries, including seven fellowships supported by IBPGR. The course is unique and no other university offers similar training. All those whom the Panel met who had attended believed they had derived substantial benefit from doing so. Several other commentators thought the course too academic but the Panel notes that there is now (as from 1979) a seed technology component run in collaboration with the School of Agriculture, Edinburgh and that, since 1975, the IBPGR has supported a lecturer in plant breeding. Professor Hawkes will retire in 1982 but the course (very probably need not end then, even if his successor is not so deeply committed to the programme. The Panel noted that the course is unique and generally highly regarded and believes that it offers a valuable element in IBPGR training. So it recommends accordingly.

One practical point about short courses is worth making. They are expensive and it will usually be cheaper to transport a few visiting teachers a long way than a lot of students. The Secretariat, the Panel understands, is well aware of this point but it seems worth making nevertheless.

More generally, the Panel felt that there was a gap between the short training courses conducted in the regions on the one hand and an M.Sc. course in a developed country on the other. Even in those developing countries which have agricultural faculties or universities with good plant breeding courses, matters related to GRC work are frequently not, or at best sketchily, treated. The Panel thinks that, in the longer run, a wise course of action would be to strengthen this middle ground and recommends accordingly; this idea is of course once more linked to the ideas of influence and awareness.

## 4.3 Research and Action

### 4.3.1 Research

Research does not appear explicitly in the Board's Terms of Reference, (Section 3.2) but has, the Panel thinks, unavoidably and properly, figured in the programme. This is clear in the functional accounts presented in Table 3, though not in the current accounting system (Table 1). A research element was also present in the IS/GR work at Boulder; it might be put at about 10 percent of the cost of that programme.

In practice, useful investigations on seed longevity have been supported by the Board at Reading University from 1977 to 1979 and will be continued in 1980. Valuable results on storage techniques appropriate to some of the more tractable cereals and legumes have been achieved and are now being made the basis for the design of storage facilities. These are good achievements and there is no doubt that the Board must continue to support work of this general nature. It would be idle to suppose that all the problems of storing the "easy" seeds have been solved but the Panel thinks that the work should nevertheless gradually move away from them towards the forthcoming problems of genetic conservation of perennials: the use of meristems (or larger sterile shoot tips), the management of tree crops with short-lived (so-called "recalcitrant") seeds, the problems of quarantine that will have to be overcome if effective collections are to be assembled and used. There is growing general awareness of these problems and the Secretariat is certainly conscious of them.

The Panel thinks that research must have a continued place in the Board's programme and that it should be an explicit one; so it recommends accordingly. It also notes that the research element so far has been carried out in developed countries but believes that some of the problems of the future will only be effectively tackled in developing countries.

### 4.3.2 Collecting

A substantial part of the Board's finances are employed in collecting (Table 2). Sixty-eight missions have been supported in various regions; some of them (particularly in Africa) have been implemented through scientific institutions from outside the region concerned or through IARCs; mostly, however, grants have gone to local institutions. The IBPGR Secretariat has itself organized or helped to organize missions and has co-ordinated others in order to ensure harmony of purpose at national level.

A point which is emerging clearly and which Panel members have noted on several occasions during their travels, is the growing awareness in developing countries that genetic resources are a kind of wealth, coupled with an understandable unwillingness that they should be dispersed to other places without guarantee of return. This is becoming a somewhat delicate issue of which the Board is well aware and which the Secretariat treats with sensitivity. Once again, the importance of influence and awareness presents itself. Effective collecting cannot be done without local goodwill. In this connection the great value of FAO's assistance, both influential and practical, can hardly be over-emphasized; collecting missions supported by the IBPGR have benefited very greatly from it and, indeed, many would probably have been impossible without it.

As regards the Board's policy on collecting, the Panel noted that the programme has followed established priorities by crops and regions and has responded also to emergencies. This must remain the general pattern but the Panel believes that there is scope for some rebalancing of effort as between collection and conservation (Section 4.3.3) and perhaps also for enhanced attention to minor crops of local importance. It recommends accordingly.

### 4.3.3 Conservation and dissemination

Grants to build or improve storage facilities have gone to 11 different institutions, mostly in Latin America (including CIAT), some in Europe and Asia, and one in Africa (IITA). In all, about 15 percent of the total cost of collection and conservation has gone to this purpose. The Board's policy has been to support equipment rather than building and this, the Panel thinks, is a reasonable approach. Most projects seem to have been reasonably successful but several have run into technical difficulties of installation and maintenance (e.g. Appendix I). One can only note the need for careful initial choice and subsequent monitoring and help where necessary.

The Panel has the impression that collection and conservation have been somewhat unbalanced, the former tending to outrun the capacity to store the products efficiently. The impression is clear, though it is hard to give quantitative substance to the idea.

The Panel has noted the concern that a number of developing countries have as to the eventual place of storage of base collections (cf. Section 4.3.2). This has been particularly evident in Southwest Asia and Latin America and is a point of quite general, and probably growing, significance. Countries providing genetic resources need to be assured that they will have continued access to them in the indefinite future. The need for some secure legal framework to guarantee such access is widely, and increasingly strongly, felt. Developing awareness of the reciprocal aspects of genetic resources on a worldwide scale will no doubt mitigate the problem in time but the need for a secure international framework remains. The Panel recommends accordingly.

#### 4.3.4 Information and documentation

By this we mean information about the entries in a collection, gathered, stored and distributed (Table 2). This is the only area in which the Panel thinks that IBPGR has gone seriously wrong in its priorities and decisions. It needs no deep discussion here because (see Section 2.1.2) the matter has been substantially assimilated into the thinking of the Executive Committee.

In essence, the Panel thinks that information/documentation is indeed essential for the effective management and utilization of a collection but that computerization and the development and use of formal DSR 1/ systems are secondary. The first step is surely the development of agreed descriptor systems. Only when a collection becomes substantial (thousands rather than hundreds) and the descriptor system is known to be workable, does a computer become essential. When it does, then practical *ad hoc* adaptation of a suitable DSR system to the local hardware (with expert consultancy if necessary) should be the rule. The TAC Review Panel was quite clear that there was no good argument for universal computing systems and the practical successes of institutes such as IRRI and ICRISAT support this view.

The achievements of the IBPGR in this area of work include the local implementation of EXIR (e.g. at Bari, Italy) and useful advisory work by the Boulder group to several institutes in Latin America (see Appendix II). Also some progress has been made with the development of descriptor lists though perhaps not as much as might have been hoped; eleven crops can be regarded as having been adequately treated and five more are in preparation. The Panel regards this (as did the Boulder Panel) as a matter of basic importance and recommends accordingly below.

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1/ DSR = Data Storage and Retrieval.

It may be helpful here to reiterate a point made in the Boulder report (para 16-18). The word "evaluation" often causes some difficulty because it can be variously used to refer to the totality of information about an accession to a collection or only to its assessment as to utility for plant breeding or agriculture. The Panel prefers the latter usage and would refer to the basic botanical description and accession data as "characterization". In these terms, descriptors characterize rather than evaluate. Thus a collection must be characterized and the data made accessible if it is to fulfil the needs of users; but evaluation is a job for the breeders and evaluation data are not an essential component of a collection's data base. The Panel is convinced (and have found a large measure of agreement with the view) that this is a useful distinction. One might summarize it by saying that "characterization" includes both "passport" and taxonomic (minimal descriptor) information which is essentially stable and finite; by contrast, "evaluation" relates to performance data which are essentially variable, subject to interaction and are open-ended (potentially infinite).

One final point: the purpose of characterization is to identify accessions and give information on basic botanical characters to users. Over-elaborate descriptor lists are self-defeating; they should surely be as short as possible for practical purposes (i.e. "minimal" lists). But decision as to what is minimal can only be taken on a crop by crop basis.

## 4.4 Strategy and Support

### 4.4.1 The Board

The Board is composed os a Chairman and 13 members of whom at least four are from developing countries. UNEP and FAO each appoint one ex-officio, non-voting member to the Board; the Executive Secretary attends meetings but is not a member. The Board meets once a year. The Executive Committee meets three or four times a year or more, if need be. The Executive Committee comprises the Chairman and Vice-Chairman of the Board and three other elected Board members, with the participation of the FAO-designated member. At least two of the five members of the Executive Committee are from developing countries. Tenure of office of all Board members is three years, renewable once. Members of the Executive Committee are appointed on the Chairman's nomination.

In the development of its strategy, planning and decision-making procedures the Board, having no precedents to follow, had to find its own way. Essentially, it came to rely upon a strong Executive Committee which met frequently and generated most of the policy of the Board, particularly as to definition of priorities between crops and regions and as to the weight accorded to information/documentation studies. In these activities it was aided by several (latterly five) Crop Advisory Committees, by PAC (the information committee) and by ad hoc working groups. It also has the advice of such Regional Committees as exist (one at present). In discussion with the Executive Committee, the Panel learned that, in future, it was intended that the Secretariat (which has only recently attained fully executive status) should prepare an annual forward plan and that the Executive Committee itself should increase in number from five to seven. The decision-making process has been both passive (receiving and screening requests according to established priorities) and active (by contracting-out chosen activities). In all this the Executive Committee has played a pivotal role, ranging from strategy formulation to managerial decision making.

The IBPGR has thus relied heavily upon a vigorous Executive Committee carrying diverse tasks. The Panel thinks that these tasks have become too diverse to be carried out by a single body, however vigorous. It thinks, therefore, that the time is ripe for some redistribution of responsibilities and recommends accordingly.

In considering the Board's Terms of Reference (Section 3.2) the Panel thought that, though they had served to initiate the work of the quinquennium, they had been to some extent overtaken by events and stood in need of revision in the light of experience. The Executive Committee thought that the Terms of Reference were still broadly satisfactory but perhaps needed some "sharpening". The Panel would go further than this, noting that influence and awareness are not identified, that research does not appear and that the information function is partly prejudged by reference to computing. It recommends accordingly.

### 4.4.2 The Secretariat

The Secretariat has grown over the years, an important move in this connection having been the assimilation of the Genetic Resources Unit of the Plant Production and Protection Division of FAO with the IBPGR Secretariat. From an initially narrow professional base, it has (as from January 1980) a staff of six professionals, three administrative assistants, four secretaries and one clerk. This staff is complemented by consultants (including a semi-permanent senior consultant for Southwest Asian affairs), and by a regional officer for Southeast Asia. The financing of the above posts is divided about equally between FAO and IBPGR. The Secretariat has an increasing workload: in 1979 it organized to a greater or lesser degree 40 meetings, passed 64 contracts and organized 12 field collecting missions; it continued to fulfil its vital role in the information, publication and training sectors; and it assembled material for administrative and planning decisions by the Board. As noted in Section 4.4.1, it is also asked to prepare a forward plan each year for the Executive Committee and the Board.

The position of the Secretariat within FAO Headquarters is a historical anomaly, but a happy one. Some early difficulties notwithstanding (and the Panel is confident that these have been fully resolved), great advantages accrue to IBPGR from that position (Section 4.5.4). By comparison with the advantages, drawbacks inherent in having to follow FAO administrative procedures seemed, to the Panel, to be trivial, especially as FAO officers clearly made efforts to smooth out difficulties. Furthermore, some staffing problems could probably be mitigated by the Board itself by recourse to Trust Fund and fixed-term appointments.

The Panel agrees with the Executive Secretary's view that the staff as constituted is adequate for headquarters functions but that the IBPGR is deficient in permanent officers in the field (Regional Officers). It recommends accordingly.

The Panel notes that the Executive Secretary attends the Board but is not a member of it; also, that he has limited managerial authority, being required to refer comparatively minor items of expenditure to the Executive Committee or its Officers. It also notes that, though the IBPGR is not an IARC, there is an analogy between them which would, in turn, suggest an analogy between the Director of a Centre, responsible for the work of his institute, and the Executive Secretary, responsible for the work of the Board. These considerations, plus the recently increased staff of the Secretariat and the world-wide responsibilities of the Board, have led the Panel to the view that some modification of structure is desirable and it recommends accordingly.

## 4.5 General Observations

### 4.5.1 Introduction

The analysis presented so far has been based upon the Panel's structural analysis of the work of the IBPGR. The larger themes which have engaged the Board's attention, however, cut across the finer structure; the more important of them are, therefore, reviewed in this section.

### 4.5.2 The Genetic Resource Conservation Network

The Beltsville proposal, that a GRC network should be constructed *de novo* was clearly infeasible, would have been very expensive and was simply never adopted. Instead, the Board was commissioned to proceed towards the same end, but more slowly and by essentially catalytic means. This it has done and the grand objective remains the development of a functional international network.

There are three main elements in the programme: the national, the regional and the IARC (see Figure 1). Some, but unequal, progress has been made with all. National activities are developing well in some places (India, Southeast Asia generally, Brazil, Mexico for example) but yet little or not at all elsewhere. Regional activities are even less developed, good starts having been made in Southeast Asia and the Mediterranean but matched by near total failure elsewhere. Regional centres, earlier considered as the lynch-pins of the system, seem to be running against a current of growing national interest: hence this Panel's insistence on the importance of awareness and commitment at the national level as the basic step. Increasingly, regional activities seem to be taking the form of cooperation and coordinated action; this is excellent but it implies that centres with regional responsibilities will generally be national bodies committed to regional activity. As to the IARCs, the situation is that the IBPGR has had generally good working relations with most but that their commitment to GRC work is very uneven. The IARCs are independent bodies, each having generally a strong interest in assembling the germplasm it needs for its own work but with no necessary commitment to GRC activity beyond those limits. Thus, at one extreme, CIMMYT maintains substantial working collections of cereals for its own use while, at the other, IRRI and CIP aim at nearly complete coverage of their crops (strictly, the relevant sectors of them). In this context all the IBPGR can do is what it has done, attempt to encourage wider interest and commitment in GRC work in the various IARCs.

Thus, some progress has been made in developing the network but there is still a long way to go. The basic step remains the encouragement of interest and commitment at national and IARC level; regional activities are consequent on the above. The need for some international legal framework to secure free access by all GRC workers to all collections is becoming apparent; it is referred to elsewhere in this report and is recalled here because it will become, the Panel believes, an essential condition for effective development of the network. The same consideration applies, of course, to the choice of places of base storage. Finally, quarantine problems (already evident) are bound to become prominent in the operation of the network as time goes on, both on entry to and exit from the collections. Present quarantine arrangements are a maze of national regulations and the need for some international agreement to smooth the passage of GRC material can only increase.

### 4.5.3 Priorities by crops and regions

The Terms of Reference of the Board refer to crops of "major economic importance". The Board, interpreted this, inevitably and quite properly in the view of the Panel, to give greatest weight in the first quinquennium to the major cereals. Substantial progress having been made with these, the Board is now widening its scope and this, again, seems to the Panel to be appropriate. The Panel is not competent to comment in detail on the specific choices made by the Board; it can only note that they appear to be broadly reasonable and that actual, detailed decision can only be based on informed technical appraisal by experts assimilated into the Board's planning mechanism.

Main priorities having been established, the Board has been, and must continue to be, free to put significant efforts into crops, which may be minor on the world scale but can be of great local importance, on an ad hoc opportunistic basis: to meet unforeseen emergencies, to respond to local interests (especially when response would help the GRC cause as a whole), to widen its experience as a basis for future activities, and to support promising ventures which are likely to be sustained in the longer run from other sources (e.g. among industrial crops). Thus the Panel feels that modest efforts devoted to minor crops, domestic-forestry and industrial crops are well justified, should be a recognized feature of the strategy-planning process of the Board; and it recommends accordingly.

#### 4.5.4 Relation with FAO

The great importance of, and value to IBPGR, of the relation with FAO is a recurrent theme of this report. The following advantages are evident: (1) the administrative and financial support given to the Secretariat by its presence in FAO Headquarters free of the usual charges on trust funds; (2) freedom from cash-flow problems; (3) scientific contacts within FAO Headquarters; (4) scientific contacts with FAO workers in the field and hence access to local expertise; (5) administrative support by the world-wide FAO offices; (6) the prestige of FAO and the trust reposed in it by countries as a factor which has immeasurably aided the international activities of the Board.

The disadvantages, by comparison, are trivial and the Panel is in no doubt that this valuable relation must continue, a view which, it was pleased to learn, was shared by senior FAO officers. The Panel noted that the FAO connection in future will probably turn out to be of particular importance: (1) in developing the foreseen need for some legal framework to guarantee access to working and base collections; (2) in attacking the foreseen quarantine problems on an international basis; and (3) in developing new sources of funds for GRC work. Under (3), the possibilities are various and the Board is already conscious of them.

#### 4.5.5 Funding

Past levels of funding have been found by the Board to be adequate for the activities in hand and as much as could be wisely spent. The Panel does not feel competent to predict future funding in numerical terms but notes the following factors as relevant: (1) the decline in a very substantial commitment to information and documentation (Table 1); (2) a foreseen need for more field officers (Section 4.4.2); (3) probably greater costs of the programme as the balance of activities moves away from the cereals towards more difficult crops. A modest net increase in funding is indicated and the Panel recommends accordingly.

#### 4.5.6 Forward Planning

There are two levels at which the Board has operated. The first level, that of priorities by crops and regions, has been systematically and well done; it is, and will continue to be, the subject of continued reappraisal in the light of progress, experience and new information (Section 4.5.3). The second level, that of priorities between the main functional areas of activity (as defined here, Table 2) seems to the Panel to have been less successfully treated. So far, the Board has proceeded by a sort of practical empiricism based on the knowledge and experience of its members. As evidenced in this report, some imbalances have ensued (as between information/documentation and the rest, between collecting and storage) and significant areas seem to have been somewhat neglected (e.g. promotion of national awareness, training and publications policies). The Panel thinks the time is ripe for a more systematic treatment of the formulation of strategy and recommends accordingly.

## 5. LOOKING TO THE FUTURE: CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

In this section recommendations are made in the light of the analysis presented in the preceding chapter. We assume (Section 4.3.4) that, in connection with information/documentation, the necessary major adjustment is already in hand and that only subsidiary observations are needed here. Recommendations and the arguments leading to them are set out in some detail in the following sections and summarized above in Chapter 1.

### 5.2 General

#### 5.2.1 The main objective

In the light of the discussion above the Panel is in no doubt that the main objective of the IBPGR must remain, as it always has been, the development of a worldwide genetic resource conservation network devoted to the long-term needs of world agriculture. The need for genetic resource conservation becomes no less with time. Indeed the reverse is true, for genetic erosion is, generally, accelerating and there is continued need for ensuring the safety of collections and for enhancement of national co-operation. The objective is universally accepted and received renewed and powerful support from the 20th FAO Conference, 1979.

### 5.2.2 Continued support

The Panel records its conviction that, in the light of IBPGR's valuable achievements of the past quinquennium and the agreed importance of the overall objective, CGIAR should reaffirm its continued support of and interest in this important work.

### 5.2.3 FAO relations

In all its many discussions, the Panel heard no dissent from the proposition that the IBPGR has been immeasurably aided in its work by the physical placement of the Secretariat within FAO Headquarters (Sections 4.4.2 and 4.5.4). Furthermore, the Panel was delighted to learn from senior FAO officers that the Secretariat would be assured of future support. The Panel records its conviction that this arrangement should continue, to the great benefit of the work of the IBPGR, and also, it would hope, with some reciprocal gain to the FAO commitment to its objectives. The point is emphasized here because it has been suggested in the past that the Secretariat should be isolated from FAO.

### 5.2.4 Long-term funding

The Panel noted that present funding is adequate and that changes in programmes will tend to balance out but that some enhancement of net activities and of staff can be foreseen in the future. It therefore recommends that the Board should be free to bring forward proposals for a modest increase in expenditure during the next quinquennium and should explore, jointly with FAO, alternative or additional sources of funding.

## 5.3 The Board

### 5.3.1 General

The Panel, while recognizing the valuable overall achievement of the IBPGR, has identified what it takes to be certain weaknesses in the structure and working of the Board (Section 4.4.1). These relate to its Terms of Reference (Section 3.2), the relative roles of the Board and its Executive Committee and the formulation of strategy and programme. These issues are now to be explored.

### 5.3.2 Terms of reference

The Panel thought that the Terms of Reference of the IBPGR were unsatisfactory in being both vague in some particulars and over-specific in others. The Board has had to interpret them somewhat elastically in order to accommodate, for example, the research which it clearly had to support.

Since the Terms of Reference had to be written before the Board could begin to understand the nature of its task, some discrepancy was probably inevitable, and the Panel thinks that the time for revision has arrived. It recommends, therefore, that CGIAR should invite the Board, when both bodies shall have assimilated the present report, to revise its Terms of Reference and it would hope that the structural analysis of IBPGR functions used here will prove helpful in doing so. The Panel notes that this recommendation, when implemented, will inevitably also involve the Board in scrutiny (and probably also revision) of its by-laws.

### 5.3.3 Executive Committee

The Panel thought that the Executive Committee, in its zeal for the work of the IBPGR, had somewhat overburdened itself by assuming heavy responsibilities for financial control and programme formulation, in addition to tasks of a more routine nature. To lighten the load on this Committee, therefore, the Panel recommends that greater managerial-financial responsibility be given to the Executive Secretary (Section 5.4) and that the function of strategy-programme formulation be given to a new committee, as recommended below (Section 5.3.4). This would enable the Executive Committee to meet more rarely (once, perhaps twice a year).

### 5.3.4 Strategy/Programme Committee

Up to now the Executive Committee has formulated the overall policy of the Board, on the basis of proposals brought forward, on request, by the Executive Secretary and subject to ratification by the full Board. The Panel thought that this procedure was not wholly satisfactory and had led to perceptible imbalances between components of the work: for example, over-emphasis of information-documentation and under-emphasis of influence, training and publications aspects. The Panel concluded that the Board would be helped by objective advice on strategy from a body of high scientific competence that was effectively free of the practical problems of resource allocation. It recommends, therefore, that the Board should be assisted in its strategy/programme formulation by a small advisory committee. The Panel does not make detailed recommendations but thinks that this committee probably: should meet annually, should be responsible for formulating strategy/programme proposals, should be composed of 5-7 members of whom perhaps two might be Board members, should have an independent chairman (i.e. one who was not himself a member of the Board) and should include also the Executive Secretary (by whatever name - Section 5.4). In formulating programme proposals, the Committee should address itself to the allocation of priorities both between and within the main functional headings adopted (Table 2). The Panel hopes that such a committee, as well as the Board itself, would be materially assisted in its deliberations by the functional accounting recommended below (Section 5.3.6).

### 5.3.5 Other committees

The Panel is aware of the universal tendency for committees to become self-sustaining and notes the difference between the five crops committees of the Board and the working groups; the former meet regularly, the latter only when there is specific reason to do so. Meetings are expensive, so economy would be served by designating all as working groups and the Panel so recommends: it believes that this would help the Board in scheduling meetings at the most favourable times for the work in hand.

With regard to the possible new advisory committee on information/documentation referred to in the Boulder report (Appendix V), the Panel thought that the earlier mission was mistaken in thinking that a need existed: it could foresee no tasks which could not as well be done by appropriate consultants or working groups. It understood, further, that the Executive Committee was thinking along the same lines. The Panel, therefore recommends that no such committee be appointed.

### 5.3.6 Functional accounting

The Panel found the analysis of functions given in Figures 1 and 2 and Table 2 helpful in thinking about the work of the IBPGR. As a simple extension of the idea, Table 3 gives an analysis of the 1978 accounts by a functional classification. The Panel learned that the table was not difficult to prepare and thinks that it provokes several questions about allocation of resources which simply could not be asked of the conventional accounts. The Executive Secretary shared these views and the Panel therefore commends the approach. Specifically, it recommends that, for the internal guidance of the Board and of its Strategy/Programme Committee (however entitled), budgets and accounts should be presented in some such functional form.

## 5.4 The Secretariat

### 5.4.1 General

The Panel noted (Section 4.4.2) that the Secretariat had recently grown somewhat in size, in line with its increasing budget and responsibilities. And it noted that its proposals regarding the Board (Section 5.3) had implications for the Secretariat, too. Recommendations follow.

Table 3. IBPGR Functional Accounting for 1978

| (1) By functions | k$ | % |
|---|---|---|
| Administration | 372.0 | 21.7 |
| Inflation | 148.0 | 8.6 |
| Technical meetings | 84.1 | 4.9 |
| Publications | 15.0 | 0.9 |
| Training | 126.0 | 7.3 |
| Research | 57.4 | 3.3 |
| Collecting | 360.0 | 21.1 |
| Storage | 112.5 | 6.6 |
| Information | 440.3 | 25.6 |
| | 1,715.3 | 100.0 |

| (2) By areas 1/ | k$ | % |
|---|---|---|
| Central America | 36.4 | 3.9 |
| South America | 156.2 | 16.5 |
| Med. and North Africa | 189.3 | 20.0 |
| Africa | 97.7 | 10.3 |
| Southeast Asia | 198.1 | 21.0 |
| South Asia | 30.5 | 3.2 |
| Southwest Asia | 232.0 | 24.6 |
| Far East | 4.5 | 0.5 |
| | 944.7 | 100.0 |

| (3) By crops | k$ | % |
|---|---|---|
| Cereals | 259.3 | 52.0 |
| Food legumes | 88.3 | 17.7 |
| Tubers | 31.2 | 6.3 |
| Fruits | 33.2 | 6.7 |
| Vegetables | 16.1 | 3.2 |
| Industrial crops | 13.7 | 2.7 |
| Forages | 57.2 | 11.4 |
| | 498.9 | 100.0 |

| (4) Administrative subdivision (including inflation) | k$ | % |
|---|---|---|
| Board/Exec.Com./Chairman | 74.3 | 19.3 |
| Secretariat staff 2/ & travel | 122.2 | 31.6 |
| Field staff and travel | 142.2 | 37.0 |
| Miscellaneous (photocopying..) | 18.0 | 4.8 |
| Servicing costs (Southwest Asia project) | 28.1 | 7.3 |
| | 384.8 | 100.0 |

1/ Includes the distribution of partial support to the Birmingham course according to provenance of students.

2/ Additional to FAO provision.

Notes: The figures given are for 1978 and were provided by the Executive Secretary in a trial run to test the feasibility of the proposal. Items listed under (1) are as in Table 2 and Fig. 1; items under (2) and (3) are provisional. In principle, a complex 3-way table could be constructed but would be unreadable. Note that, though the total under (1) should equal actual (or estimated) total expenditure, totals under (2) and (3) will always be less.

5.4.2 Title

The title 'Executive Secretary' was appropriate so long as the occupant of the post was simply responsible for carrying out the specific directives of the Board. The job, however, has grown greatly in size and responsibility and is now analogous to that of the Director of an Institute. The Panel, therefore, recommends that the title be changed to 'Director'.

5.4.3 Responsibilities of the Director

In the light of the preceding argument, the Panel believes that the Director should be given responsibility for programme formulation (in consultation with the proposed advisory committee) and full (including the appropriate financial) responsibility for carrying it out. He should also become a member of the Board (just as Directors of IARCs are members of their Boards). The Panel so recommends. The Panel notes in this connection that the status of the Secretariat Unit within the FAO office is likely to be affected by this and the preceding recommendations. It believes that FAO and IBPGR will need jointly to explore the administrative implications of the change proposed.

5.4.4 Staff

The Panel accepts the view that the Secretariat is adequately staffed for the immediate tasks in hand, but that there will be a developing need for (up to four more) Regional Officers as regional activities grow. There may develop a need for a Publications Officer as publications activities are enhanced. The Panel recommends that the Director should be encouraged to bring forward proposals along these lines when circumstances can be shown to justify the appointments.

5.5 Programmes

5.5.1 Introduction

On the basis of the analysis presented in Section 4, the Panel concludes that the IBPGR has been doing all the things appropriate to its basic objective but that some changes of direction and emphasis would now be desirable. Recommendations follow, under the eight functional headings adopted above.

5.5.2 Plan and promote

The Panel recommends as follows:

(1) Influence. The IBPGR should make a systematic effort to enhance its influence and promote the idea of genetic conservation at government level, especially in those areas of the world where the idea is yet weak. It should seek the help and guidance of FAO in doing so and should adopt whatever means seem appropriate: personal influence and specialized publications and seminars suggest themselves. Related matters which will also have to be explored at government level include: international acceptability of designated base storage facilities, the very probable need for some international legal framework to guarantee reciprocal access to collections in the long term, and quarantine problems (which can only become more acute as clonal crops enter the scene).

(2) Meetings. The IBPGR should support professional meetings whenever there is a clear technical reason for doing so but should exercise caution in seeing that committees do not become self-perpetuating.

(3) Publications. The IBPGR should develop a systematic publications policy aimed at influence and awareness as well as at technical information. Directories, handbooks and descriptor lists should figure in the latter category. The Director should be invited to make the case for appointing a Publications Officer when the need can be demonstrated.

(4) Training. The IBPGR should enhance its training programme along the lines already well established: by initiating/supporting local short courses whenever appropriate and by offering continued support to the Birmingham M.Sc. course. It should also deliberately encourage and assist university teachers of plant breeding courses particularly in developing countries to incorporate genetic resource conservation elements in their teaching, with a view to laying a base for more advanced studies.

5.5.3 Research and action

The Panel recommends as follows:

(1) Research. The IBPGR should continue its selective support of research but the direction should change somewhat, away from studies of the easily-stored seeds of annual crops towards the problems of perennials that are either clonal or have short lived seeds; economical maintenance of collections and disease-free transmission should be leading objectives. There should be good opportunities for initiating such work in developing countries. The forthcoming IBPGR conference (1981) could usefully be made a forum for exploration of these problems.

(2) Collecting. The IBPGR should continue to support collecting activities according to the best current advice on priorities by crops and regions but should be prepared to devote modest efforts to what seem to be, on a global scale, minor crops, when justified by emergency or policy

considerations. The Board should be prepared to reduce somewhat its collecting activities in favour of enhanced support of conservation if the Panel's judgement of the matter is sustained.

(3) Conservation. The IBPGR should enhance its support of conservation if the two activities were found to be in competition for limiting resources. As the Board itself recognizes, a balance between the two activities must be sought. It should, in general, support the provision of equipment for buildings supplied from local resources and pay attention to subsequent working and maintenance.

(4) Information/documentation. The Board should accept the main findings of the Boulder Panel, except in regard to an advisory committee (Section 5.3.5). Specifically, it should use consultants or ad hoc working groups when it needs technical advice, avoid commitment to any specific computing equipment or systems and encourage the development of descriptor lists as the basic step in all documentation work. Further, it should adopt the distinction made in this report between "characterization" and "evaluation" and confine its documentation activities to the former.

## 6. TERMS OF REFERENCE AND QUESTIONS

### 6.1 Introduction

The Panel conducted its business in terms of its own functional analysis of the work of the Board, an analysis which it very much hopes will be useful both to the IBPGR and to the CGIAR in future. In this section it seeks to reconcile its analysis with its formal terms of reference (Section 2.2) and subsequent questions posed by TAC.

### 6.2 Terms of Reference

The mandate of the Board (Terms of Reference items (i) and (ii) (a)) was not thought by the Panel to be wholly satisfactory (Sections 4.4.1 and 5.3.2) and it recommends revision. On Terms of Reference item (ii) (b), the work of the Board impinges and will continue to impinge, on the genetic resource conservation work of national and international institutes in the only possible way, namely by striving to weld diverse bodies together in working networks (Section 4.5.2). This is the central practical objective before the Board; progress has been made and regional activities are starting to develop but there is a long way to go. On Terms of Reference item (ii) (c) and (d), the Panel thought that the Board's methods of formulating its strategy and the balance of major constituents of its programme were not wholly satisfactory (Sections 4.4 and 5.5) and merited some revision, which it duly recommends. On Terms of Reference items (iii) (a), (b), (c), the Panel thought that results achieved in collection, conservation and training have been and continue to be very valuable but that changes of emphasis towards enhancement of the two latter items would be desirable (Sections 4.3 and 5.5); on information/documentation (Terms of Reference item (iii) (c), the Panel agreed with the Boulder Mission in recommending a substantial reduction in and reorientation of effort (Sections 4.3.4 and 5.5.3). The Panel assumes that Terms of Reference items (iii) (d) and (e) refer to the performance of the Secretariat in executing the wishes of the Board; it thinks it has been very satisfactory indeed. On Terms of Reference item (iv) the Panel thinks that the Board has had a valuable impact upon genetic resource conservation activities throughout the world, has itself cooperated excellently with other organizations, national and international, and has promoted cooperation among others to a degree which probably could not have been greatly exceeded in so short a period and with limited resources; this view is to be qualified by the observation that the information/documentation programme has had but a small impact in relation to its cost, as is now generally accepted. As to Terms of Reference item (v), the Panel thought that such constraints as it could identify lay largely in the area of Board-Secretariat structure (Section 4.4) and hopes that they may be alleviated by adoption of its recommendations (Sections 5.3, 5.4).

### 6.3 TAC Questions

A number of specific questions posed by TAC before the Panel was finally constituted are listed above in Section 2.2. Answers to them, some fairly precise, some of necessity a little vague, are offered here.

On question (i) the longer-term future for the IS/GR programme, the answer is that there is none, the report of the Boulder Mission having been substantially accepted. On priorities (question (ii) A) the Panel is not competent to comment in detail but it thinks that, in general, the early priorities were well chosen and that the list should be kept under continuous review. On (ii) B, the question of responsibility for forestry, minor crops and industrial crops, the Panel thinks that a modest commitment is well justified on grounds of emergency, local needs and general experience (Section 4.5.3).

On question (iii) concerning the effectiveness of the Board's impact on national and regional programmes, the Panel found that the former had been the more effective. Since national-regional relations must vary with time and place and must depend also upon the particular crops being handled, the Panel did not feel able to comment upon implications for long-term funding except to observe (Section 4.5.5) that a modest increase could be foreseen. On (iv), the position of the IARCs, the Panel noted that their contributions varied widely (Section 4.5.2) but thought that their long-term commitment to GRC work was a matter for CG strategy rather than for this Panel to pronounce upon; meanwhile, the IBPGR can only try to persuade and encourage.

To the last three questions, clear answers have, the Panel thinks, been given. There will undoubtedly be a need for consideration of quarantine problems (v); there will be a need for some enhancement of staffing (especially in the field) (vi); and the present Secretariat structure is not wholly satisfactory (vii).

## 7. ACKNOWLEDGEMENTS

The Panel expresses its gratitude to Mr. S.A. Risopoulos, Deputy Executive Secretary, TAC, for unfailingly helpful guidance as Secretary to the Panel; its best thanks are also due to Mr. P.J. Mahler, Executive Secretary, TAC, for many useful discussions and for a very thorough report on his travels; and the Panel also expresses its thanks to Ms. Paola Dionori, for excellent secretarial help.

The Panel gained much from information provided in advance by Dr. J.T. Williams, Executive Secretary, IBPGR, and from several frank and easy discussions with him; it benefited also from its collective discussions with the Secretariat staff as a whole (Dr. J.T. Williams, Ms. E. Bennett, Dr. J.T. Esquinas-Alcazar, Dr. N.M. Anishetty, Mr. D. van Sloten, Mrs. C. Gorelli, and, in addition, Dr. K.S. Dodds, Senior Consultant, FAO). The Panel's best thanks are due to all.

The Panel also thanks members of the IBPGR Executive Committee for a productive discussion, namely: Mr. R.H. Demuth (Chairman), Dr. G. de Bakker, (Vice-Chairman), Dr. O. Brauer, Dr. A.B. Joshi, Prof. L. Kåhre and Ir. W.F. Kugler.

The Panel expresses its gratitude to Dr. D.F.R. Bommer for a most informative meeting and to Dr. O. Brauer, Mr. J. Pichel and Mr. R.L. Willan for very helpful discussions.

Finally, the Panel is also very grateful indeed to all the many people, scientists and administrators, who took much time and trouble to make the preceding journeys productive of ideas and information; they are named in Appendices I-V.

## 8. REFERENCES

The following are the leading documents consulted in preparing the report. They all have bearing on the work of the IBPGR as a whole. For documents of local/regional concern, see Appendices I - V.


(1) IBPGR, preliminary meeting, Rome, 1974 (AGPE:IBPGR 74/6)

(2)-(6) IBPGR Annual Reports, 1974-78:
I (1974, AGPE:IBPGR 75/3); II (1975 (AGPE:IBPGR/75/47);
III (1976, AGPE:IBPGR 76/27); IV (1977, AGPE:IBPGR 78/8);
V (1978, AGPE:IBPGR 79/8).

(7) IBPGR Board Meeting, VI, Feb. 1979 (AGPE:IBPGR 79/15).

(8) IBPGR, A Review of Policies and Activities 1974-78 and of the Prospects for the Future, 1979 (AGPE:IBPGR 78/24 Revised).

(9)-(10) IBPGR Executive Committee, XIV, May 1979 (AGPE:IBPGR 79/28) and Extraordinary Meeting, June 1979 (AGPE:IBPGR 79/40).

(11) IBPGR Mid-term Report on the Programme and Budget, June 1979 (AGPE:IBPGR 79/21 Revised).

(12) Report of the TAC Mission to the IBPGR Programme at Boulder, Colorado, USA. April 1979 (AGD/TAC:IAR 79/18 Rev. 1).

APPENDIX I

# IBPGR QUINQUENNIAL REVIEW

## Report on a Visit to the Mediterranean and Southwest Asian Programmes

30 September - 9 October 1979

CONTENTS

Report on a Visit to the Mediterranean and Southwest Asian Programmes

30 September - 9 October 1979

## 1. Introduction

At the Seventeenth Meeting held in September 1977, TAC agreed that the work of the International Board for Plant Genetic Resources (IBPGR) should undergo a quinquennial review in 1979. As IBPGR's mandate is of a global nature, it was decided that three separate missions would be required to study samples of these activities. The Programme for the regional visits of the Review Panel members was approved and finalized by the 22nd TAC Meeting which decided that these visits were to be undertaken in each case by a member of the Review Panel assisted by a member of the TAC Secretariat.

The present report reflects the findings of the Mission which visited the Southwest Asia and Mediterranean Regions. Within the general framework of the terms of reference of the Review the purpose of this Mission was to assess the content, quality, impact and value of IBPGR's contribution to the plant genetic resources activities in the two regions and to identify problems and constraints for further consideration by the Review Panel. This report was considered by the IBPGR Quinquennial Review Panel, which met 3-8 December 1979 at FAO Headquarters in Rome, as an input to the preparation of the final IBPGR Quinquennial Review report. It is understood that the observations and opinions expressed here refer only to this mission and that conclusions may be modified by consideration by the Panel as a whole.

The Mission was composed of Prof. E. Åberg, Panel Member, assisted by Mr. L.H.J. Ochtman of the TAC Secretariat. Dr. K.S. Dodds, Senior Coordinator of IBPGR Southwest Asia Region, accompanied the Mission to ARARI and ICARDA.

## 2. The Mediterranean Programme

The main activities of the IBPGR on crop genetic resources in the Mediterranean region are based on the continuation of a programme initiated with UNEP and IBPGR funds in 1975, executed by FAO. As from 1976, the programme has been entirely funded by IBPGR.

### 2.1 Background

The Germplasm Laboratory Bari, Italy, started as an independent institution, sought on its own initiative cooperation with other countries in the Mediterranean region. It has a well-established gene bank, predating the IBPGR supported programme. With a few exceptions, the Bari Laboratory was engaged in most collecting missions in the Mediterranean region. The collections were made in collaboration with the other countries in the region; half of each sample collected was taken to Bari, the other half left in the country of collection. These arrangements were and still are based on personal contacts, as the Bari Laboratory is not at this time a formal coordinating body for the Mediterranean programme.

In March 1979 the first Regional Meeting of the IBPGR Mediterranean Germplasm Programme took place at FAO in Rome. Nine countries (Algeria, Cyprus, Egypt, Greece, Italy, Portugal, Spain, Tunisia and Yugoslavia) attended this meeting, which agreed (ref. 11) to recommendations relating to the definition of national coordinators and the eventual formation of a regional committee.

### 2.2 The Present Situation

At present the Mediterranean Germplasm Programme is being coordinated by a staff member of the Genetic Resources and Crop Ecology Unit (AGPE) of the Plant Production and Protection Division (AGP) of FAO. The Coordinator prepares, on an annual basis, in consultation with the Germplasm Laboratory Bari and the other national programmes, the regional programme of activities and a corresponding budget proposal for approval by the IBPGR. Recently, in October 1979, a preliminary agreement in principle was reached between FAO/IBPGR and the Germplasm Laboratory Bari, for the latter to assume the role of Regional Coordinator, if agreed by the joint participating nations.

The priorities for the region decided upon by IBPGR in consultation with the participating nations, are cereals, grain legumes and sugar beet. Libya and Algeria give also high priority to forage crops for semi-desert areas. Currently about 5,000 population samples of germplasm, mainly cereals and grain legumes, have been collected by regional teams supported in some instances by experienced plant collectors under short-term contracts. Thus far 17 expeditions have been made in the nine countries included in the programme.

So far only Morocco has not yet responded to invitations for cooperation from the IBPGR Secretariat or the Laboratory in Bari. Owing to the fact that IBPGR concentrated its efforts in the less developed countries of the region and is still in the process of establishing the right contacts in France, the last country does not yet actively participate in the Mediterranean Region.

The evaluation of collected germplasm is at an early stage in most countries. The Germplasm Laboratory Bari provides valuable assistance, but hopes to involve the cooperating countries even more, for example, through evaluation of germplasm by national experimental stations involved in work with the crops concerned. At Bari itself, more than 6,000 samples of Mediterranean wheats are being evaluated. Data for processing in computer programmes are being forwarded to Bari which operates a variety of computerized systems, e.g. TAXIR, EXIR, FAMULUS and SAS.

Ample facilities for conservation are available at Bari. However participating countries feel the need for small local storage units so as to relieve Bari of other than long-term responsibility.

Financial aid and expertise has been provided by the IBPGR towards the construction of facilities for gene banks in Spain (near Madrid) and in Northern Portugal (at Braga); others are eventually planned for Libya and Greece. The first two will be responsible for grain legumes and maize, respectively. Bari is subsidized by IBPGR for collection missions outside Italy and for documentation systems.

Practical training of staff in the Mediterranean programme is possible at Bari, theoretical and higher training must take place overseas. There are resources for this through fellowships, but increased efforts are needed.

### 2.3 General Assessment

The programme seems to be developing fairly satisfactorily, although there is a need for greater international input through the IBPGR especially as regards the structure of the programme, as well as financial assistance and guidance in establishing facilities. At present, too much responsibility for the Regional Programme, in both coordination and operation, is carried by the Germplasm Laboratory at Bari.

The IBPGR emphasized strongly and gave valuable assistance to the two initial phases of plant genetic resources activities, i.e. exploration and collection. IBPGR still puts much emphasis on these two activities in spite of the apparent shift in certain countries towards a need for increased assistance for documentation, conservation and evaluation.

The coordination of this programme is further discussed in section 4.1.

## 3. The Southwest Asia Programme

The main activities of the IBPGR on crop genetic resources in Southwest Asia are based on the take over and continuation of a project started with UNDP funds and executed by FAO.

### 3.1 Background

Six countries participate in this programme within the project TF/REM 31 (IBPGR) entitled "Crop Genetic Resources of Southwest Asia", namely: Afghanistan, Iran, Iraq, Pakistan, Syria and Turkey. This project was preceded by two others, executed by FAO, one (ref. 2), operational from 1963 to 1973, and the other (ref. 3) operational from 1974 to 31 July 1976.

The former was not a regional project. It was concerned solely with activities in the Aegean Agricultural Research Institute (ARARI), Menemen, Izmir. The consequence was that when the second project followed in 1974, ARARI was the only centre in the six participating countries that had facilities and a cadre of trained staff to undertake crop genetic resources activities. The other five had to start from scratch and this imbalance between Turkey and the others is still very evident today. At that stage various alternatives for future work were discussed and, in the end, the IBPGR decided to make a fresh start with the redesigned project TF/REM 31 (IBPGR) cited above. It was not until 1 August 1977 that a revised work plan acceptable to the six member countries was defined and could be started. By January 1979, all six countries had signed the Plan of Operation.

The programme at ARARI in 1979 was far more advanced than the programmes in the other five countries. It was, therefore, to be supported mainly by help with its problems of documentation. In the other five countries (Afghanistan, Iran, Iraq, Syria and Pakistan), a drive to establish strong national genetic resources programmes was started.

With this aim, a Coordinator based in FAO and two technical advisers in the field were appointed in April 1977. The two advisers were placed at the Genetic Resources Division of the Seed and Plant Improvement Institute, Karaj, Iran, on the understanding that they would visit other project units when asked to do so. Both had to be withdrawn from Iran in January 1979. One of them was transferred to Iraq, to help with the establishment there of a Genetic Resource Unit. He has since visited Syria to give technical help and advice. The second expert returned to his former post at the Germplasm Laboratory, Bari, Italy. Prior to that he had spent a month in Afghanistan towards the end of 1978 to initiate work at the Genetic Resources Unit.

### 3.2 The Present Situation

At present, each country has a Plant Genetic Resources Unit, with its laboratory and functional seed processing equipment. Since July 1979, each unit has also had an operational medium-term cold store, though these are not always working due to variable electric power supply, or to defective compressors (as in Iran).

Taking into account differences in agricultural practices and diversity of ecological zones within the region, the following crops rate an overall high priority throughout the region: wheat, barley, chickpea, lentil, pear, apple, onion, brassicas, carrot, spinach, radish, melon and forage plants. Sub-regionally, i.e. in Afghanistan and Pakistan, rice, watermelon and cummin rate high; in Iran and Iraq dates also assume high priority.

Although collecting missions have taken place from time to time, they have not been in the field every year. Extant collections have not always been well maintained and a major task of the project has been to clean up a backlog of samples and to put them into storage.

In most participating countries, collections of vegetatively propagated crops, especially of fruits and nuts, are still in a preliminary phase, except in Turkey which has a large coordinated programme for this material.

Sponsored by various organizations, a total of 22 graduates from the six countries in the Southwest Asia programme have received formal training overseas in plant genetic resources activities, the majority at Birmingham University. When the total is corrected to include only those graduates who are currently engaged in plant genetic resources activities, it reduces to 13 as follows: Afghanistan 2, Iran 2, Iraq 2, Pakistan 1, Turkey 5, and Syria 1.

Officials of all six countries consider their cadre of trained staff far too low and are most anxious for the programme of training to continue.

A brief country-by-country account of progress made is given below.

<u>Afghanistan</u>

A small cold store for seed storage supplied by USAID several years ago was made operative in April 1978 and three small adjacent rooms were adapted for seed processing during the visit of the Technical Adviser in November 1978. This enabled a start to be made with the job of cleaning up and properly storing samples from earlier collections. Several collecting trips were made in 1978 and 1979, mainly for cereals and food legumes. These expeditions provided 600 samples of wheat that were grown at Daoulamen Field Station, Kabul for preliminary study and bulking in 1979.

<u>Iran</u>

Between March 1978, when the two Technical Advisers were in post, and January 1979 when they were withdrawn, good progress was made in the collection of material and setting up a genebank at the Seed and Plant Improvement Institute, Karaj. An IBPGR-funded cold store for medium-term seed storage was fitted out and brought into use in the small but adequate building set aside for crop genetic resources activities. Since the experts left, it has been reported that the condensers for the cold store have broken down.

Iraq

An IBPGR-funded cold store for medium-term seed storage was completed in April 1978 and a small laboratory building for the Genetic Resources Unit is nearing completion. The Technical Adviser has participated in two collecting trips to Northern Iraq during 1979. He reports that the replacement of local wheat varieties by exotic varieties is virtually complete in the region though wild relatives of wheat and barley are still very prevalent. A good start has been made with the gene bank. Accessions so far number about 500 and consist mainly of wheat, barley, rice, broadbean and chickpea samples.

Pakistan

Except for one or two collecting expeditions in collaboration with foreign institutes, plant genetic resources activities at the Agricultural Research Centre (ARC) Islamabad have been suspended until facilities for seed processing and seed storage become available. Word has just been received that a small building housing these facilities is ready. Scientists at ARC are anxious to have an active genetic resources programme so that there is every reason to think that good use will be made of the new building.

Syria

A medium-term cold store for seed storage was completed in March 1979 but it is not possible to be optimistic about the future of the Syrian Genetic Resources Unit. Only about 300 seed samples have been collected since 1976 and these have not yet even been properly cleaned and labelled. The Unit consists of one graduate who has attended the course on plant genetic resources at Birmingham University. Another graduate has been nominated this year for training.

Turkey

A very comprehensive national genetic resources project is being undertaken by ARARI in collaboration with agricultural institutes, agricultural stations and university agricultural departments throughout the country. Eight teams, each led by a staff member of ARARI, are responsible for survey, collection, rejuvenation, multiplication and evaluation of plant material of the group of crops assigned to it. The programme embraces cereals, grain legumes, industrial crops, forage plants, vegetables, fruits, ornamentals and medicinal plants. Documentation of the collections and seed storage and distribution are done by ARARI.

### 3.3 General Assessment

Political events have disrupted the programme in Southwest Asia to varying degrees, especially in Afghanistan, Iran and Northern Iraq. However, there are also other problems in the region which affect cooperation and coordination. For instance, in the absence of a regional genebank the national genetic resources units have no coordinated system for storage of duplicates. There is, however, a general consensus among participating countries that if FAO could establish a seed storage facility on neutral ground, the countries would readily send material there for safe storage.

Other factors that limit progress are lack of personnel (Syria), poor facilities (Afghanistan) and, with the possible exception of Iraq, low national budgets. Routine genebank practices are not fully underway. With the exception of Pakistan, duplicate seed samples have not been sent from any of the National Units for safe storage elsewhere, though seeds are distributed world-wide from ARARI when requested for research purposes.

With regard to project TF/REM 31 (IBPGR) (ref. 10), most of IBPGR's budget contribution has been utilized as programmed. After the Consultative Meeting of the Region's participants in October 1979, IBPGR prepared a final list of equipment, on account of the participants' needs, for supply to the six national genetic resources units. Only under "Personnel" have considerable savings been made; due to events in Iran there were savings in man-months of the Genetic Resources Expert and a programmed Documentalist was not needed at all.

## 4. The Coordination of Regional Activities

### 4.1 The Mediterranean Region

The Director of the Germplasm Laboratory Bari, Italy, would be willing to coordinate genetic resources activities in the Mediterranean Region with some backstopping by the IBPGR Secretariat. With such coordination, the Mediterranean programme might confidently be expected to go ahead, especially as the countries in the region are willing to collaborate and work in close contact with Bari. Such a development would mean that, in addition to the coordination of scientific and technical activities by the Germplasm Laboratory, the Bari Genebank would become the Mediterranean Regional Genebank.

### 4.2 Southwest Asia Region

In the Southwest Asia Region the problem of coordination is a real one. The Mission has considered three possibilities:

(1) A first possibility might be to make ARARI a regional centre for gene resources work in Southwest Asia. It is the best equipped national centre in Southwest Asia in terms of both personnel and equipment. However, the present working conditions and the structure of ARARI do not meet the requirements of a regional centre and its status is not such that it would be acceptable to the other nations in the region.

(2) A second possibility would be for ICARDA to undertake regional coordination. However, under the terms of its mandate, the interest at this centre is confined to five crops (barley, durum wheat, lentil, broadbeans and forage crops). For ICARDA, the collection, classification and maintenance of germplasm of these five crops is an internal responsibility with working collections as the main aim. Furthermore, ICARDA is not structured for a role as coordinating regional centre.

(3) Neither of the two possibilities discussed above can really replace the present form of coordination. The only solution appears to be to have a regional coordinator but to abandon, for the time being, the notion of a regional gene bank. The main duties of the coordinator would be:

- to encourage the deposition of duplicate seed samples from the national collections for safe storage at appropriate gene banks;
- to stimulate cooperation between national programmes as well as between national programmes and international centres in the region;
- to foster contacts with organizations outside the region;
- to be aware of sources for technical and financial assistance to the programmes.

The most logical procedure would be to place the proposed regional coordinator within the IBPGR Secretariat. Whether technical and financial help should be on an *ad hoc* basis, or through FAO-type projects, or a combination of both, is a matter for later consideration.

5. Other considerations

In addition to the foregoing, several other points merit consideration:

(i) Countries included in the programmes

Eight countries are included in the Mediterranean programme and others may perhaps wish to join later. Such a development would be welcome, and should be encouraged.

The Southwest Asia programme grew out of the initial development of ARARI as a project (1963-1973) under UNDP/FAO auspices. The other five countries (Afghanistan, Iran, Iraq, Pakistan and Syria) came to be included in the regional project (ref. 3) which followed the Special Fund project in Turkey. The IBPGR inherited this grouping and accepted it.

With the current project due to end in December 1979, it seems opportune to consider whether or not changes should be made in regional groupings and, if the project is to be extended, whether or not other countries should be invited to join the programme, for example, Jordan and North Yemen, both of which should be surveyed as soon as possible for crop genetic resources.

(ii) IBPGR's interest in and support of national programmes

It is evident that most of the countries participating in both the Mediterranean and the Southwest Asia regional programmes cannot support comprehensive genetic resources activities without considerable outside help. As basic requirements, however, countries must feel themselves to be nationally committed to the idea of genetic resource programmes and the interest and good will of indigenous scientists must be assured.

Whatever the decision about the level of outside help to national programmes, a special effort should be made to mount collecting expeditions in which national and foreign scientists participate when there is reason to think that the crop genetic resources of a particular region have not been sampled adequately. The policy of IBPGR should be to concentrate its assistance on situations where there is a perceived need and clear potential for success.

(iii) Regional Gene Resources Centres

It became evident during the Mission that the Germplasm Laboratory in Bari, Italy, is of great importance for the coordination of gene resources in the Mediterranean region. Moreover- the Laboratory is prepared formally to assume this role if so requested by the participants in the region. In the Southwest Asian region, it became clear that ARARI could, in principle, act in a similar capacity. This, however, would be politically unacceptable. A neutral site would have to be assured for any such venture.

(iv) Use of International Agricultural Research Centres

In seeking to fulfil its global mandate, the IBPGR relies upon certain of the CGIAR's International Agricultural Research Centres for assembling and maintaining major collections (for example: rice at IRRI; wheat and maize at CIMMYT, millets and sorghum at ICRISAT).

Although ICARDA feels that it cannot assume a regional coordinating role for diverse crops, it accepts an obligation to develop major collections of its mandate crops. This will surely be very valuable but the implications for IBPGR can only become clear as the ICARDA programme develops.

(v) IBPGR, National Gene Resources Centres and International Agricultural Research Centres

One has the impression that, so far, the emphasis in genetic resource conservation work has been on collection rather than upon maintenance. Despite the emphasis IBPGR has placed on crop priorities, manageable targets for collecting require to be more precisely defined in view of the difficulties most countries face in meeting the costs of maintaining the collections they already have. Moreover, in the near future, most of them may be asked to add vegetatively propagated crops to the list of crops for collection.

Thus it seems desirable that, from now on, IBPGR should pay more attention to the activities that follow collecting and to the cost of these activities, i.e. the costs of maintaining, evaluating and rejuvenating collections and of processing data. Events at ARARI illustrate the point. Financial constraints hamper follow-up activities, particularly in long-term storage (13,000 seed samples of diverse crops), in evaluation of the collections and in computerized data processing.

As mentioned above, ICARDA intends to assemble major collections of its mandate crops. It will also keep working collections of which it already has some 10,000 samples of chickpea, 20,000 samples of cereals and 5,000 samples of forage plants. IBPGR could be instrumental in helping to develop a profitable cooperation between ICARDA and the national germplasm centres in the Mediterranean and the Southwest Asia regions.

(vi) Training

The IBPGR has given valuable support for training, particularly through the M.Sc. course at Birmingham University. The need for this type of training is still evident, owing to resignations and transfer of trainees to duties other than in genetic resources.

At the same time, the need for other, often more practical, forms of training, in which technical assistants can participate, is also evident, especially now that several small national genetic resources units exist.

The IBPGR should consider how best to meet this demand, for example through a series of workshops dealing with the day-to-day operations of a gene bank, with the basic principles of cold store maintenance and with evaluation of samples in liaison with plant breeders.

(vii) Data Processing

So far as data processing is concerned, TAXIR and EXIR are being used at Bari and apparently meet requirements.

The attempt to introduce computerized data processing at ARARI has been a good deal less successful. By 1976, ARARI personnel had key punched data in readiness for TAXIR, only to find that nowadays EXIR is recommended rather than TAXIR. Consultants sent to ARARI this year to introduce EXIR failed to do so because EXIR could not be operated on the model IBM computer used by ARARI at Ege University. Thus processing of data at ARARI will be done manually until the appropriate software is acquired. Experience so far emphasizes the cost of buying time and the difficulties of access in competition with other users. In general, national institutes for genetic resources activities are in greater need of help in this field of activity than international agricultural research centres.

6. Conclusions and Recommendations

Conclusions and recommendations may be summarized as follows.

(a) In the Mediterranean region IBPGR should continue to encourage an increased responsibility of the Germplasm Laboratory at Bari for co-ordination of activities in the region.

(b) Inputs to achieve this must not, however, exclude such continuous contacts between IBPGR and national centres for genetic resources in the

Mediterranean region that are needed for providing (with outside help) such resources (financial and other) that otherwise may not become available to national centres.

(c) The IBPGR should employ a consultant in the Mediterranean region with responsibility for facilitating genetic resources work in the region.

(d) In the Southwest Asia region there are a number of problems. No national agricultural research institute has such a standing in the region that it would be accepted as a regional centre for genetic resources activities. ARARI in Turkey most nearly fulfils the requirements but it lacks the confidence of scientists in the other nations in the region. ICARDA is not structured to act as coordinating centre and cannot be given that responsibility. It could possibly host a unit for coordination, but even this is doubtful.

(e) The only evident solution is for IBPGR to employ a regional coordinator with adequate administrative powers and with sufficient financial support.

(f) It is clear that such a regional coordinator will meet a number of obstacles of scientific, administrative and financial character. He will also meet a number of problems caused by the political instability in the region.

(g) A regional coordinator is most likely to be successful in his work if he is directly responsible to IBPGR.

(h) For both the Mediterranean and the Southwest Asia regions, IBPGR should, through its regional coordinators take the initiative to establish contacts and to promote cooperation between ICARDA (and possibly other international agricultural research centres) and national research institutes and authorities.

(i) IBPGR should give increased attention to the training of staff for gene resources work, emphasizing those activities which follow after collecting, i.e. evaluation, rejuvenation and maintenance.

(j) Data management presents problems for national institutes engaged in genetic resources work and the IBPGR will need to be prepared to help in this connexion.

7. Itinerary and Programme

| | |
|---|---|
| 30 September 1979 | Rome - Izmir by air |
| 1 October | Izmir - Discussions with Dr. K. Temiz, Director Aegean Regional Agricultural Research Institute (ARARI), and Dr. Ayla Sencer, Head of Systematic Unit ARARI |
| 2 October | Izmir - Discussions with Mr. K. Alpman, Head Generative Conservations & Seed Physiology ARARI, Mrs. Nedret Settar, Head Documentation Unit ARARI, Ms. Ayfer Tan, Documentation Unit ARARI and Ms. Gail A. Vonborstell, IS/GR Boulder. |
| 3 October | Izmir - Final discussion with Dr. K. Temiz, Director ARARI |
| | Izmir - Beirut by air |
| 4 October | Beirut - Brief discussion at ICARDA Beirut Office with Dr. Mohamed Nour, Deputy Director-General, Dr.J.P.Srivastava, Leader Cereal Improvement Programme, Dr. T. Matheson, Plant Breeder Cereal Improvement Programme, Dr. Ahmed Osman, Forage Improvement Programme, Mr. J.J. Bourgeois, FAO Associate Expert Plant Genetic Resources. |
| | Beirut - Terbol by car. Visit of ICARDA's Terbol Experiment Station for medium altitudes; accompanied by Drs. Srivastava, Matheson, Ahmed Osman and Mr. Bourgeois. Discussions with Mr. A. Alameddin, Head, Plant Breeding Department (Cereals and Legumes), Agricultural Research Institute Tel-Amara, Rayak, Mr. Mimir Sughayyar, Station Operation Engineer and Mr. Nicolas Rebeiz, Senior Technician, both of Terbol Station. |
| | Night at Beirut |
| 5 October | Beirut - Further discussions at ICARDA Office with Dr. Mohamed Nour, Dr. J.P. Srivastava, Dr. T. Matheson, Dr. Ahmed Osman, and Mr. J.J. Bourgeois. |
| 6 October | Beirut - Final discussion at ICARDA Office with Dr. H.S. Darling, Director-General of ICARDA, Dr. Mohamed Nour, Dr. Matheson and Mr. Bourgeois. |
| | Beirut - Rome by air |
| 7 October | Rome - Bari by air |
| 8 October | Bari - Visit to the Germplasm Laboratory, Bari. Discussions with Dr. E. Proceddu, Director, Germplasm Laboratory. |
| | Bari - Rome by air |
| 9 October | Rome - Report writing. |

## 8. Documents Consulted

(1) The Collection, Evaluation and Conservation of Plant Genetic Resources, Report of TAC Ad Hoc Working Group held in Beltsville, U.S.A., 20-25 March 1972. TAC Secretariat PAB:IAR/72/11, 4 April 1972.

(2) International Board for Plant Genetic Resources, First Meeting, Rome, Italy, 5-7 June 1974, IBPGR Secretariat, AGPE:IBPGR/73/6, October 1974.

(3) Exploration and Conservation of Plant Germ Plasm in the Near East by K.S. Dodds, Review of Project Results - AG:TF/REM/5 (SWE), FAO 1977.

(4) Programme and Budget Proposals for 1979-80, IBPGR Secretariat, AGPE:IBPGR/78/11 May 1978.

(5) TAC Quinquennial Reviews of the International Agricultural Research Centres, "Terms of Reference" and "Guidelines for the Quinquennial Reviews", TAC Secretariat, DDD/TAC:IAR/78/11 Rev. 1, 1978.

(6) TAC Quinquennial Review of IBPGR, Progress Report, TAC Secretariat AGD/TAC:IAR/79/9, 1979.

(7) Report of the TAC Mission to the IBPGR Programme at Boulder, Colorado (USA), TAC Secretariat, AGD/TAC:IAR/79/18 Rev. 1, April 1979.

(8) A Review of Policies and Activities 1974-78 and of the Prospects for the Future, IBPGR Secretariat, AGPE:IBPGR/78/24, Rev., May 1979.

(9) Genetic Resources Proposals for ICARDA - Germplasm Maintenance & Security within ICARDA by E.M. Matheson, ICARDA - Aleppo, 3 May 1979

(10) Project Progress Reports, TF:REM-31 (IBPGR) 1 January-30 June 1978; 1 July-31 December 1978; 1 January-30 June 1979.

(11) Report of IBPGR Regional Meeting on the Mediterranean Germplasm Programme, IBPGR Secretariat, AGPE:IBPGR/79/20, July 1979.

(12) IBPGR Annual report, 1974, AGPE:IBPGR/75/3, June 1975
1975, AGPE:IBPGR/75/47, April 1976
1976, AGPE:IBPGR/76/27, March 1977
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1978, AGPE:IBPGR/79/8, May 1979

(13) Program of Work and Budget: 1980, ICARDA, March 1979.

## 9. Acknowledgements

The Mission wishes to express its gratitude to the IBPGR Secretariat and to Dr. K.S. Dodds for their valuable assistance in providing background information and in clarifying matters under discussion. The Mission also wishes to thank the Directorates of ARARI, ICARDA and the Germplasm Laboratory, Bari, for arranging informative discussions with them and their staff and for their generous hospitality.

APPENDIX II

IBPGR QUINQUENNIAL REVIEW

Report on a Visit to Latin America and North America

5 - 17 November 1979

CONTENTS

Report on a Visit to Latin America and North America

5 - 17 November 1979

1. Introduction

The visit to Latin America and North America was part of the three missions which were launched to study the activities promoted by the IBPGR at national and regional level before the meeting of the Review Panel in Rome in early December 1979. Each of these missions was to be conducted by a member of the Review Panel. Unfortunately, the Panel member who was designated for the visit to the Latin America and North America was unable to make the mission due to unexpected and compelling reasons. The mission was made by the two persons who were requested initially to accompany and assist the Panel member: Dr. W. Kugler, member of the IBPGR and roving consultant of the Board for Latin America on a half-time basis and Mr. P.J. Mahler, Executive Secretary, TAC.

As no Panel member participated in this mission, the report contained initially detailed information on the places visited and identified issues for further consideration by the Panel. This abbreviated version was then prepared to be appended to the Panel Report.

2. Itinerary

The itinerary of the mission was as follows:

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|---|---|
| 4 November | Visit to CIP, Peru |
| 6 " | Visit to La Molina University, Peru |
| 7 " | Travel to Costa Rica |
| 8-9 " | Visit to CATIE, Turrialba, Costa Rica |
| 10 " | Travel to Mexico |
| 11-12" | Visit to CIMMYT, Mexico |
| 13 " | Visit to INIA 1/, Mexico |
| 14 " | Travel to Fort Collins, Colorado, USA (Mahler only; Dr. Kugler returns home) |
| 15 " | Visit of NSSL 2/, Fort Collins - Travel to Washington |
| 16-17" | Completion of the Report |

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1/ INIA = Instituto Nacional de Investigaciones Agricolas

2/ NSSL = National Seed Storage Laboratory

3. Visit to CIP

The visit to CIP took place on 5 November. A full day was spent at the Headquarters of the Centre. The people met were Dr. R.L. Sawyer, Director General, Dr. R. Rowe, Deputy Director-General, Dr. O.T. Page, Director of Research, Dr. C. Ochoa in charge of collection, taxonomy and maintenance of the wild* Solanum species, Dr. Z. Huaman in charge of maintenance and data management of CIP primitive cultivar germplasm and Dr. H. Mendoza, in charge of several programmes of utilization of genetic resources of Solanum.

3.1 General

The mandate of CIP, as established in 1971, includes the collection and conservation of genetic resources of potato and its wild relatives on a worldwide basis. When IBPGR came in existence in 1974, therefore, the Board had merely to endorse a responsibility which CIP had already taken and a programme which the Centre was pursuing vigorously.

The programme has been guided by a series of Planning Conferences which have been held in 1973, 1976 and 1979. These planning conferences involve a small group of advisors (6-7) including the Executive Secretary of IBPGR and specialized scientists which are active and knowledgeable in this field of potato genetic resources. Very few specialists exist in this field and therefore the planning conferences have been attended mostly by the same group of persons or by people coming from the same institutions which are active in this field (i.e. in the USA, UK, Netherlands, FRG, and Denmark). In addition to the staff concerned in CIP, two former staff members from Latin America who now have responsibilities for potato collection in their country also participate.

The planning conferences review the status of germ plasm conservation, the progress made by CIP and others in this field and makes a series of recommendations for future activities. These recommendations are primarily addressed to CIP but also to the scientific community working in this area. In practice, these conferences serve as coordinating mechanisms between the institutions involved, in particular as regards the exploration missions in priority regions, the storage of duplicate collections and the development of a common data base.

The IBPGR found this arrangement satisfactory and considered that these planning conferences play the role of a Crop Advisory Committee. The Board has therefore accepted the view of CIP that the establishment of a Crop Advisory Committee for potato was unnecessary.

The Panel should further discuss with IBPGR the question of the composition of the group which advises CIP in this field. It should be noted

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* Tuber-bearing.

however that this mechanism has been useful in avoiding duplication of work between CIP and other institutions and mobilizing resources towards the priority areas.

3.2 Exploration and Collection

The exploration and collection of primitive cultivars by CIP is now considered as almost complete. Further work is necessary in few countries such as Mexico, parts of Colombia and Chile. More than 12,000 accessions have been assembled by the staff of CIP and also by donations to CIP of duplicates of the several national collections of Latin American countries.

The collection of wild species was given high priority by the 1976 Planning Conference. Out of some 170 species known, about 50 were not in living state at that time. CIP has launched 12 expeditions and recuperated 18 of these species in living state. This type of work does not seem to attract young scientists in the region. Nevertheless an effort should be made to develop an autochtonous capacity for plant exploration in the region. For the moment the only alternative is for CIP to call on expatriates to carry out this work in cooperation with its staff.

The material collected is divided in several parts. One part is offered to the local institutions of the country. Some countries are interested to keep this material but do not have sufficient capacities for maintenance (facilities and staff). Others are not interested. The wild species are not stored at CIP but sent to Sturgeon Bay, Wisconsin for conservation. At the present stage, CIP does not wish to build up the additional greenhouses and other facilities which would be required to maintain these collections of wild species.

The collection of wild species by CIP has made considerable progress. In three years CIP has collected about one-third as much as what had been collected so far by expeditions before 1976. One of the questions to be further discussed by the Panel is whether more of this material should be maintained in the region of origin either at CIP or at other institutions in Latin America.

3.3 Maintenance, documentation and distribution of germ plasm

Most of the available collection originates from Peru (73%), Bolivia (7%), Colombia (3.8%) and Chile (7.4%). Other countries of origin are Ecuador, Argentina, Venezuela and Guatemala. Some 3,500 duplicates have been identified by morphological observations at CIP supplemented by biochemical analysis carried out in FRG (amino acids and enzymes). A computer programme is also used to identify duplicates. This collection has been thus reduced from some 12,000 to 9,000 accessions. Further elimination of duplicates should enable CIP to take a more active role in maintaining the collection of wild species.

The maintenance of these clones is very risky. Assembling the material also implies assembling the diseases which they carry. Bad weather may also harm the collection. Tubers are kept in three places at Huancayo, Peru, where the whole collection is planted each year, at La Molina in cold storage and at Bogota, Colombia in cold storage also.

True seeds are kept in Peru, Fort Collins and Sturgeon Bay, USA, and at Braunschweig, Germany.

The collection will also be transferred gradually (some 200 samples per year) to be grown in another country (Colombia).

The characterization of the accessions with standard descriptor lists is in progress. 6000 accessions were characterized with 16 descriptors, 3000 others with 9 descriptors. In addition, all accessions have information on provenance. The data have been recorded in catalogues which have been put in computer-readable form at Boulder. This data base will now be sent back to CIP with a series of programmes and a minicomputer. The computer available at times was considered too small and too expensive for the use of EXIR. Other software now developed at Boulder (GDM and REX) will be used. It will also provide a programme for identification of duplicates.

CIP has taken a number of steps to ensure a better phyto-sanitary control of its collections, in particular for those of viruses. An outbreak of the spindle tuber viroid last year has seriously limited the movement of germ plasm material. This problem has now been overcome. The increased use of tissue cultures and of botanical seeds should assist in ensuring the phyto-sanitary control of germ plasm.

It should also be noted that neither CIP nor IBPGR have formal agreements with the institutions which store duplicates of CIP collections. It seems that these institutions do not have legal obligations as regards the maintenance of this material and their distribution to users in specific regions of the world. This appears to be a general question of concern to other centres which the Panel should address.

A major obstacle to the movement of material for identification and/or storage is the fear from certain institutions in Europe to import material from CIP especially as regards wild species, which may carry diseases. CIP may require larger quarantine facilities in this respect.

### 3.4 Use of germ plasm in breeding programme

The germ plasm is being systematically screened for specific characters. Gene pools are then established which are used by the breeders. Most of the distribution of germ plasm by CIP to other countries takes place in this form rather than in the form of specific accessions in the germ plasm bank. The CIP scientists argue that the individual accessions usually have a number of undesirable characters and therefore are of little interest for distribution to national programmes.

It was understood that gene pools with specific attributes (i.e. for highlands or lowlands, with certain disease resistance) are made up from the individual accessions by recurrent hybridization and selection of populations (and not of clones). CIP scientists use this method in order to maintain a broad genetic base in these pools and develop multigenic resistance to specific factors or diseases.

The material thus obtained is distributed to the CIP regional programmes which in turn distribute (after multiplication) to the national programmes. The choice of the material sent to a specific country is based on the experience which the CIP staff have of the ecological regions which it serves.

The maintenance of the genetic diversity in the genepools which are made of the individual accessions seem to be of a critical importance. The Panel may wish to address further this question as CIP plays a key role in the access which the national programmes have to the germ plasm collections of the centre.

## 4. Visit to the Agricultural University, La Molina, Peru

### 4.1 Background

Besides the visit to CIP, the purpose of the travel to Peru was to understand how the Board operates as regards its support to genetic resource conservation at national level. The University of Agriculture, La Molina, was taken as a sample of these activities as the Board had given three grants to this institution .

The persons met at the University were: Ing. Mario Zapata, Rector; Ing. Guillermo Parodi, Vice-Rector; Dr. Ricardo Sevilla, Head, Cooperative for Programme for Maize Improvement (PCIM); Dr. Alfonso Cerrate, Ing. Antonio Marrigue, Ing. Hugo Sanchez, staff members of PCIM.

Peru does not have a national structure nor a country-wide programme for genetic resource conservation. A national institute is now being established for agricultural research, a field which has been so far covered by the Universities of Agriculture in several provinces. Several of these universities have a long standing interest in genetic resources conservation, in particular that of La Molina, in the vicinity of Lima. Several departments of the University had already established collections for their training programmes and crop improvement research activities in the early 60s or even earlier.

The work of this University had been given international recognition, when the Panel of experts which met at Beltsville in 1972 suggested that this University should be invited to develop a regional centre for genetic resource conservation for the Andean zone. The choice of Peru for this centre had also been made taking into account the genetic diversity present for several crops in the wide range of ecological conditions of the country.

This project was not pursued further. The University however continued to maintain and expand its collections in cereals, potato and other tubers, beans, maize and vegetables. Cold chambers were established in several departments of the University for these collections.

4.2 The contribution of IBPGR to PCIM

The Board has given three successive grants to the Cooperative Programme for the Improvement of Maize: in 1977 to collect maize germ plasm in the coastal areas ($24,777); in 1978 to improve the maize germ plasm storage facilities ($18,792); in 1979 to collect germ plasm in the "selva" areas ($23,100).

(i) The collection missions - The grants for collection missions were given to assist in collecting local land races which were being replaced by hybrid maize in these areas. Other areas of the Andes had been already covered by collection missions by PCIM. Collection in these two zones were considered urgent as valuable genetic material was at risk of disappearing. The grants were provided to help meeting travel expenses including rental of vehicles, labour and some collection equipment.

The project documents follow a standard format which gives specifications for the work, the personnel involved, the conditions in which the material will be stored, and the follow-up activities of evaluation.

When the visit was made to PCIM, the first collection project had been completed, while the second was going to be started in the following week. 728 samples had been collected in the coastal areas, covering about 50 land races which had been previously recognized (20 years ago).

3444 accessions had been already collected by PCIM since 1962, 2600 of which still have a germination capacity. 600 samples had also been received from NSSL Fort Collins for regeneration. These came from a collection of Peruvian maize by a Rockefeller Foundation team which included some 1000 samples, one-third of which was said to have lost their germination capacity.

All this material has been collected by the PCIM staff which have a long experience in this work and an intimate knowledge of the maize land races in Peru.

(ii) Storage facilities - PCIM was experiencing difficulties in maintaining its three cold chambers in adequate working conditions. IBPGR agreed to give a grant to improve storage conditions of the largest chamber helping PCIM to buy and install new equipment for refrigeration and for the storage of samples.

At the time of the visit, the material appeared to be very well kept. Computerized registers were maintained on provenance and main characteristics as well as data for the management of the collection (germination tests, regeneration, etc.). These data were assembled following the standard record formats of IS/GR.

A main difficulty is in the considerable amount of work involved in the regeneration of the collections and in their evaluation. These tasks will in general compete with the more urgent work of crop improvement at national level, unless genetic resource conservation and breeding are entrusted to different institutions.

The Panel may wish to address further the above questions in particular the extent to which the Board should be involved in helping national institutions to evaluate and rejuvenate their collections.

Another question which comes to mind when observing the successful impact of the IBPGR grants in Peru is how this impact could be expanded further by some multiplying effect mechanism. This could be achieved in several ways:

(i) using the national expertise to train some people in the country or in the region for this type of work;

(ii) using this national expertise to assist other countries in collecting their material and building up their national programmes of genetic resource conservation;

(iii) raising the level of responsibility of a national programme and giving to it a regional role for genetic resource conservation in a certain field.

All these possibilities seem to have been examined by IBPGR. The Panel should seek clarification on the strategy of the Board in this respect and inquire on the next steps which would follow the granting of funds to individual national institution for collection and storage.

The distribution of duplicates poses also problems in several ways. PCIM has accepted (in the contract giving the grants for collection) to make duplicate available to another institution. Although PCIM has not found it possible to do it as yet, it fully agrees with this procedure. There was, however, some confusion as to the place where samples should be sent, i.e. CIMMYT which is the centre designated by IBPGR in the contract or NSSL (USA) which has recently requested a whole duplicate of the PCIM collections. The national programmes, when sending duplicates for long-term storage, wish to be assured that they can re-obtain samples of their collection in good germination conditions.

The long-term storage institutions are also expecting in some cases the national programmes to rejuvenate part of their collections and may send samples for regeneration to the country of origin for this purpose. This represents a considerable workload on a small programme in a developing country which sometimes cannot be afforded. The Panel may wish to advise in this respect on the best course of action.

The participation of a national institution in an international programme such as that of IBPGR promotes the exchange of information on its activities and as a result other countries learn of the material available and request duplicates of this material.

There is, however, a limit to the capacity of PCIM to meet these demands and probably a stage where these requests should be directed to some kind of central germ plasm conservation facility in the region rather than to a national programme.

## 5. Visit to CATIE [1/]

Two full days were spent at CATIE, Turrialba, Costa Rica. The people met were: Dr. N. Muñoz, Director of Research; Dr. J. León, Head of the CATIE-GTZ Genetic Resource Programme; Dr. H. Goldbach, Plant Physiologist; Ing. J. Engels, Plant Geneticist.

### 5.1 Background

The genetic diversity of the Mexico-Central America region has long been recognized both as including the centre of origin of several crops and for the wide range of genetic resources of crops introduced in the area. The region was placed on the priority list of the experts which met at Beltsville in 1972. This group of experts also recommended that CATIE host a centre for genetic resource conservation for the region.

As a follow-up of this Beltsville meeting, TAC recommended in 1973 as a third priority (after Izmir, Turkey and Ethiopia) that this centre be

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1/ CATIE = Centro Agronomico Tropical de Investigacion y Enseñanza is a regional independent centre established under an agreement between IICA (Instituto Inter-Americano de Ciencias Agricolas) and the Government of Costa Rica, Panama and Nicaragua and other institutions.

established at Turrialba under the auspices of IBPGR which was then being constituted. Meanwhile CATIE and FAO convened a meeting of experts on the use and maintenance of genetic resources in the Caribbean region at Turrialba in December 1973. Eighteen specialists of 11 countries attended. They reviewed the status of germ plasm collection in the region and established a plan for exploration, conservation, documentation, and plant introduction activities in the region. They also supported the recommendations which had been made before by the FAO Panel of Experts on Plant Exploration and Introduction and the TAC Working Group at Beltsville that a genetic resource centre be established at Turrialba in association with CATIE. They also stressed that the germ plasm conservation activities for maize and beans should continue in Mexico and Colombia.

GTZ, the German Agency for Technical Cooperation decided to support the establishment of two of the three centres recommended by TAC, i.e. one in Ethiopia and CATIE Turrialba. A GTZ mission was sent to CATIE to formulate a project. Meanwhile, IBPGR was established and the Board also sent a mission to CATIE in August 1975. The IBPGR mission recommended that the centre establish an Advisory Board nominated by IBPGR,but CATIE and GTZ found it difficult to implement this recommendation as both organizations had their own governing bodies.

The agreement between CATIE and GTZ was signed in December 1975 and the project started in July 1976. The framework of this bilateral arrangement also includes cooperation with the Institute for Crop Science and Seed Research of the Research Centre for Agriculture, Braunschweig - Volkenrode. The activities of this project are now entering a second phase ending in July 1981.

The relations between IBPGR and CATIE have been rather limited during the period 1976-1978. 1/ It is only recently that IBPGR has convened at CATIE a consultation on the genetic resources activities in Meso-America for two days in August 1979. This meeting recommended, inter alia, the establishment of an IBPGR Advisory Committee for the region with a secretariat provided by CATIE (see section 4.4 below).

Lastly, the Board of Trustees of CATIE have agreed to include in the organizational structure of the Centre a genetic resources unit, thus making these activities an integral part of the core programme of the Institute. This decision gives the possibility to this unit to receive funds from the core budget of the centre in addition to those of the special project with GTZ.

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1/ Except in that some contracts were taken with IS/GR.

## 5.2 Priorities for genetic resources conservation in the region

Priority areas and priority crops for collection mission in the region have been reviewed and changed a number of times. The TAC working group meeting at Beltsville 1/ made a first list in 1972. The FAO/CATIE consultation in 1973 made a more detailed list but felt that it had not enough information to classify crops and areas by priority order.

In 1975-76, the IBPGR established its overall list of priorities from a global point of view. Several crops which were not in the earlier lists for the region were added, whereas many others were deleted.

The regional priorities were then further reviewed by an IBPGR consultation held at CATIE in August 1979. The list of priority crops prepared by this consultation included many species which were not of a global interest and therefore were not included in the overall priority list of the Board. It should be noted also that several crops such as groundnut, potato, pigeon pea and sunflower which were placed on the IBPGR list were not recognized by the regional consultation as important for the region.

This brief analysis of the changes in the priorities has been made to draw the attention of the Panel on the need to clarify the process and the criteria by which the Board has established its priorities.

## 5.3 CATIE as a genetic resource centre

### (i) Organization and facilities

The CATIE/GTZ project is a cooperative programme in which GTZ mainly provides the funds for the scientific and technical personnel, the operating expenses, equipment, supplies and labour and CATIE mainly contributes land, building and administrative support services. The scientific and technical personnel comprise a botanist (project leader), a seed physiologist (in charge of seed collections), a plant breeder (specialized in documentation) and a horticulturist in charge of maintenance of living collections. GTZ also helped in funding the building of cold chambers and greenhouses. More than 30 hectares are used for the maintenance of living collections. In addition, other sites at different elevations are used for multiplication and rejuvenation of the collected material.

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1/ The region considered by the Beltsville group was larger and included South American lowland, and as priority crops Phaseolus beans, cassava, cacao, rubber, tropical fruits and tropical forage legumes. It did not include Guatemala and Mexico for which beans, corn, cotton, and cucurbits were given as priority crops.

(ii) Seed conservation

CATIE has a short-term storage cold chamber at 6°C of 55 sq. m. at 40-45% of relative humidity and a long-term storage room of 110 sq. m. at minus 20°C and 10-20% relative humidity. A drying room is adjoining the latter for the preparation and handling of the samples. This long-term storage room was built with the guidance of the Mississippi University and meets the IBPGR specifications.

The collections in the stores include some 5,000 entries: phaseolus beans (about 3000 accessions), tomato (400), cucurbits (800), peppers (250) and some other 50 species.

Several other species which are maintained in living collections have "recalcitrant seeds" which lose quickly their viability, in particular cocoa, coffee, and many fruit trees and tuber crops. Some of these can be stored only for a couple of years while others lose their viability in a few days. Work has been initiated to study the best conditions for their conservation 1/. These activities appear to have been launched independently from those supported by IBPGR at the University of Reading, although CATIE has been recently requested to send material to the latter.

Most of the material is stored for short-term conditions. Samples are now prepared for long-term conservation. An original procedure has been elaborated to store an accession in the form of a series of sub-samples in sealed aluminium foil envelopes which can be retrieved individually for distribution, germination tests or rejuvenation without disturbing the other sub-samples.

(iii) Living collections

Most of species on which the project works have to be maintained in living collections either because their seeds cannot be stored or because their production of seeds is erratic or inexistent. The main collections which have been established since many years at CATIE are those of coffee (1400 entries) and cocoa (300 entries). In addition, there are some 220 entries of fruit trees and 180 entries of the "pejibaye" palm. 2/

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1/ For some of these species, there is no knowledge available of the optimum conditions of storage or germination and even in some cases whether seeds can be stored or germinated at all.

2/ *Bactris gasipaes*.

In addition to the above tree species, several roots and tuber crops and vegetables which have to be vegetatively propagated are kept in living collections. Among these cassava (120 entries), several yams, cocoyams and taros (some 50 accessions), chayotes 1/ (100 accessions) and many others. A total of some 330 species of economic value are present in these living collections. In some cases, the material which is maintained in these living collections is unique in that it is not known to exist in other collections or in natural conditions. Several of these are maintained as a single plant of a single species and do not represent the variability. In this respect, the collections also serve as a botanical garden for the many students, research workers and other visitors which come to CATIE.

(iv) Exploration missions

These are conducted by the project staff and also by two local collectors, one in Guatemala and one in Colombia. These collection missions have been carried out in South Mexico and in several countries of Central America. In addition, the project staff has been associated with collection expeditions in Brazil and Peru.

(v) Introduction and exchange of material

In addition to the material brought recently by the exploration missions, CATIE used to receive material since many years from a number of sources and exchange material with other countries. Coffee and cocoa are the most important among the crops which are subject to this distribution of material.

Quarantine does not seem to be a major limitation to the introduction of material in CATIE's collection and the quarantine facilities established at CATIE have been used only in a limited number of doubtful cases. In the case of coffee, a USDA quarantine station is used as an intermediary before entering material from Asia and Africa.

CATIE considers that keeping material for possible introduction of new crops which are not grown in certain countries is as important as supplying new germplasm accessions for the improvement of crops which are already grown in the region. It has established close cooperation with botanic gardens and germplasm storage facilities in the region and in other continents for this double purpose.

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1/ Sechium edule, an important vegetable in Latin America and Africa which is grown commercially for export to Europe and North America. Chayote is the third vegetable in importance in Brazil.

(vi) Documentation

An elaborated system of punched cards which can be processed manually has been developed by the project to record data on the material, which is collected, stored, maintained and distributed. Lists of descriptors have been established for peppers, cucurbits, cocoa, and cassava. These descriptor lists were prepared in consultation with specialists of these crops and using available literature. It does not seem that IBPGR has been directly involved in this work although some contacts have been made with the Secretariat and contacts were established with IS/GR. The cooperation with IS/GR however served mostly to adapt the GDM programme to the microcomputer used by CATIE. CATIE has found this contribution very useful since its limited computer capacity did not permit the use of EXIR. The data on the large collections are being transferred from the index cards to computer storage. For many crops, however, the limited number of accessions does not warrant the use of the computer and index cards which can be processed manually are preferred.

(vii) Training

Four-month graduate courses are organized in the field of genetic resources and seed technology. The project also provides opportunities for in-service training for few students and for thesis work of some others. CATIE has also organized a ten-day seminar with participants of six countries in genetic resource conservation and documentation.

5.4 Prospects for future cooperation between IBPGR and CATIE

The IBPGR consultation on genetic resource activities in Meso America which was held at CATIE in August 1979 may be a new starting point for IBPGR/CATIE cooperation. The outcome of this consultation as regards priorities in the region has been reported on in section 5.2 above. The consultation also made a number of recommendations to IBPGR for future activities. Although it is not clear for the moment whether the Board will implement these recommendations it is felt that the Review Panel should be informed of several of these since they may have considerable importance in discussing the future strategies and plans of the Board in the region and elsewhere.

(i) The proposed Regional Advisory Committee

The consultation considered that a regional committee with government representatives was impractical at this stage and recommended that an IBPGR advisory committee be established for the future programmes in the region. The members (six in total with a fixed number of seats for each sub-region and alternates) would be selected by IBPGR and should meet every other year. The committee may establish specialized working groups as necessary. The Secretariat of the Committee would be provided by CATIE. This Committee should establish priorities and programmes for the consideration of IBPGR regarding genetic resource activities in the region.

The Panel may wish to discuss further the role of such advisory committees (one is already established for the South East Asian programme and its composition is fully representative). The respective roles of the Secretariat staff, of the Committee and, in this case, of CATIE, as Secretariat of the proposed Committee, should be clarified, in particular as regards the formulation and implementation of the programme and the channelling of funds. Another question is the role which such Committee may play as regards the national activities whereas its members are not nominated by the countries concerned but by the Board itself. It should also be noted that the geographical scope of this committee go beyond the field of jurisdiction of CATIE. 1/ The limited participation of the countries of the region in this consultation also raises doubts about the strength of these recommendations.

(ii) Proposed IBPGR/CATIE cooperative activities as recommended by the IBPGR regional consultation

The consultation held in August 1979 made a series of general recommendations on the needs of the countries of the region as regards exploration, storage, documentation and training. It is not clear as yet whether IBPGR will take action on these recommendations and how nor whether CATIE will be involved in their implementation. A comprehensive programme proposal which would translate these recommendations into specific action is lacking for the moment.

(iii) General remarks

The Centre has developed very good facilities for genetic resources conservation. These are still modest but are very well conceived and well run. These facilities and the staff are sufficient for the present programme. The size of the operation has not been expanded so far, knowing that CATIE may have to absorb this programme on its core budget. It will not suffice if the centre is taking a wider role as suggested below.

The major limitation to the expansion of the activities of the Centre is the available staff. Money is available for training and the problem is for the programme to meet concurrently the requirement for further collection, and maintenance of the material with those for training more staff. Some steps are taken in this direction. These could possibly be expanded and accelerated.

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1/ CATIE however has cooperative activities with several countries outside Central America.

The main reasons for the further development of the activities of the Centre are (a) genetic erosion is accelerating and involves many species; (b) the type of material on which CATIE works is difficult to collect, increase and to maintain; (c) the countries of the region need the co-operation of CATIE in their own programmes of genetic resources conservation (training, consultancies, collecting missions, storage facilities); (d) it is important that CATIE acts as a regional centre for major food crops of the region, having duplicates of the seed collections of the IARCs; (e) CATIE could expand its cooperation with countries in characterizing, evaluating, rejuvenating and multiplying its material. Otherwise the material collected risks to be lost or not to be used; (f) the project may serve as a model to demonstrate how a genetic resource centre can be organized and managed in a developing country. Other countries of the region or from elsewhere could be invited to send people who could study this model and learn from CATIE's experience on establishing this type of activities (building, collection maintenance, documentation, etc.).

A major obstacle in a wider use of the material collected is the difficulty to prepare and distribute samples of those species which do not set seeds or whose seed viability is very limited. It seems logical, therefore, that CATIE now tries to expand its capacities to provide vegetatively propagated material to other countries and have its own meristem culture facilities for vegetative propagation.

The cooperation with IBPGR is increasing but it is still leading to scattered activities. It is clear also that as long as GTZ is ready to support CATIE there is no reason for the centre to seek additional funds to IBPGR (which it can obtain from GTZ). It is not clear, however, that GTZ would support a wider expansion.

Should this expansion take place it will put more managerial and administrative burden on the programme and its present small team, (especially as far as the relations of the Centres with the national programmes are concerned if CATIE accepts to administer IBPGR funds for activities in specific countries). It seems therefore that an expansion of the staff should not only cover specialists but also some staff for the management and administration of larger-scale operations.

Such expansion, if accepted in principle, would of course require a plan for systematic collection, characterization of material, rejuvenation, multiplication in cooperation with countries and for exchange of material and information on a larger scale. If the countries of the region would be ready to take long-term commitments in this field and agree to CATIE playing a leading regional role and if CATIE would accept this wider role, then it could be the task of IBPGR in the next five years to assist in the planning and funding of a wider programme. IBPGR should also see to it that the IARCs concerned cooperate with CATIE in this respect. The development of CATIE as suggested above would, if implemented, probably require a more organized linkage between the Secretariat of the Board or the Board and the Centre.

## 6. Visit to CIMMYT

Discussions with the Directorate and the staff of CIMMYT [1/] were held on 12 November.

### 6.1 Genetic resources conservation and use in the Wheat Programme

CIMMYT has modest facilities for the conservation of wheat germplasm. It essentially maintains miscellaneous working collections for the purpose of its breeding programme. CIMMYT depends mostly on Beltsville USA and on the national programmes with which it cooperates as sources of germplasm material. The Beltsville collections have been grown twice at CIMMYT and the wheat programme staff has chosen within these collections the material which had a potential interest for their activities. Similarly, when the staff visit national nurseries during their travel abroad, and they find material which they do not have and could be useful, they request that a duplicate be sent to Mexico. As a result the collections are fragmentary in appearance but serve specific needs of the international breeding programme.

The material which comes from these national collections generally has a poor agronomic type and much of it cannot be used directly in the breeding programmes. One breeding unit at CIMMYT works on the transfer of desirable characteristics found in these new entries into lines with good agronomic type. The new material is screened for these characteristics and then crossed and back-crossed several times with lines of good agronomic type (earliness, stiff and short straw, day length insensitive, etc.). When the desirable characteristics have been transferred and fixed, the source may or may not be discarded.

The work on intergeneric crosses involves mostly wheat x barley and wheat with _Agropyron_, _Aegilos_ and _Elymus_. CIMMYT has recently recruited a cytologist to assist the breeders in this programme. The wild wheat relatives used come from US collections and not from the recent explorations missions carried out in the Middle East. The early types of wheat are not used at this stage in this programme. These activities are expected to be expanded and CIMMYT hopes in this way to renew the interest of advanced

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1/ Dr. R. Havener, Director-General; Dr. K. Finlay, Deputy Director-General; Dr. S. Anderson, Director of the Wheat Programme; Ing. Ricardo Rodriguez in charge of wheat germplasm development; Ing. Maximino Alcala, wheat international nurseries and germplasm conservation; Drs. Peter Goertz and Alejandro Ortega, maize advanced unit; Drs. Shivaji Pandey, Hugo, Zorilla, Dietmar Dehne, Maize Backup Unit; Dr. Elmer C. Johnson, Maize Special Projects, Dr. N.L. Dhawan, Maize International Nurseries.

research institutions in developed countries in this type of work. CIMMYT considers that the use of wide crosses can often be more effective in introducing certain new desirable characters in the wheat and barley germplasm than searching for these characters in local races of wheat or barley. This is, however, only one of the approaches followed by CIMMYT in a very complex programme of crop improvement.

The process of introducing new desirable characters in the material with good agronomic type necessarily involves a "narrowing down" of the genetic variability available in the sources where these characters are found. A wider diversity is introduced however when the gene pools so obtained are crossed with other material of multiple origins as part of the worldwide breeding process which CIMMYT operates and distributes through its international nurseries. Advanced material which is generated by the national programmes enters these international nurseries along with material developed by the CIMMYT breeders. CIMMYT keeps in its cold storage facilities (at 0°C and 40-45% relative humidity) small samples of each of the lines which enter these international nurseries. In this way CIMMYT has in store a considerable diversity of advanced germplasm material of wheat, barley and triticale which originate not only from the CIMMYT programme but also from the many countries with which the Centre cooperates. CIMMYT also keeps duplicates of parents and segregating material sent to national programmes while these programmes proceed with the further steps in selection. The national programmes have then the possibility to obtain from CIMMYT samples of the duplicates for these lines which prove to be of interest to them. The information on these lines is available in the reports which CIMMYT publishes each year on the result of these nurseries. There is a continuing flow of requests to CIMMYT for duplicates of these samples.

### 6.2 Cooperation of CIMMYT with IBPGR as regards wheat germplasm

CIMMYT has very limited facilities for germplasm storage of wheat, barley and triticale. For these reasons, CIMMYT has not been requested by IBPGR to take a worldwide responsibility for long-term storage for these crops; long-term storage facilities at VIR, USSR, NSSL, USA and Bari, Italy have been designated by IBPGR for this purpose. CIMMYT, however, cooperates with IBPGR in the framework of its Wheat Advisory Committee which the Centre has accepted to co-sponsor since 1978. The worldwide experience of CIMMYT scientists was found particularly useful in the Wheat Advisory Committee when deciding on priorities for collecting missions and also when elaborating the list of descriptors.

It should be noted that CIMMYT has recently agreed to store the main germplasm "land marks" in the development and improvement of triticale.

CIMMYT does not participate in the cooperative pilot project which IBPGR is launching to evaluate some 200 accessions at different sites and test the validity of the established system of descriptors but has offered and is prepared to collaborate if this is desired. The value of this type of activity for the centre is not clear and it seems that the role of IBPGR in evaluation of material requires further discussion. "Characterization" seems a better word than "evaluation" to describe these activities of the Board.

CIMMYT is going to enlarge its facilities for wheat germplasm handling and storage. This expansion is meant to serve the increasing needs of its programme. These facilities will also be used to receive on a selective basis material collected by the IBPGR missions. CIMMYT is also reinforcing its links with NBPGR/USA and will continue to use their collections as a major source of germplasm. It looks also for increasing activities of the Board in cataloguing other existing collections and to facilitate the access of CIMMYT to the material contained in these collections.

### 6.3 Conservation and use of genetic resources in the Maize Programme

Before the establishment of CIMMYT, Mexico had made in 1943 a bilateral agreement with the Rockefeller Foundation for a cooperative programme including the collection and evaluation of maize germplasm. The material collected at that time was described in a publication on Mexican maize land races. The collections were eventually handed over to the Mexico Maize Programme and then duplicated and stored at CIMMYT. These included mostly material from Mexico and also more accessions from other Latin American countries.

A larger collection programme was also mounted in Latin America with the help of the US National Academy of Sciences in 1966. Some 4,000 accessions were stored at four banks in Brazil, Colombia, Mexico and Iowa University. This material was also sent to Fort Collins. As its viability was insufficient NSSL sent the material back for regeneration in the countries of origin.

At present CIMMYT has some 13,000 entries in its maize germplasm collection. 200 of these are hybrids and varieties and the rest are land races. 5500 accessions originated from South America (3000 from Brazil, 600 from Peru, 4000 from Mexico, 2500 from Central America, 30 from the US, and others from other places including some from Asia). CIMMYT also has 78 entries of teosinte.

5800 entries have been rejuvenated. Material was sent to Fort Collins for long-term storage (7629 accessions). In addition, 200 land race composites and 700 groups have been made by bulking material of similar origin.

The maintenance of the germplasm of an open pollinated crop such as maize requires a considerable amount of work to regenerate and/or maintain the variability within one accession. The simpler procedure which is now followed involves 256 plants per accession and bulk pollination instead of plant-to-plant pollination. 350 entries are so regenerated every year. 3000 entries are more than 10 years old and will be regenerated in the next 10 years. Cooperators may be invited to help in this work and also in increasing seeds.

The evaluation process is associated with the procedure by which new accessions are entering the back-up tools. The procedure consists in growing an accession for observation at three locations at different elevations and then to compare them with the pools at two locations, before deciding on whether to include the accession in a given pool.

Another approach in introducing new germplasm in the maize improvement programme is the wide crosses which are being made by CIMMYT since 1975. These include crosses between maize and its wild relatives (teosinte) and between maize and sorghum. This programme is now being expanded as a means to introduce new variability in the germplasm material which CIMMYT uses in its breeding programme.

The material is stored in sealed cans in a cold chamber at 0°C and 40-45% relative humidity. Computerized registers have been established with the help of IS/GR Boulder for the management of the collections. CIMMYT also has a register which contains some information on the characteristics of the accessions. This catalogue is incomplete and search for specific accessions has to be done manually. Plans had been made for IS/GR to help CIMMYT in computerizing this catalogue with the GDN system. This is not likely to be achieved now that IBPGR is reducing its support to IS/GR. Nevertheless, CIMMYT may contemplate to undertake this work which is said to require a few months only.

### 6.4 Relationships of the maize programme with IBPGR

In 1975, CIMMYT "has agreed to assume primary responsibility for maize germplasm" 1/ and to co-sponsor the Maize Advisory Committee. There does not seem to be a clear agreement on the implications for CIMMYT of this responsibility as regards the collection of additional maize germplasm. IBPGR has not designated CIMMYT as depository for the main base collections. 2/ CIMMYT does not have adequate facilities for long-term storage which meets the IBPGR specifications. CIMMYT is in principle interested in keeping

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1/ IBPGR Annual Report 1975.

2/ NSSL USA; NIAS Japan and VIR USSR have been designated.

collections of all the tropical and subtropical germplasm but wants to remain selective in storing essentially the material which is of interest to its programme (chiefly that coming from Latin America and within Latin America the germplasm which it considers valuable for its programme).

As to the Maize Advisory Committee, CIMMYT has made important contributions to it in the elaboration of descriptors and in the selection of the priority areas for collecting missions.

IBPGR does not systematically consult CIMMYT on the maize collecting missions undertaken in Latin America. As the Advisory Committee meets every two years, the Secretariat of IBPGR consult the Chairman of the Committee on the requests for collection expeditions which are submitted in the interval.

There seems to be no formal agreement between CIMMYT and IBPGR by which CIMMYT agrees to receive duplicates of the material collected by the IBPGR missions, although the IBPGR project document specifies in certain cases that duplicates are to be sent to CIMMYT (when the Centre is interested in receiving this material).

CIMMYT would welcome the cooperation of IBPGR in solving special problems such as the methods for sampling the material during the collecting missions and the use of composites for storage instead of individual accessions. CIMMYT also stresses the urgency of collection missions in the Amazon region (these are now initiated by IBPGR) and in Asia.

## 7. Visit to INIA Mexico

The main institution in charge of genetic resources in Mexico is the National Institute for Agricultural Research (INIA). The Institute has established in 1977 a special unit for genetic resources. The visit was made to the Directorate of INIA and to the Genetic Resources Unit. 1/ The unit has now taken the overall responsibilities for collections which were long established in many experimental stations of INIA. The activities of genetic resources in Mexico started in the early 40s and have covered a large number of provinces where some crops had their origin in Mexico and others where crops were introduced and developed a considerable diversity. The main collections are those of beans (6000 accessions), maize (8000

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1/ The people met were Dr. E. Alvarez Luna, Director-General INIA; Dr. J. Moncada de la Fuente, Deputy Director for operations; and Dr. F. Cardenas Ramos, General Coordinator for the Genetic Resources Unit.

accessions), wheat and potatoes (undetermined number), sorghum (3000 accessions) and soya bean (1500 accessions). INIA also has collections in rice, cassava, lentils, barley and many vegetables and fruit trees.

Since 1977, INIA has accelerated its exploration missions. These are conducted by the national personnel specialized in specific crops and in agricultural botany in general. Some of these missions are conducted jointly with personnel from other institutions such as CATIE, USDA, CIAT. A comprehensive programme has been launched to rejuvenate the collections, evaluate the material with the established descriptors and maintain the collections of various types as working collections and living collections. Storage facilities at 0-5°C are available at Chapingo, Ciudad de Obregon, Sonora and Rio Bravo. For working collections, two other similar storage facilities are planned. In addition INIA is planning the establishment of a major central facility for long-term storage for which the support of IBPGR will be requested.

The support of IBPGR has also been requested for a collecting mission for Capsicum sp.

INIA has access to a major computer facility with which the use of the EXIR programme has been tried. More recently INIA has been in contact with IS/GR and has now a micro computer on loan into which the data on maize and beans are being entered using the GDN system. A staff member of IS/GR has helped to install the micro computer and establish the programmes which are now run by INIA personnel.

Although the germplasm unit of INIA has a core of experienced personnel (10 professionals), 1/ it feels the need for training more staff with the help of IBPGR, CATIE and some of the IARCs. INIA has established active relationships with a large number of genetic resource institutions in the region and elsewhere and is keen to play an important role in further regional cooperation in this field.

## 8. Visit to the National Seed Storage Laboratory (NSSL), Fort Collins, Co., USA

A short visit 2/ was made to NSSL which is one of the repositories which has agreed with IBPGR to store major base collections. NSSL has

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1/ Breeders in the experimental stations also contribute to the work of evaluation and rejuvenation of the material.

2/ People met during the visit were Dr. L.N. Bass, Director; Mr. D. Clark, Botanist (Data Management); Dr. E. Roos, Plant Physiologist (research); Dr. P. Stanwood, Agronomist (Germination, cryogenic storage).

specifically agreed to accept responsibility for storing base collections of rice (Mediterranean forms, temperate, South American and intermediate types from the USA; wheat - i.e. the US collection and a duplicate of Bari collections; maize - new world material; cultivated and wild sorghum; cultivated and wild pearl millet). 1/

Facilities at Fort Collins include a series of cold chambers with temperature controlled between -5o and -20oC; a laboratory for preparation of samples for storage and germination tests and a laboratory for research on seed physiology and cytogenetics of the material under cold storage conditions. Equipment for storage of liquid nitrogen and for data processing is also available.

The NSSL is the federal institution established under USDA/SEA for long-term seed storage. A policy statement establishes the rules under which this laboratory operates within US and in the relations with other countries.

There is no detailed formal agreement between NSSL and IBPGR. An exchange of letters between IBPGR and the Administrator for Science and Education has indicated the readiness of NSSL to store the material collected under the auspices of IBPGR and that of the IARC. Material may be received by NSSL as base collection for long-term storage or for temporary storage for collections which are in jeopardy until conditions permit safe storage in the country of origin.

For the time being NSSL plays the role of a warehouse for duplicates of material which are stored at CIMMYT, IRRI, CIAT. Botanical seeds of potato from CIP will eventually also be stored at NSSL. At the present stage, the parcels received from these centres and from Bari have been placed directly in the cold store. NSSL is in the process of reorganizing its collections and its catalogues. The parcels may eventually be opened and the material undergo the routine process for storage in aluminum bags after germination test, cleaning and drying.

Material has also been received from several collecting missions mounted by IBPGR, for example from Nepal and East Africa. In addition USDA has recently requested several countries to send duplicates of their collections to NSSL.

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1/ The Laboratory does not have a special register for this material and it was not possible during the short time of the visit to obtain detailed list of collections sent by IARCs and IBPGR.

The information on the material received from the IARCs and other sources as indicated above has not been recorded in the overall data management system operated by NSSL. The Laboratory will need additional shelf space to store this material and for the moment the information on this material is kept in the filing cabinets of the Laboratory.

Several data systems have been used in succession by the Laboratory. The Laboratory did not use EXIR as it was considered too cumbersome and expensive. The Laboratory concentrates at present on the data system for the management of the collections. It is also using this new system as a pilot project for two crops (Phaseolus vulgaris and Cyanopsis tetragonoloba).

NSSL plans to have basically two data systems: one for the management of the collection and another which would have a capacity for interactive processes with the users and may be accessible by the research stations throughout the US.

NSSL keeps in touch with the staff of LISA which has grown from staff formerly at Boulder but there are no cooperative projects between NSSL and LISA at this stage.

The policy of the Laboratory as regards material of foreign origin is the same as that of local provenance: any request for samples of accessions available in the collections will be referred to the institution which has originally provided duplicates to NSSL. For example, a request for samples of the maize collections sent by CIMMYT to NSSL would be referred to CIMMYT. Only in case the originator may not be able to provide the sample, NSSL would consider other arrangements.

The material which is sent from abroad goes first through the Germ Plasm Quarantine Centre at Beltsville for phytosanitary control. The material is not grown at this stage but the seeds are inspected and the phytosanitary certificates of the originator are checked. The material is then sent to NSSL for storage. If a sample of this material is requested for use in the USA, it will have to go through the Plant Introduction Station in the US for disease control prior to its release.

The cooperative arrangements between IBPGR and NSSL are still in an initial phase. The detailed responsibilities and the procedures have been clarified but do not seem to have been spelt out in a written agreement.

The Laboratory is in a stage of reorganization of its collections and of the related information. Although there are definite signs of goodwill and readiness to cooperate with IBPGR, it will take some time before the Laboratory undertake to store additional material in conditions similar to those of its own collections. For the time being, the Laboratory essentially acts as a warehouse facility for the material which is provided through the IARCs and IBPGR.

As this cooperation further develops, it will be essential for the NSSL to have from IBPGR a more precise information and advance notice on the collection missions which are requested to send material to the Laboratory. The specifications for the samples to be sent to NSSL (in particular the minimum number of seeds) will also have to be determined. A meeting of the curators of the international and national collections with NSSL may help to develop a better understanding of their respective responsibilities and of the procedures for their cooperation, in particular as regards the regeneration of the collections and the distribution of material.

## 9. Main observations and issues for the consideration of the Panel

There is a considerable amount of ongoing activities in Latin America in the field of genetic resources conservation. Some of these were initiated several decades ago, others more recently. The Board has since 1976 promoted these activities through regional meetings and grants to national institutions and IARCs. (Some 25 grants for about half a million US dollars):

(i) The most tangible results of these grants are the collection of additional material (mostly maize, forages, Phaseolus beans, Solanum species, Andean grains and tubers, and groundnuts) and the improvement of storage conditions, organization of collection and documentation at several national and international centres.

(ii) The cooperation of national and international institutions has been increased through several meetings convened or sponsored by IBPGR (for maize germplasm in the Southern Cone, for various species in Meso-America).

(iii) Several national programmes and international centres appreciate the help of IBPGR (i.e. through IS/GR) in establishing computerized data systems for the management of their collections and also, in a few cases, for storing detailed information on the material collected and evaluated with established descriptors.

Several other initiatives have been taken concurrently without the direct support of the Board. The most important are the establishment of the CATIE/GTZ programme in Turrialba which could probably serve as a model and a training ground for the national programmes which plan to establish modest but effective facilities for germplasm conservation; the establishment of GENARGEN in Brazil (which was not visited by the mission)and of the Genetic Resource Unit of INIA in Mexico . These two national institutions have both central facilities and actual or proposed storage and evaluation programmes in their regional experimental stations.

The interventions of the Board in the region took into account these parallel activities and tried to complement and capitalize on the past and ongoing work. For these reasons, the activities of the Board may at first sight appear scattered, somewhat unrelated, and opportunistic. In fact, the Board tried to take advantage of the expertise and interest shown in different institutions to get as much collection work under way as possible, and to cope with emergencies, in particular as regards the deterioration of the material already collected. As a result, most of the institutions visited do not have a clear understanding of their long-term commitments vis-à-vis the Board.

The Panel may wish to discuss with the representatives of the Board whether the time has now come to develop regional mechanisms and cooperative programmes which would give more cohesion to its activities in the region and so enhance the impact of the grants which have been distributed so far. The priorities in terms of crops and subregions could be reviewed at this opportunity, taking into account those of the countries concerned. It would be also important to examine whether the geographical distribution of the activities of the Board and of the material collected actually correspond to these priorities and whether some imbalance should be corrected. Similarly, it seems necessary to examine in more depth the implications of the growing quantities of material collected in terms of storage, maintenance, cataloguing, rejuvenation, duplicates for long-term conservation, use in breeding programmes, etc.

All the institutions visited showed a growing concern for the additional workload which their cooperation with the Board is creating. It seems therefore essential that the Board assist these institutions in sharing this workload and in clarifying their respective roles and responsibilities, in particular those for storage (short-term and long-term), rejuvenation and evaluation.

Most of the institutions visited consider that the lack of trained personnel in the countries of the region is a major obstacle to the development of their activities and would wish the Board to be more active in this field. The need for a clear political commitment at the government level appears to be an essential first step in establishing a national focal point-institution for genetic resources conservation and for regional cooperation.

An important aspect of the maintenance of the genetic diversity is related to the methods and procedures by which the collections are used to make gene pools (back-up pools) for the international crop improvement programmes. It would seem important that the Panel discuss with the Board the role which it could play in this respect in cooperation with the IARCs.

Several institutions visited have suggested that the Board should be more active in promoting basic research on several problems which have a bearing on genetic resources conservation. These include the methods of conservation and exchange of vegetatively propagated material and of the recalcitrant seeds; the methods of rejuvenation of collections in particular for open pollinated crops; the taxonomy of some of important crops (e.g. Phaseolus); the cytogenetic changes of the material under storage; long-term storage in liquid nitrogen. The methods of collecting samples during the exploration missions should also be examined. Biochemical methods to identify gaps and duplicates in the existing collections should also be promoted.

The establishment of an international code of conduct or international convention for the collection, movement and custody of germplasm between countries has also been suggested.

All the above suggestions, if supported by the Panel, would probably lead to an increasing demand on the financial resources of the Board. The Board has so far used essentially its "core" resources for its programme. The Panel may wish to discuss with the representatives of the Board the possibility of using extra-core resources, i.e. special projects as commonly used by the IARCs.

The Secretariat has established a standard format for the contracts between the Board and other institutions. This format has been well conceived to make sure that the activities financed by the Board meet certain specifications. It would seem essential that in addition the Board spell out the methods and the criteria used for deciding the allocation of its resources to specific institutions. The respective roles of the Secretariat, of the Crop Advisory Committees, of any regional committee which may be created and of the IARC concerned (when applicable) should be clarified in this respect.

The above observations should be examined in the context of the generally very positive impression which has been gained throughout the mission, of the important and useful role played by the Board in the region.

## 10. Acknowledgements

The kind cooperation and hospitality of the persons met during the visits at CIP, PCIM, CATIE, CIMMYT, INIA and NSSL 1/ are gratefully acknowledged. Thanks are due also to the IBPGR Secretariat for the preparation of the mission and the background documentation provided.

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1/ The list of the persons met is given in the sections of the report related to each of these institutions.

## 11. Documents Consulted

1. Summary of major activities of IBPGR in Latin America (past, present and future)

   Annex I - Training for Latin America

   Annex II - IBPGR funded projects in Latin America

2. Programa Cooperativo de Investigaciones en Maiz, Universidad Nacional Agraria La Molina, Lima, Peru

3. Programa de Recursos Genéticos CATIE-GTZ

4. IBPGR: Informe de la Consulta en Actividades sobre los Recursos Genéticos en Mesoamerica

5. Informacion general sobre la Unidad de Recursos Genéticos del INIA de Mexico

6. Extract from CIMMYT Review 1978

7. Extract from the CIP Annual Report 1977/78 and the TAC Quinquennial Review Mission to CIP

8. Plant Genetic Resources: Conservation and Use National Plant Genetic Resources Board (USA)

APPENDIX III

# IBPGR QUINQUENNIAL REVIEW

## Report on A Visit to Asia

8 October - 22 October 1979

CONTENTS

## Visit to Asia - 8 October to 22 October 1979

### 1. Itinerary

The mission to Asia was composed of Prof. N.W. Simmonds, Panel Chairman and Mr. S.A. Risopoulos, Deputy Executive Secretary, TAC.

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|---|---|
| 8 October | - Left Edinburgh and Rome, respectively, and travelled overnight |
| 9 October | - Arrived Delhi early morning |
| 10 October | - At Delhi |
| 11 October | - Travelled Delhi - Hyderabad |
| 12-13 October | - At Hyderabad |
| 14 October | - Travelled Hyderabad - Bombay - Jakarta, arriving in the evening |
| 15 October | - At Jakarta, to Bogor |
| 16 October | - At Bogor, returned to Jakarta |
| 17 October | - Travelled Jakarta to Manila in the morning, to Los Baños in the afternoon |
| 18 October | - At Los Baños |
| 19 October | - Travelled via Cebu to Davao, arriving early afternoon |
| 20 October | - Returned to Manila in the morning and travelled on to Bangkok in the afternoon |
| 21 October | - At Bangkok in the morning, left for Europe in the afternoon |
| 22 October | - Arrived Edinburgh and Rome, respectively. |

### 2. Introduction

We travelled (8-22 October 1979) through India, Indonesia, the Philippine Islands and Thailand. Contacts with local scientists from whom we sought advice had been well prepared by the TAC-IBPGR Secretariats. From each person or group we met we tried to elicit a general discussion of and views upon the working of the IBPGR , its usefulness in the past and possible priorities for the future. The purpose of this report is formally to record the main facts relating to our visits and to indicate the tenor of our discussions. No attempt is made to draw general conclusions about Board policy; these must be reserved for the collective report of the Panel. Nor do we attempt to describe the many interesting but essentially subsidiary discussions we had on plant breeding and other agricultural matters, useful though these were in filling in the background against which the IBPGR must operate.

### 3. Observations

#### 3.1 India - New Delhi

We had several long talks with Dr. K.L. Mehra, Director of the National Bureau for Plant Genetic Resources (NBPGR). In company with Dr. Mehra, we also had the privelege of talks with Dr. M.S. Swaminathan, Secretary to the Government of India, Ministry of Agriculture, and long eminent in the affairs of the CGIAR/ TAC; with Dr. H.K. Jain, Director of the Indian Agricultural Research Institute; and with Dr. C. Kempanna, Deputy Director-General, Indian Council of Agricultural Research (ICAR).

The NBPGR was established in 1976 out of its predecessor (the Division of Plant Introduction) within the Indian Agricultural Research Institute (IARI); it is now autonomous and it is expected that the complement of scientific staff will rise to about 150 under the Sixth Plan. Serious interest in genetic conservation in India goes back some thirty years, so the total effort and commitment is very substantial. The NBPGR will ultimately provide a centralized collection-introduction-storage-distribution system for all crops on an all-India basis. It maintains seven stations and a network of contacts with the 24 agricultural universities and the numerous crop research programmes of the IARI. It is seen as, basically, a service to crops research and is soon to be paralleled by similar bodies with responsibilities for animals, fish and trees.

Of the many valuable points we picked up from these interesting discussions, the following seem the most important. First, there was no doubt of the value of the IBPGR and of the importance of its work, at all levels from the practical to the political. It was suggested that it might perhaps seek more consciously to inform and influence politicians, by way of brochures and selective seminars, using the good offices of FAO, a body that had enormous prestige as well as deep commitment to the idea of genetic conservation. Most discussions tended to view the IBPGR-NBPGR linkage as the natural one, placing less emphasis on regional organizations and the IARCs. The formation of a regional committee had been regarded as premature at the 1978 Workshop (ref. 1), but we understood that views might now be changing on this matter. As to the IARCs, the value of their work both in breeding and genetic conservation was not at all in doubt but we had the impression that relations with national bodies had not always been as good as they might have been. It seems that the Centres would do well to be as selfeffacing as possible in order to minimize damage to national susceptibilities. We learned later that Centres are indeed now very conscious of this and of the necessity of local development of their products through national agencies.

Two(related) points about the Board itself arose at one of our discussions. It was suggested that the Board was a diverse and rather distant body, with insufficient professional expertise and local knowledge to cover adequately the complex decision that it had to make. More expertise (on the Board itself or by way of special

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consultancy), plus formal regional representation were suggested as remedies.

At a more practical level, the value of training courses, and the desirability of the IBPGR providing help to local initiative in this connection, was repeatedly emphasized (a recurrent theme of later discussions). Dr. Mehra showed us the interesting book he and his colleagues had compiled for what had clearly been a very successful recent IBPGR/NBPGR course at Delhi (ref. 2). Other technical points of interest included the observation that the IBPGR will soon have to move away from seed-crops into the much more difficult area of clonal crops. This will generate new demands for supporting research and will draw attention to the problems of quarantine; what will the Board be able to do to minimize the difficulties of international movement of clonal materials?

Finally, it seemed to be pretty generally agreed that computing-documentation aspects of genetic research work had been too heavily emphasized in the early years of the work of the IBPGR.

3.2 India - Hyderabad

At Hyderabad we had the pleasure of several talks with Dr. M.H. Mengesha (Head of Genetic Resources Unit, ICRISAT) and also of productive discussions with: Dr. J.S. Kanwar (Deputy-Director, ICRISAT), Dr. R. Williams and Dr. R.W. Gibbons (ICRISAT); and with three Directors of All-India Coordinated Crop Improvement Programmes, Rajendranagar, namely: Dr. R. Seetharaman (rice), Dr. R.V. Vidyabushanan (sorghum) and Dr. Vikram Singh (oilseeds).

Once again, no-one doubted the value or importance of the IBPGR, especially as an instrument of awareness and influence at governmental level. The relationships between the AICCIPs and the appropriate IARCs (rice with IRRI, sorghum and groundnuts with ICRISAT) were obviously good and there was clearly an excellent flow of materials, ideas and people in both directions. Similarly, the Sorghum and Millets Committee (ref. 3-5) and the Legume Panel (ref. 6), promoted by IBPGR and centred at ICRISAT, were thought to be valuable agencies for information flow (though a tendency to press the Centre into genetic resource activities beyond the boundaries of its mandate crops was noted).

More generally, we wondered whether, when a major crop was fairly well collected and the mandated subject of a Centre, then the interest of the Board in that crop should decline. True, the Board would probably still need to promote information flow and might well support further collecting on a strictly limited ad hoc basis but the need for major involvement would have gone. In this situation, the crucial need for good working relations between Centres and national agencies deserves emphasis.

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Finally, we discussed extensively the connection between conservation and exploitation. All agreed that these were distinct functions which had, nevertheless, to be closely integrated. Neither breeding nor conservation should dominate the other. As to evaluation, it was felt that the extent to which this could be done in the collection itself was very limited; generally, breeders would have to do their own evaluations and data bases would be functionally separate.

3.3 Indonesia - Bogor

At Bogor we had the pleasure of several talks with Dr. Setijati Sastrapradja (Director, National Biological Institute, LIPI) and with her colleague, Dr. M.A. Rifai, both members of the Indonesian National Committee. Dr. Setijati is also a member (lately Chairman) of the IBPGR Regional Committee (ref. 9 et sqq) and has long been distinguished for her contributions to the work of the Board. We were, unfortunately, unable to meet the National Committee collectively, as had been planned, but were able to talk with two members in their offices: Dr. B.H. Siwi (National Agricultural Research Centre) and Dr. I.G.M. Tantra (Forestry Institute). We also met Dr. R.J. Deswert (Industrial Crops, a colleague of Dr. A. Mamid who is also a member of the National Committee).

We got many valuable points. The importance of the Board as an agent for influencing governments and for promoting awareness at all levels by judicious training programmes and publicity was repeatedly emphasized. It appeared that the Indonesian Government is already highly aware and, besides supporting substantial efforts on specific crops, is developing important legislation for the protection both of extensive forest reserves and also of designated field collections of tree crops. The latter is a particularly interesting idea because it would give the maintenance of perennial collections the force of law.

In view of the importance of perennial (often clonal) crops in Indonesian agriculture, it is not surprising that a good deal of thought had been given to the related problems of clonal maintenance, of non-storable("recalcitrant") seeds and of quarantine. We all recognized that these are questions with which the IBPGR will soon have to grapple, as the major annual crops progressively come under control.

As at Hyderabad, we found that the rice breeders had good working relations with IRRI and that excellent progress in collecting, conservation, exchange and exploitation was being made; Dr. Siwi showed us his new storage facility, soon to be commissioned.

Again, as elsewhere, we found that the view prevailed that conservation and exploitation should be distinct but complementary activities. Workers in charge of collection and plant breeders have large areas of common interest but distinct

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responsibilities. Similarly, Dr. Sastrapradja's distinction between botanical evaluation within the collection and agronomic evaluation somewhere else, with separate objectives and data bases, parallels the distinction also made in Hyderabad and elsewhere. On documentation, the trend of opinion was clear: that this activity (especially the computer aspects) had been overemphasized in the past. The use of computers should be secondary to the acquisition of well-founded data and might often be long (even indefinitely) delayed, depending on local circumstances.

### 3.4 Philippine Islands

We first visited IRRI and had the benefit of an introductory discussion of the work of the Institute with Dr. M.D. Pathak (Deputy-Director, in charge of the Genetic Evaluation Unit, GEU) followed by a talk with Dr. T.T. Chang on the work of the GEU in relation to genetic conservation. In company with Dr. R.V. Valmayor (Deputy-Director, Philippine Council for Agricultural Research and Resources, PCARR) we visited Dr. R. Lantican and his colleagues of the newly formed Institute of Plant Breeding, recently developed out of the long-established University Department. The Institute is acquiring new buildings on the Los Baños site and we walked round them; the buildings are in an advanced stage of construction and include a medium-term seed storage facility. Dr. Valmayor kindly accompanied us to Davao where we saw, in company with Mr. F. Lomuljo, the first stage of development of the base collection of bananas growing well on a very attractive site. Collection in the Philippines proceeds and the problems of introducing clones from other countries in South East Asia, and further afield, will soon have to be faced. At Davao we also saw something of the work of the Philippine Coconut Authority, by courtesy of the Manager, R.C. Blancaver.

Notable points at IRRI included the following: the insistence on a "low profile" whereby good varieties emerging from the GEU programme are named by the breeders/selectors in the countries concerned; the close collaboration between GEU workers at IRRI and breeders in other countries, along with the intensive biannual courses run for visitors; the close integration in the GEU programme of genetic resource conservation work in the rice collection proper with breeding programmes but the clear separation of functional responsibility for conservation and breeding (with separate data bases); we noted also the huge scale of the collection (ca. 60,000 entries and still growing) coupled with superb storage facilities (nearly complete) and locally-developed computerization.

In our more general discussions about the functions of the IBPGR, several of the, by-now, familiar points again emerged: the importance of promoting awareness at all

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levels by propaganda, publications and training; the importance of perceived national interest as an essential basis for effective regional organizations; the need to develop agreed descriptor systems as the basis sine qua non of documentation; the feeling that computerization per se had been somewhat over-supported in the past and that, when required, it should grow out of local needs with ad hoc adaptation to the local computing resources; and, yet again, the perception of technical and quarantine problems to come when clones and tree crops are tackled seriously.

### 3.5 Bangkok

Our stay here was short and we met only Dr. R.B. Sing, IBPGR Officer for S.E. Asia. Short as it was, we had several hours of intense discussion of great interest. Although he had only been in post for a few months, Dr. Singh had clearly started to become acquainted with his "parish" and had thought deeply and effectively about the functions of the IBPGR and his own responsibilities (ref. 17). Our talk ranged systematically over the whole field. Rather than try to summarize conclusions specifically, we shall only say that we found a high level of agreement between Dr. Singh's observations and our own views (which were, by then, beginning to crystallize into, we hope, a more coherent form than they had taken earlier). We took this to be an encouraging sign but note, cautiosly, that the Review Panel as a whole has yet to meet. At all events, Dr. Singh's perceptions of the IBPGR as a whole and of the situation in South East Asia will be of substantial value.

## 4. IBPGR achievements in the area

### 4.1 Preliminaries

South East Asia has shown, among the different regions of the world with significant crop diversity, unusual perception of the importance of genetic resource conservation. This was evidenced by the holding in March 1975 at Bogor of a Symposium on S.E. Asian plant genetic resources (ref. 8). It was the result of close collaboration between Dr. Setijati Sastrapradja (who was later to become a prominent member of the IBPGR and a driving force behind IBPGR regional germplasm conservation and coordination efforts), FAO and regional institutions such as the Regional Centre for Tropical Biology of the S.E. Asia Ministers of Education Organization. Among the recommendations made was one addressed to the newly created IBPGR for the convening of a regional working group which would prepare a regional cooperative plan for genetic conservation. This was agreed to by the IBPGR and effected in December 1976 in Manila under the co-sponsorship of the Philippine Government (ref. 9). The working group provided a current statement of the genetic

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resources work in the five participating countries (Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand), and of the programme of regional and international organizations which had a bearing on genetic resources conservation in S.E. Asia. During the discussions, points of agreement were reached which laid the foundation for a regional cooperative programme. An organizational framework and plan of action were provided, with targets for exploration and collection, priorities for crops and agreed sites for collection. This plan was approved by the IBPGR and agreed to by the five Governments. The latter agreed to nominate spokesmen to serve on an IBPGR Regional Committee.

4.2 The IBPGR Regional Committee for S.E. Asia

The first meeting was held in Bogor, Indonesia in July 1978, and a second one in Sanur, Indonesia in July 1979 (ref. 11 and 12). During such meetings, participating countries relate the progress made in genetic conservation, review the regional crop priorities, define procedures for moving accessions into base and working collections, identify training needs and relevant training programmes, consider and define IBPGR regional budget allocations to national and regional programmes. There is therefore an excellent interaction between IBPGR governments and national and regional activities, a linkage reinforced by the appointment of an IBPGR regional officer, Dr. R.B. Sing, located in the FAO Regional Office in Bangkok.

4.3 Regional Activity in South Asia

In this region, the coordinating role of IBPGR was slower to develop than in S.E. Asia. An IBPGR Working Group met in May 1978 in Delhi (ref. 1) under the co-sponsorship of IBPGR and the Indian National Bureau of Plant Genetic Resources. Representatives from India, Bhutan, Nepal and Sri Lanka identified national priorities for the collection of genetic material and formulated recommendations as regards collection, storage, information, training and liaison. Since the meeting Bangladesh has agreed to cooperate. At this stage no committee has been formulated but countries have been asked to nominate liaison officers.

4.4 Crop Advisory Committees

There are two centred in this region, one in IRRI (rice) and one in ICRISAT (sorghum and millets). The Rice Advisory Committee met in 1976, 1977 and 1978 (ref. 14, 15 and 16). A good record is kept of who sends what and to whom and agreements have been reached as regards storage descriptors and an action plan for collecting. The Sorghum and Millets Advisory Committee met in 1976, 1978 and 1979 (ref. 3, 4 and 5) and has identified the priority species and areas for collecting as well as advising on base storage. An explanatory Panel on legumes has also been held at ICRISAT (ref. 6)

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4.5 Grants made by IBPGR

The material assistance given by IBPGR went in S.E. Asia to the collection of tropical fruits (Indonesia, Thailand, Philippines), tuber crops (Indonesia), grain legumes (Thailand), rice (through IRRI), banana (Malaysia, Thailand, Indonesia), coconut (Indonesia), vegetables (Thailand). A base regional storage facilities is being assisted in the Philippines and additional small units funded for Indonesia and Thailand. In S. Asia, grants were given for the collection of cereals (India, Nepal), rice (through IRRI) and grain legumes (Bangladesh).

4.6 Training

The major feature of training in S.E. Asia were the regional courses on plant genetic resources exploration techniques at Bogor in 1977, 1978 and 1979, which were attended by a total of 50 trainees from the region. These IBPGR courses followed an FAO/UNEP/UNESCO course in 1975 at Bogor. This was complemented by a first regional training course on genetic resources documentation which was held in the Philippines in 1979 in which 16 trainees participated. In S. Asia, the first regional training course on plant exploration and collecting techniques was held in India in 1979 (ref. 2); it assembled 13 trainees. Seven trainees from either S. or S.E. Asia attended the two IBPGR courses at Edinburgh University on seed technology for gene banks which were held in 1978 and 1979. Seven trainees attended the two FAO/IBPGR courses on genetic resources information system which were held in Colorado University at Boulder. From 1975 to 1979, 26 students from S. or S.E. Asia followed the M.Sc. International Training Course in Conservation and Utilization of Plant Genetic Resources at Birmingham University, U.K. Three of these were supported by IBPGR. Others received grants from various sources, mostly from the British Government.

5. Summary

5.1 The main value of this journey lay in the opportunity it gave to fill out the impressions gained from reading the preliminary documentation and to get some feel for the views of the practitioners and users of the products of genetic conservation. In general, we found that the work of the Board has been and is highly appreciated in the area; it has made good ('though uneven) progress in stimulating interest, awareness, training and practical collecting/conservation activities.

5.2 The leading conclusions from the viewpoint of IBPGR strategy seem to be the following: (a) the importance of promoting awareness and interest at all levels from the governmental/political to the worker in the field; seminars, publications and training all have parts to play; (b) the basic nature of national commitment to the idea of genetic conservation, without which regional/international organization is unlikely to be fully effective - (a) is clearly a prerequisite for (b).

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5.3 At a more practical level the following points emerged: (a) the value of diverse technical training, adapted to personal needs, and ranging from prolonged courses at post-graduate level to short, intensive courses with much local emphasis, whether national or regional; (b) the technical problems of collection, maintenance and exchange of perennial crops, including clones and trees (often with short-lived seeds); the problems will be manifold, the solutions not easy; (c) the need for good descriptor lists internationally agreed and used; computerization, as and when necessary, should arise ad hoc from locally perceived needs; and (d) the essentially distinct character of conservation and exploitation; these are complementary activities implying distinct responsibility but close integration and collaboration.

5.4 The above points represent, fairly we believe, a consensus of opinions we received on our tour from colleagues in India and South East Asia; the Review Panel is not, of course, committed to agreement with them and will, in due course, form its own opinions. But we think it unlikely that the Panel will dissent substantially from them.

## 6. Acknowledgement

We acknowledge, with gratitude, the very generous way in which colleagues named in this report gave of their time and wisdom in helping us with our study. And we thank them also for many personal courtesies. Our best thanks are also due to FAO Offices in Delhi and Djakarta for help with practical arrangements.

## 7. References to Documentation

The following documents pertain specifically to our travels; papers relating to the IBPGR generally are listed in the collective report.

Delhi

(1) Report of IBPGR Workshop on South Asian Plant Genetic Resources, New Delhi, 1978 (AGPE:IBPGR/78/17), with subsequent brief report on progress)

(2) South Asian Training Course on Plant Exploration and Collection, New Delhi, 1979, ed. Mehra and Arora

Hyderabad

(3) Advisory Committee on Sorghums and Millets, I, 1976 (AGPE:IBPGR/76/17)

(4) Advisory Committee on Sorghums and Millets, II, 1978 (AGPE:IBPGR/78/1)

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(5) Advisory Committee on Sorghums and Millets, III, 1979

(6) Panel on Collection of Legume Germplasm, 1978

(7) ICRISAT, General Information, 1979

South East Asia (General

(8) South East Asian Plant Genetic Resources, Bogor, 1975, ed. Williams, Lamoureux and Soetjipto

(9) A Cooperative Regional Programme in Southeast Asia: a proposed organizational framework and plan of action, Los Baños, 1976 (AGPE:IBPGR/76/37, 1977)

(10) Proceedings, Southeast Asian Workshop on Plant Genetic Resources PCARR/IPBGR, Philippines, 1977)

(11) Regional Committee for Southeast Asia, I, Bogor, 1978 (AGPE:IBPGR/78/20)

(12) Regional Committee for Southeast Asia, II, Sanur, 1979 (AGPE:IBPGR/79/39)

Indonesia

(13) Pamphlets on the activities of the National Biological Institute (LIPI), the National Germplasms Committee and the Southeast Asian Regional Committee

Los Baños

(14) Proceedings of the Workshop on Genetic Conservation of Rice, IRRI, 1977 (pub. 1978)

(15) Advisory Committee on Rice, I, IRRI, 1976 (AGPE:IBPGR/76/9)

(16) Advisory Committee on Rice, II, Beltsville, 1978 (AGPE:IBPGR/79/19)

Thailand

(17) Terms of Reference for Dr. R.B. Singh (IBPGR note, no ref. no.) and Dr. Singh's observations on a list of questions addressed to him.

APPENDIX IV

# IBPGR QUINQUENNIAL REVIEW

## Visit to Department of Plant Biology, Birmingham University

22 - 23 November 1979

CONTENTS

Visit to Department of Plant Biology,

Birmingham University, 22-23 November 1979 1/

1. Introduction

The purpose of the visit was to learn something, at first hand, of the MSc course in Conservation and Utilization of Plant Genetic Resources run by Prof. J.G. Hawkes. The course has been supported by the IBPGR for some years and the need to know something of its structure and working had become clear during the preliminary work of the IBPGR Quinquennial Review Panel. With TAC approval, therefore, and the kind agreement of Prof. Hawkes, I visited Birmingham on 22-23 November 1979, travelling down overnight from Edinburgh on November 21 and returning late in the evening of the 23rd.

2. Historical

The course was started in 1969-70 in response to Prof. J.G. Hawkes' perception of a wide international need. The present year (1979-80) is therefore the eleventh. To date, 133 students, from 38 different countries, have been accommodated. A majority (86) were from less developed countries and, of the remaining 47, 41 were from the U.K. The intake hastended to rise over the years and, judging by the flow of applications, there has been no decline of international interest, indeed rather the reverse.

From the start, teaching was mostly by the staff of the Department, but with important contributions by the Genetics Department and a few visiting teachers. Since 1975 the course has had substantial support from IBPGR, which permitted the addition of a lecturer in plant breeding to the teaching staff, a technician and miscellaneous minor expenditures. Though basically a "taught MSc", there has always been a substantial project/thesis element.

Of the first ten years' products (100 graduates) enquiry showed that about one third were directly involved in genetic resource work, nearly a half were in related activities (teaching etc.) and about a quarter had left the field or could not be traced.

The course, it should be noted, is unique. A few proposals that similar courses were to be set up elsewhere all apparently came to naught.

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1/ by Prof. N.W. Simmonds

## 3. Present Structure

### 3.1 Contents

The component courses are as follows:
1. Introduction; 2. Cultivated plants; 3. Economic plants; 4. Taxonomic methods; 5. Population genetics; 6. Variation in plants; 7. Agricultural systems; 8. Agro-ecology; 9. Plant Pathology; 10. Biological statistics; 11. Data processing; 12. Documentation; 13. Plant Exploration; 14. Conservation; 15. Utilization; 16. Plant Breeding; 17. Forest genetic resources.

The total is about 200 lectures plus practical classes and excursions, plus visiting speakers. Items 5 and 10 in the list above are given by the Genetics Department, item 11 by a Computing Department lecturer and item 7 by a visitor from London. The rest are given by Prof. Hawkes and his departmental colleagues.

This work occupies the three terms from October to June. From July to September the students do their projects and write reports. A great deal of work goes into the preparation and supervision of projects, which all have a substantial experimental content but must be capable of yielding useful results in two or three months, July-September. A few projects are done at labs away from Birmingham (e.g. agricultural research institutes) and these have gone well; but one attempt to locate projects in an overseas lab did not work well.

Of the excursions, one deserves special mention. In 1979, the class, with IBPGR support, visited Edinburgh for a week of intensive tuition in Seed Technology at the Edinburgh School of Agriculture. This fitted in well, between the completion of thesis work and the oral exams at the end of September. By all accounts, the visit was very successful and Prof. Hawkes hopes that it can be repeated.

### 3.2 Students

As noted above, a substantial majority of students are from less developed countries (14/18 in the current year) and there is no evident fall in demand for places. The 18 now in training are about as many as the staff and resources can sustain.

### 3.3 Resources

The Department has modern, well-equipped laboratories and clearly benefits, from the point of view of post-graduate teaching, both from the proximity of other strong science departments (Genetics is in the same building) and from the

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geographical location of the University (Birmingham is near the centre of England). The experimental ground (Winterbourne) is only about a kilometre away, with plots, gardens, glasshouses and modern laboratories to accommodate, among others, the MSc class.

3.4 Funds

Most of the cost of running the course is met by University funds (which contain, of course, a notional element derived from the fees paid by MSc students). The IBPGR grant (48 k$ this year) supports a lecturer in plant breeding, on a year-to-year basis, a technician and sundry minor expenditures.

The great majority of students are supported by grants from governments, international bodies (FAO, IBPGR) and foundations; very few come privately.

3.5 Observations

The course has sometimes been criticized as being "overacademic", a critisism of which the Birmingham staff are well aware. An earlier weakness in the plant breeding/exploitation aspects of GRC work was largely remedied by the appointment, with IBPGR support, of a lecturer in the subject (para. 3.4). A continuing weakness in the area of field exploration/collecting work is recognized by all but is far harder to correct: Birmingham is just not a suitable place for practical experience of this nature. However this aspect is very well covered by local short courses within the tropics, so these and the MSc course are effectively complementary. Thus the MSc has its limitations on the more practical side but these can be repaired elsewhere; and if it be agreed that there is need for fundamental training then this MSc certainly supplies it, as no other course in the world does. Indeed it is probably more accurate to describe it as fundamental than as academic. However, the fact of a basically botanical rather than agricultural orientation remains.

4. Short courses

From a beginning in 1978/79, the same department has offered several short courses in genetic conservation, of duration 5, 10 and 13 weeks.

The titles are: Crop plant diversity,
Genetic exploration and conservation,
Documentation and information,
Management and Evaluation and Utilization.

Each contains lectures, practicals and project work. They are designed to introduce more mature workers (already of MSc or PhD or equivalent status) to genetic resource conservation work (especially those workers who cannot be away for long). Space limits numbers of admissions to about two people per course. The project is still experimental and it is too early to assess its usefulness.

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5. The future

Prof. Hawkes will retire in 1982 but foresees a need for the MSc course for some years after that date - judging by the yet-upward trend of applications for admission. He hopes that the IBPGR will commit itself to support (in principle and subject to funds, of course) for the next quinquennium. This would secure the course for two years after Prof. Hawkes' departure and would give the new professor time to decide whether he wished it to continue or not. It has to be recognized that the interest and encouragement of the new professor would be essential, even if he himself were not active in running the course.

6. Other matters

6.1 Talks with Prof. Hawkes

I had several useful talks with Prof. Hawkes about GRC work in general; these, in view of his long experience and activity in the field were valuable. There is no call to expound his views here but the main points will emerge in the forthcoming Panel discussions.

6.2 Talks with colleagues

Apart from discussions of matters relating specifically to the MSc teaching, I also had useful talks about scientific matters. From Dr. Henshaw and his colleagues I learned that meristem technology, at least for herbaceous plants, is in a more advanced state than I had appreciated; but that there are yet many unresolved problems in handling the meristems of woody plants. The Panel will wish to be aware of this and also of the very high levels of technique and understanding of this subject resident in this laboratory.

7. Conclusions

I had the impression of a good, though perhaps somewhat too academic (or fundamental?) MSc course run by a vigorous and enthusiastic staff, two at least, of considerable international standing. It is clear that a substantial number of very useful GRC workers from less developed countries have been trained there in the past decade, and that the flow of applicants continues. It will be for the Panel to consider, in the light of its discussion of training in general, whether it should recommend that IBPGR support be continued. Considerations that will have to be taken into account include the relative importance attached to long and short courses, rising costs and the imminence of Prof. Hawkes' retirement.

8. Acknowledgements

I am very grateful to Prof. Hawkes and his colleagues for receiving me kindly and giving up much time for discussion. Among colleagues were: Drs. G. Henshaw (tissue and meristem cultures), P. Mumford (plant breeding), D. Wilkins (ecology and adaptation), B. Ford Lloyd (numerical taxonomy, documentation), R. Lester (taxonomy, chemical methods), and D. Astley (potato systematics).

# IBPGR QUINQUENNIAL REVIEW

## Report of the TAC Mission to the IBPGR Programme at Boulder, Colorado, USA

CONTENTS

COPY

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

**TECHNICAL ADVISORY COMMITTEE**

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8 June 1979

Dear Dr. Cummings,

... I have pleasure in sending herewith the report of the TAC mission on the IBPGR Information Programme at the University of Colorado, Boulder, USA. It has been a personal privilege for me to have been given by TAC the leadership of this mission and to work with such distinguished colleagues as Professors N. Simmonds and J. Warren.

As you know, the preliminary conclusions of the mission were presented to you and to Mr. R. Demuth, Chairman of IBPGR, at the end of our visit to the USA and the Panel benefitted from your and Mr. Demuth's observations.

The draft report was then considered by the Executive Committee of IBPGR at its May 1979 meeting. I was pleased to learn from Dr. T. Williams, Executive Secretary of IBPGR, that the Executive Committee had agreed with the basic thrust of the report. Through Dr. Williams, I received also from the Committee a series of comments and suggestions on the draft report. These have been taken into account as much as possible in finalizing the report while maintaining the integrity of the collective analysis and conclusions made by the Mission Panel.

I wish to thank you again and the members of TAC for the confidence placed in me for the conduct of this mission. I would also like to thank the Panel members for their hard work and the staff of the IBPGR Secretariat and the IS/GR Programme at Boulder for the cooperation extended to us during the mission.

Yours sincerely,

E. Åberg
Chairman
TAC Mission Panel on
IBPGR Information Programme

Dr. Ralph W. Cummings
Chairman
Technical Advisory Committee to the
Consultative Group on International
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812 Rosemont Avenue
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# REPORT OF THE TAC MISSION TO THE IBPGR PROGRAMME AT BOULDER, COLORADO (USA)

## I. SUMMARY

1. The IBPGR programme, in addressing the information needs of an international genetic resources network, has been confronted with a difficult and demanding task. Considerable effort has been expended and substantial experience has been acquired.

2. Progress has been made in the development of descriptor lists and the storage of germplasm data in an exchangeable format. A computer package for managing germplasm data, EXIR, has been developed and distributed. A technical assistance effort using micro-computers has been initiated. These undertakings appear to have had relatively high costs.

3. Major recommendations of the Panel include:

(i) Assignment of the highest priority to the development of directories of centres, personnel, contents of collections and areas of activity for both germplasm related efforts and computing skills related to computing applications in agriculture.

(ii) Assignment of equally high priority to the pursuit of minimum descriptor lists.

(iii) Adoption of a policy that will avoid investments in the development of computing products or the sponsorship of such products.

(iv) Adoption of a policy that will limit the role of IBPGR in computing to that of arranging ad hoc advice upon request. This policy should be implemented in a manner that provides for maximum diversity in the sources of skill employed and should conserve access to the experienced personnel that have recently shifted from IS/GR to a separate USDA programme.

(v) Formation of an advisory committee which reports to the Executive Secretary and includes a wide range of computing background, germplasm experience and general experience in computing needs of agricultural research. This committee will advise on persons available for advisory help in computing and assist the Secretariat in reviewing the performance of advisors.

(vi) Adoption of revised organizational structure that places responsibility and authority for programme formulation, implementation and budgetary control with the Secretariat.

(vii) Treatment of technical assistance projects to national governments as special projects or bilateral agreements except in carefully defined and limited conditions.

4. The Panel suggests that immediate attention be given to:

(i) Providing current EXIR users with the help needed to continue use of that package for a clearly defined period of time.

(ii) Ensuring that EXIR is no longer to be distributed if other alternatives can be located which are more cost effective.

(iii) Clarification of the responsibilities that IBPGR will take for the continued maintenance of the micro-computer hardware and software now being distributed in the technical assistance programme.

(iv) The formation of an advisory committee which will assist the Secretariat in identifying sources of advice (see above (v)).

(v) The formation of a widely knowledgeable and ad hoc working group to assist the Secretariat in preparing a directory of computing skills and products and to set up a scheme for periodically updating that directory.

## II. INTRODUCTION

5. When reviewing the proposed programme of work and budget of IBPGR for 1979, TAC at its 19th meeting in June 1978 raised questions as to the purpose and financial support of the contractual arrangement which IBPGR had concluded with the University of Colorado in the field of information on plant genetic resources. The Committee decided to refer these questions to the forthcoming quinquennial review of the IBPGR which was, at that time, scheduled for the first half of 1979. Meanwhile an internal review of the IBPGR programme at Boulder, Colorado, was carried out in October 1978. This review recommended that the orientation of the programme be changed by stopping software development and concentrating on helping several designated centres to put their genetic resources information into machine readable form. These recommendations were endorsed by the Board at its Sixth Meeting in February 1979.

6. The quinquennial review was subsequently postponed to the second half of 1979. The Committee, however, recommended that the questions raised on the information programme of IBPGR should be addressed as soon as possible and this should be done before the Committee had the opportunity to examine the IBPGR proposals for its programme of work and budget for 1980. The Secretariat of TAC was therefore requested to mount a mission of three consultants to visit the IBPGR information programme at Boulder, Colorado and report to the TAC at its 22nd meeting.

7. The terms of reference of the mission were established as follows.

(i) To gain an understanding of the past and present objectives, strategies, priorities and programmes of the IBPGR in meeting the needs for improved information, documentation and communication on plant genetic resources at international level. In this context, to analyze the scope, organization and management of past and present activities supported by the Board at the University of Colorado, Boulder.

(ii) To assess the usefulness of the results obtained through the IBPGR-supported activities at Boulder in the light of the needs, in particular:

(a) to identify achievements and constraints relating to the adoption and use of EXIR by different categories of users in developed and developing countries; and

(b) to review the technical help provided to other institutions.

(iii) To advise TAC on the rationale for a continued CGIAR support to the Boulder programme, on its future direction, management and guidance, on the nature and level of support required for its component activities and on possible alternatives to the present arrangements.

8. In addition to the above terms of reference, the Team was assisted in its work by a list of questions which had been identified by reference to the documentation made available (Annex II). The list of questions (Annex I) was largely based upon a review of TAC and CGIAR discussions as recorded in the reports of their meetings and on an analysis by the TAC Secretariat of the documentation provided. As indicated in the list presented in Annex II, this documentation was considerable. It concerned mostly, however, the past and present activities of the Board in the field of genetic resources information and provided limited information on the future plans of work beyond 1979 in this field. In fact, a report on the proposed 1980 programme of work and budget was only being prepared when the mission visited Boulder.

9. At the request of the Panel, the Chairman of the Advisory Committee 1/ provided a note giving his personal views on future prospects regarding this programme. Like the overall document on the future plans of the Board, however, this note essentially outlined the future perspective of the activities and their organization and, understandably, could not provide sufficient information to the Panel on the future work plans and resource allocations proposed for the programme in 1980 and beyond.

10. The Mission Panel was composed of Prof. E. Åberg (plant taxonomist and agronomist) Swedish University of Agricultural Sciences, Uppsala, Sweden (Chairman), with Prof. N.W. Simmonds (plant geneticist), University of Edinburgh, UK and Prof. J.A. Warren (agricultural applications of statistics and computing specialist), University of New Hampshire, USA, as Panel members. Mr. P.J. Mahler, Executive Secretary of TAC, acted as secretary of the Panel. Mr. J. Griffith, Senior Programme Officer, World Bank, participated as an observer on behalf of the CGIAR Secretariat.

11. The mission was carried out from 4 to 9 April. The Panel first assembled in Washington on 4 April and met with Mr. F. Williams, Assistant Director, Research, U.S. Department of State, Dr. Q. Jones, Coordinator for Plant Germplasm, Science and Education Administration/Agricultural Research, USDA, Mr. D.M. Daugherty, Assistant Chief, International Programs

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1/ IBPGR Advisory Committee on the Genetic Resources Communication, Information and Documentation System.

Staff, Science and Education Administration, USDA, and members of the CGIAR and TAC Secretariats. The Panel also met with Dr. G.N. Hersh, Director of the Laboratory for Information Science in Agriculture (LISA), Fort Collins, who was formerly associated with the information programme at Boulder. The Team then visited the Information Science/Genetic Resources Programme (IS/GR) at Boulder, Colorado, for two days where it had extensive discussions with the Director of the IS/GR programme (Prof. C. McMillan), the Chairman of the IBPGR Advisory Committee for the programme (Prof. A.H. Bunting) and with the Executive Secretary of the Board (Dr. J.T. Williams). The Team also met briefly with two former chief scientists of the programme, Drs. K. Rawal and J. Hanley, now staff members of LISA. The Team returned to Washington on 7 April, drafted its report and on the 9th presented its conclusions first to the Chairman of TAC, Dr. R.W. Cummings, and then to the Chairman of IBPGR, Mr. R. Demuth.

12. The Panel was helpfully received both at the FAO Offices in Washington and by the Group at Boulder. It wishes to record its thanks to both for the good working arrangements made and for helpful responses to requests for information.

## III. GENERAL CONSIDERATIONS AND THE ROLE OF IBPGR IN GENETIC RESOURCES INFORMATION

### 1. General Considerations

13. The need for genetic conservation has now been thoroughly accepted for about 10 years. It emerged from the realization, largely stimulated by FAO, that genetic resources were precious, that they were declining rapidly, that they were essentially non-renewable and that they were of profound long-term practical value. The practical conclusion was that, since the decline could clearly not be halted in situ, there was an evident necessity to conserve large collections of crop plants in perpetuity. The need is not long-term; it is immediate and infinite and it applies to all crops; none can be considered exempt. So much is now generally accepted.

14. The ultimate object is practical: to conserve variability in usable form for the benefit of plant breeding and therefore (the Panel reasonably assumes) for the ultimate benefit of mankind. This, too, is generally accepted. The procedures appropriate to the acquisition, maintenance, distribution and utilization of plant collections stem from the biological natures of individual crops; they are, as might be expected, exceedingly diverse; wheat, coconuts, bananas and potatoes pose quite different practical problems which require diverse solutions. The information component of genetic resource work is, however, virtually independent of crop biology and the technology of maintenance. Thus the problems of, for example, definition of descriptors, are often considerable but they are of the same general nature whatever the crop and it matters little whether one is considering wheat or bananas. The Panel therefore ignored biological complication and addressed itself solely to the information aspect.

15. That there is a basic need for some information about all the entries in a collection is not in doubt. The questions of what information and how much are explored below. The Panel wishes simply to note that the common idea that information management and computerization are virtually synonymous is wrong. The information about a small collection can well be handled by the purely mechanical methods traditional in the past. Large bodies of data, however, and large collections, are far better handled by computer. Declining costs of equipment will no doubt ensure that computers, already well established in the field, become ever more widely used for this purpose. This report is therefore basically concerned with computer-based methods; but one does well to recall that they are not yet universally adopted.

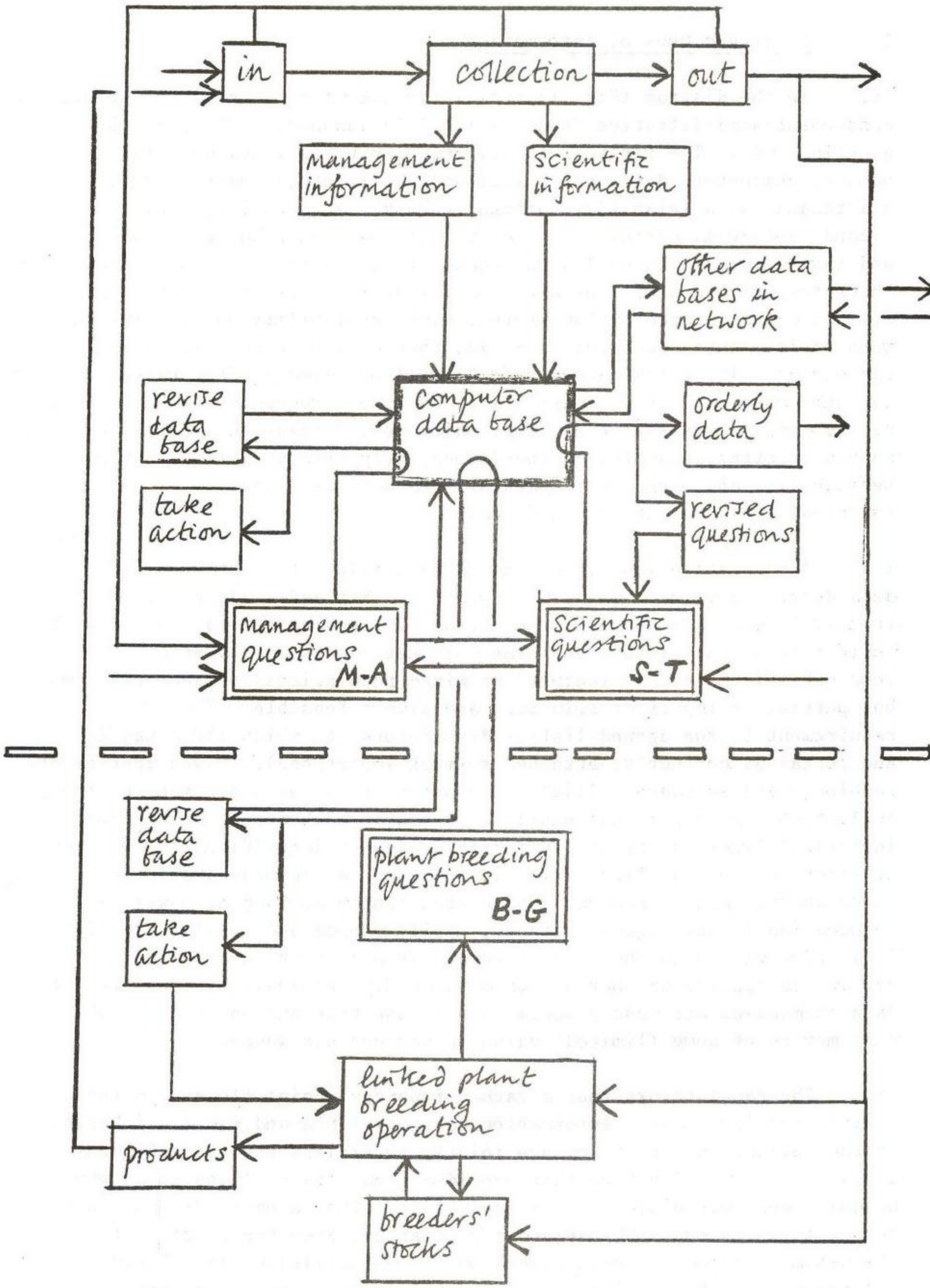
## 2. Kinds and Uses of Information

16. In the diagram (Fig. 1) are distinguished three kinds of information: management-administrative (M-A), scientific-taxonomic (S-T), and breeding-genetic (B-G). The first (M-A) will contain the primary data (accession number, collector, date, site, altitude, soil, etc.) and secondary maintenance data (viability, stocks in hand, regeneration, etc.). The second (S-T) will contain descriptive material contributed by the collector and taxonomic data assembled subsequent to entry into the collection. The characters recorded will be often of the yes-no, present-absent kind and will be characterized by few states, high heritability and low interaction with environmental factors; that is, they will have relatively stable expression. The third category (B-G) will only emerge from extensive evaluation studies by breeders. The characters recorded are occasionally of the simple, discrete kind (e.g. major-gene disease resistance) but are, much more often, examples of continuous, polygenic variation showing low heritability and large environmental interactions (e.g. yield, quality features, field resistance to disease).

17. The relative importance and manageability of the three kinds of data deserve comment. The first two kinds (M-A and S-T) are, in principle, relatively easily adapted to the computer. In practice, agreement as to definition of descriptors and states is not always easily attained and some variable materials (outbred or mixed populations) present problems but partial or imperfect solutions are always feasible. The basic requirement is the agreed list of descriptors (to which IBPGR has long, and certainly correctly, attached so much importance). Given appropriate machinery and software, allied to competent physical management of the collection, basic data can easily be transmitted between collections, individual lines can be at least fairly closely identified, the management of stocks can be facilitated and information can be made available to researchers. Apart from outright errors (which do happen, however), information is unambiguous, stable, easily stored and easily transmitted. It is otherwise with the third category (B-G): continuous, widely-varying characters are harder and more costly to handle by computer; the data themselves are mostly applicable to one time and one place - while they may be of some (limited) value to workers elsewhere.

18. The Panel thinks that a rather important point flows from the distinction just made. Information categories M-A and S-T are inherent in the collection itself and are jointly sufficient for its efficient operation. Any collection that provided good data of these kinds would be doing what was basically required of it. The category B-G is, in a sense, adventitious. The demand for it arises from the facts that: (a) the ultimate object of any collection is to facilitate plant breeding and (b) major collections ('base collections' in the commonly adopted

Fig. 1 - THE THREE POSSIBLE REQUIREMENTS OF A DATA BASE



EXPLANATORY NOTE ON THE DIAGRAM PRESENTED IN FIGURE 1

The information base in genetic resource work. Three kinds of data/questions are apparent (see text): M-A (management - administrative), S-T (scientific - taxonomic), B-G (breeding - genetic). Note interactions between M-A and S-T. As argued in the text, the B-G component (below the dashed line) could be incorporated in the same data base but is, in practice, separable; from the viewpoint of collection management, M-A and S-T alone are essential (and linked).

nomenclature) are often, as matters of convenience and practical common sense, closely associated with active breeding programmes. The evaluations which are the substance of B-G type data are produced by plant breeders for plant breeding purposes and for this they are essential. However, they are not essential to the efficient management of a collection and, as was noted above, pose operational and biological problems the solution of which might actually impede the work of the collection *per se*. In short, plant breeders will surely need to develop their own data bases for their own purposes; to associate them with collection data-bases is unnecessary and could actually be inimical to genetic resource work by generating avoidable complexity and diverting limiting resources. The simpler an information system, the more robust and the cheaper it is and the further the funds go; the basic needs of even a large collection are not too complex and should not, the Panel thinks, be confounded with the distinct (though clearly not unrelated) needs of plant breeding.

## 3. The Roles of IBPGR

19. Before IBPGR was established, there was no systematic collecting on a world-wide basis of all crops; the need had not been generally perceived. There were a few great national collections (the USSR, the USA) and a scatter of individual crop collections, nearly always associated with breeding programmes. There was much genetic erosion because the collections were often not very highly regarded and indeed several important ones were totally lost. The IBPGR has sought, following the basic FAO initiative (middle 1960s) to promote the conservation of genetic resources of major crops on an all-time, world-wide basis. To do this, it has generated priority lists by crops and regions, has encouraged appropriate local initiatives to collect and assemble and has promoted understanding and development of ideas on data/information management and flow.

20. The mandate of the IBPGR is wide. Very briefly paraphrased, it is to promote, on an international scale, the conservation, diffusion and utilization of any and all plant materials which are of major economic importance, either globally or regionally. The information component of its remit is covered in paragraphs 9 and 10 of its terms of reference, as follows:

> "9. To promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections.
>
> 10. To make appropriate recommendations with respect to computerized information, storage and retrieval system, taking into account their suitability for an effective international

genetic resources network, and their compatibility with existing systems already in operation at some regional and national centres."

21. The IBPGR (surely correctly) recognized that there were two fundamental requirements of any information system that should effectively serve the world-wide needs of plant breeding in any one crop: (1) an orderly, agreed system of annotation and description; and (2) efficient methods of storage, retrieval and transmission of intelligible data. To promote (1) it has generated a series of committees/working groups on specific crops charged i.a. to produce descriptor lists (both minimal and amplified). This task is not difficult; it has been well begun but many crops are yet untouched and the Board plans greater pressure in this important area. The information categories covered are, of course, M-A and S-T in our nomenclature (see para. 17 above). The storage-retrieval aspect (2) is the principal subject matter of this report and is covered elsewhere. The Panel notes here that any data system is only as good as the inputs and recalls the sometimes overlooked garbage-in-garbage-out principle. An excellent data system cannot compensate for ill-chosen descriptors or poor physical management of the collection.

22. To place the information aspect of the Board's work in some sort of a time-perspective, the Panel recalls that the Board itself has remarked that it will not have an indefinite existence. Its job will have been done when a substantial fraction of the variability in each of a substantial fraction of the major world's crops is safely conserved in well-managed collections. This will not be soon. The basic information requirements will be met (in the form of accepted descriptor lists and appropriate computer systems) long before this point is reached. The Panel recalls here its opinion (para 18) that plant breeding data (B-G) need not and, indeed, in the early phases at least, should not, enter the information system.

## 4. Institutional Arrangements

23. Three kinds of institutional arrangements for the conservation of collections are apparent: the national, the regional and the crop-specific. National collections (for example the Russian and American ones) typically cover many kinds of crops, as also do regional ones (for example the European Gene Banks). Crop-specific collections are characteristically devoted to crops for which there is local breeding responsibility (for example rice at IRRI, sorghum at ICRISAT). It is unlikely (having regard to ecological amplitude and diseases) that any major crop could be kept effectively at one place so, in practice, collections are widely dispersed as sub-collections, the totality representing the crop as a whole. Duplication between collections is desirable as an insurance against

various local hazards. The notion of the single, gigantic, all-inclusive collection in one place is neither realistic nor biologically sensible. From the information point of view, the total data bank for a crop must also be dispersed and therefore provided with an appropriate referral system to aid searchers. So much is generally accepted and the IBPGR has worked within the general framework of dispersed sub-collections joined by freely-flowing materials and data.

24. From the information point of view, the relevance of the IBPGR's information objectives (para 20) to the practical situation will be apparent: agreed descriptors and efficient communications are essential if the system is to work. In the longer run, one expects to see a strong flow of materials and information between widely spread workers, a productive network stimulated, in part, by the catalytic activity of the Board. Workers in some crops (for example sugar cane, barley) are already in remarkably close touch with each other internationally; this must tend to facilitate, to provide a basis for, the adoption of standard descriptors and methods. Contrarywise, the Board's promotion of those last must have beneficial effects beyond the immediate objectives. These invisible colleges are, crop-by-crop, a potent stimulus to information flow.

## IV. ORGANIZATION AND MANAGEMENT OF IBPGR ACTIVITIES IN THE FIELD OF GENETIC RESOURCES INFORMATION

### 1. The Programme

25. The major part of the programme of IBPGR in the field of genetic resources information was and still is implemented by means of contracts with the University of Colorado, at Boulder.

26. During the first years and until 1976, the executing agency for these contracts was the Taximetrics Laboratory and the University of Colorado at Boulder. This laboratory has launched a programme for the development of a Genetic Resources Communication, Information and Documentation System (GR/CIDS), which was funded from a number of sources including IBPGR, FAO, the University of Colorado, and USDA. Within this programme, the work of the Taximetrics Laboratory in support of IBPGR was determined through joint discussions and negotiations between the Laboratory and the Board, leading to yearly contracts with specifications of the work plan, operations, and budgets.

27. In 1976-77, the GR/CIDS programme of the University of Colorado was transferred from the Taximetrics Laboratory to the College of Business Administration and was officially placed under the Division of Information Sciences Research. The procedures of cooperation with IBPGR however remained basically the same. The programme, renamed Information Sciences/ Genetic Resources (IS/GR), included both activities funded by IBPGR and others, either international or national in scope, public or private, financed from various sources including FAO, the IARCs, USDA, IBM, other US corporations, and the University of Colorado.

28. Late in 1978, a further change occurred with the departure of a large part of the staff of IS/GR to the College of Agricultural Sciences at Fort Collins, Colorado, to establish a new Laboratory for Information Science in Agriculture (LISA). An IBPGR mission 1/ was sent to Boulder at that time for an internal review of the programme. The recommendations of the internal review (i.e. to stop software development and concentrate on technical assistance) were subsequently endorsed by the Board in February 1979. The IS/GR programme then became almost exclusively confined to activities supported by IBPGR funds along with computer time provided by the University.

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1/ Participants in the mission were Mr. R. Demuth, Prof. A.H. Bunting and Dr. T. Williams. Reference to the report is made in Annex II, page 2.

2. The Advisory Committee

29. After the inception of this programme, the IBPGR realized that the expertise available in its membership and in its secretariat was not sufficient to provide for the guidance and control of the highly specialized activities carried out at Boulder on its behalf. At its third meeting (in February 1976) the Board formally established an Advisory Committee on the Genetic Resources Communication Information and Documentation System, with the following terms of reference 1/:

> "The Advisory Committee will be responsible to the International Board for Plant Genetic Resources (IBPGR) and will report periodically to the IBPGR, recommending whatever actions the Committee believes to be necessary or desirable in connection with Communication, Information and Documentation System (GR/CIDS) for the assembly, storage and retrieval of information on plant genetic resources which is being developed by the Taximetrics Laboratory of the University of Colorado at Boulder, Colorado, USA. Specifically, the Committee will:
>
> (1) Evaluate the technical quality of the System for the purposes of classification of and exchange of information on crop germplasm resources.
>
> (2) Evaluate the specific priorities and targets of the GR/CIDS programme in the light of the goals and objectives of the IBPGR.
>
> (3) Evaluate the plans and resources of the Taximetrics Laboratory as against the objectives of the GR/CIDS project, and advise on the time period and manpower and financial resources likely to be required to achieve those objectives.
>
> (4) Consider the present and future computer software and hardware requirements of the System and advise on (a) whether these appear reasonable in relation to the objectives of the IBPGR programme and the staff and computing facilities likely to be available to prospective users of the System, and (b) whether there are practicable means by which the operational requirements of the System might be simplified.

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1/ The Panel was informed that the Committee as now constituted will be dissolved and established on a different basis both in terms of membership and disciplines covered and in terms of scope, its responsibilities being possibly expanded and covering other aspects of the future information programme of IBPGR.

(5) Advise on the long-term aspects of genetic resources data management, including whether there is need for a central point in the international network to monitor and assist in both computer-related work and use of the gathered data, and if there is believed to be such a need on how it can most effectively be met.

(6) Advise on any other matters with regard to the System or the GR/CIDS programme (a) which the Advisory Committee believes to be important with respect to the effectiveness of the System, and to the duration and amount of financial support by the IBPGR for the GR/CIDS programme, or (b) on which the advice of the Committee is specifically requested by either the Director of the Taximetrics Laboratory of the University of Colorado, the IBPGR or the Technical Advisory Committee of the Consultative Group on International Agricultural Research.

Appointment of the Committee will be for an initial period of three years. During this period, the Committee will meet at least once a year, and more often if it believes that additional meetings are necessary. Unless the Committee otherwise decides, meetings will be held at the Taximetrics Laboratory of the University of Colorado, Boulder, Colorado, and copies of all Committee reports to the IBPGR will be made available to the Director of that Laboratory."

30. The members appointed by the Board to the Advisory Committee were:

Dr. L.M. Branscomb, Vice-President and Chief Scientist, IBM Corporation, Armonk, New York, USA

Dr. A.H. Bunting, Professor of Agricultural Development Overseas, University of Reading, England, UK (a member of IBPGR and of its Executive Committee ) (Chairman)

Dr. K.W. Finlay, Deputy Director General, Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) Mexico

Mr. J.L. Fyfe, formerly Deputy Director, Scottish Plant Breeding Station, Pentlandfield, Roslin, Midlothian, Scotland, UK

Dr. W. Salhuana, Director, Centro Estadistico Procesamiento de Datos, Universidad Nacional Agraria, La Molina, Lima, Peru.

31. The meetings of the Committee were also attended by the Director of the programme and, as observers, the Chairman of the IBPGR and representatives of the Secretariat and other interested parties as required (e.g. USDA).

32. The Committee met every year. Its main task was to consider the progress reports and draft work plans and budget proposals for the programme and to transmit these documents to the Board with its observations and recommendations. In practice, the Committee, through its Chairman who visited the programme several times a year, played a growing role not only in the formulation of the programme and in its overall direction but in the coordination both with other activities of the Board and with other activities of the programme which were not funded by the Board.

3. The Crop Advisory Committees

33. The work of the information programme on specific crops had to be guided by specialists in the related field of conservation and utilization of genetic resources of these crops. This guidance was provided by the Crop Advisory Committees of the Board for five major crops and by specialized working groups. These committees which advised the Board mainly on the priorities for genetic resources collections and exploration, were also requested to assist in the development of the related information programmes, in particular the definition of common sets of descriptors for the standardization of the genetic resources information on particular crops. For this purpose, staff of the Boulder programme were associated with the work of the Crop Advisory Committees.

4. Observations on the Management of the Programme

34. Until recently the work of Boulder programme for IBPGR was part of a broader range of activities carried out under the auspices of the University of Colorado. The coordination of activities was ensured by joint meetings of the Advisory Committee of the Board for the CIDS (now IS/GR) programme with yet another advisory committee, this one appointed by Colorado University in 1977.

35. Until the end of 1978, the role of the IBPGR Secretariat in connection with this programme was to assist in the preparation and signature of the contracts and in the disbursement of funds on behalf of the Board. The Secretariat also played an active role in working out the practical arrangements needed for participation of the Boulder programme in other activities of the Board.

36. The major decisions which were taken as a result of the successive changes in the organization of these activities by the University of Colorado were based on the findings of several missions of the Chairmen of the Board and of the Advisory Committee.

37. More recently, a post of information programme officer was established in the Secretariat with the intention of strengthening the capabilities of the Board in this area.

38. As regards the resources made available by IBPGR to the programme, these consisted of funds for salaries, travel, computer services and equipment. Until the transfer of some of the IS/GR activities to LISA, Fort Collins, the staff and the programme activities were in part paid by IBPGR and partly from other sources. Table 1 gives the staffing patterns in 1977 and 1979.

39. Having reviewed the organization and management of the programme, the Panel wishes to make the following observations:

(i) Since its inception and until the late summer of 1978, the IBPGR-funded activities at Boulder were part of a broader programme with multiple objectives and sources of funding (international, national, public and private). Although this situation was in line with the catalytic role which the IBPGR wishes to play, it proved difficult for the Board to control the use of its resources. The Advisory Committee, through its Chairman, subsequently assumed growing responsibilities which went beyond its advisory role to the Board in formulating, guiding and reporting on the programme.

(ii) The Advisory Committee recommended to the IBPGR adoption of funding procedures for Boulder in which the IBPGR Secretariat is in a position of 'provider of funds' under an agreement that calls for funding at regular intervals. This process of funding is largely independent from that of monitoring the results of the programme. There is no control over the disposition of these funds by the Secretariat.

(iii) The accounting procedures at Boulder, after many promises for improvement, have undergone little change over the past two years. Under this present system, it is difficult to state that all the funds provided by the IBPGR are being spent in the manner intended.

(iv) Programme formulation and review lack forward planning. The team received differing viewpoints as to the future Boulder programme and it is clear that the programme for 1979 and 1980 is highly fluid at this time. The Boulder budget has been significantly reduced in scope (from some \$500,000 to \$300,000). The rationale for continued funding of the programme had not yet clearly emerged.

(v) The Panel was given to understand by the Director of the Programme that the Board gave permission for IS/GR to expand its mandate beyond germplasm data management requirements. It was to look at such other items as trials analysis, farming systems modelling, operations research, and administrative data processing needs of centres; this seems a very wide mandate indeed, especially at a time when its budget has been cut by 40%.

(vi) The Panel believes that this situation could be greatly improved by removing the functions of programme formulation, budgetary review and control from the Advisory Committee and placing them into the hands of the IBPGR Secretariat.

(vii) The newly proposed Advisory Committee would have a wider mandate than previously accepted: this new body is to advise all IBPGR activities related to management of germ plasm information. In the opinion of the Panel, any newly constituted advisory committee in this area should be very carefully constructed to draw upon a wide diversity of backgrounds and should report to the Secretariat. It should not include representatives of computer vendors nor should it be used as source of consultants for advisory services provided through the Secretariat.

## V. PROGRESS REVIEW OF THE IBPGR PROGRAMME AT BOULDER

### 1. Major Undertakings

40. Major undertakings of the Boulder group include:

(i) Data Banks and Descriptor Lists - the Boulder Group has been involved in the assembly of a number of data banks and the assembly of descriptor tests.

(ii) EXIR - A collection of programmes (software packages) for storing and managing genetic data. A seed storage management programme will be considered part of this collection.

(iii) A Micro-Computer Based System - A low cost computer system that includes programmes for storing germplasm data and performing some searches and statistical analyses.

(iv) Training and Promotion - Conduct of courses, provision of technical assistance, visits with potential collaborators, etc.

### 2. Comments on Assessing Costs and Benefits

41. Over the period from 1975 until 1978 around $1.5 million was invested in the IBPGR programme at Boulder. It is difficult to form even an approximate picture of what has been accomplished. When this question was raised with principals involved in the project, answers cited two classes of benefits:

Tangible products such as the EXIR programme, data put into retrievable form, etc.; and

Intangibles such as stimulation of efforts for managing information, knowledge of the problems of information management, personal contacts with persons interested in germplasm, etc.

42. When costs and benefits for the Boulder programme are considered, it is relevant to observe:

- Many intangible benefits tend to be associated with people.
- Experience resides in people, personal contacts, etc.
- At least 3/4 of the professionals formerly associated with the Boulder project have become separated from that project since October 1978 (see Table 1).
- No provision has been made for IBPGR to benefit from the experience of those who have left.

Table 1.

Composition of the IS/GR Staff

1977

Claude McMillan, Director
Jay E. April, Director
Gilbert N. Hersh, Director
Kanti Rawal, Chief Scientist
Jim Hanley, Chief Computer Scientist

Systems Investigation and Development

Don Watt, Head
John Gertsch
Jerry Kaltenhauser, C.U. Computing Center
Jeff Scott
Allan Shafton
Margaret Snyder
Steve Snyder, located at CIMMYT
Zhahai Stewart
Jim Warner, C.U. Computing Center
Joe Wingerd

Data Services

Lou Vincent, Head
William Boyd
John Thompson
Gail Von Borstell

Education and Training

Greg McArthur, Head
June Arnold
Rafael Zarate

Support Services

Arden Switzer, Head
Sandy Beach
Karen Nein, Publications
Marcia Rinck

(Table 1. - cont'd)

1979

Claude McMillan, Director
Lou Vincent, Director of Operations
Arden Switzer, Coordinator of Personnel, Budgets & Accounting and Purchasing
Allan Shafton, Systems Analyst
Greg McArthur, Biologist, Analyst and Education & Training Manager
Zhahai Stewart, Programmer
Wilfredo Salhuana, Chief Scientist
Richard Crosby, Graduate Student
Edward Lyell, Consultant
Gail von Borstell, Data Coordinator
Wira Babiak, Data Coordinator

43. The general impression given to this Panel has been that the bulk of the benefits to be credited to the Boulder programme are made up of intangibles. Unless measures are taken to continue access to the personnel located at Ft. Collins, little benefit can be credited to the Boulder programme for intangibles.

44. This risk of losing intangible benefits is particularly troublesome because tangible benefits are limited and a total cost of $1.5 million has to be assigned somewhere. If intangible benefits have been great, then much of the benefit of the programme is currently in danger of being lost. If intangible benefits were not great, then the cost:tangible benefit ratio appears to be poor.

45. The Panel would have preferred to have worked with actual costs for the tangible products resulting from this project. The Panel has not been able to identify such costs in the material that has been available to it. It recommends that such costs be obtained. In the material that follows the Panel's comments on costs are based on analyses that have produced consistent conclusions over a variety of assumptions.

## 3. Assessment of Tangible Products

### 3.1 Data Banks and Descriptor Lists

46. Annex V lists 18 EXIR users and 2 descriptor lists that have been developed in association with the Boulder programme. In the absence of cost information, the Panel declines to comment on whether or not this should be regarded as a reasonable return on investment. When cost information is available, allowance should be made for the tendency for start-up efforts to incur higher costs than activities that have become routine.

### 3.2 EXIR

47. The principals concerned with both the Boulder project and the USDA's Ft. Collins project agree that EXIR now has no special advantages. However, when this project started there was a need for software development. The project did provide some features that otherwise were not easy to obtain at that time. Problems associated with the adoption and use of EXIR have been abundantly identified by members of the Boulder team. They range from technical constraints related to memory size required, compiler language, etc. to design features such as provision for arithmetic operations, file merger, etc. EXIR is a programme that has some good features that can be made available on a limited range of computers. In most, if not all cases, where a computer can support EXIR it can also support other packages that provide the same or more functions than EXIR. Adoption of EXIR by new sites should be further limited by the current policy of the Boulder group that it will not maintain EXIR.

48. In 1976, the Boulder Group listed 18 installations as EXIR users. They now list 17 installations as active users. Six of the "currently active" users were also listed in 1976.

49. Consideration of EXIR should take into account two types of cost that must be of concern to IBPGR:

(i) Maintenance. If IBPGR wishes to be regarded as a credible source of help for scientists wishing to manage germplasm collections, it should not abandon those users who trusted the Boulder group and installed EXIR. If maintenance of EXIR is to be discontinued, it should be preceded by at least one year's notice and with vigorous efforts to locate and install an equivalent retrieval package.

In addressing the problem of maintaining EXIR it should be kept in mind that the personnel who developed EXIR are in the Ft. Collins group. This source of maintenance should be used if possible. It is estimated that at least one skilled programmer (salary level around $18,000 per year) will be needed to maintain EXIR.

(ii) New User Cost. Even though the principals connected with the Boulder programme state that EXIR is now not promoted and even though it was announced by the Advisory Board in 1977 that EXIR would only be supplied to organizations having skilled programmers, that group still seems to be actively promoting adoption of EXIR (Work Plan 1979) and sometimes commits to supplying EXIR without checking on programming capability. There are now 7 requests pending for EXIR. Filling those requests will add to IBPGR's obligations for maintenance. They may even carry extra costs. In some cases there may be alternatives that are as good or better than EXIR that are neglected because of EXIR promotion. IBPGR's representatives may well lose even more credibility in such cases.

50. EXIR does not appear to be cost effective. Packages having all of the capability of EXIR plus a full range of statistical routines can be acquired for much less. Several CG institutes appear to have obtained the capabilities of EXIR at costs well below its estimated cost per installation.

### 3.3 Micro-Computer Based System

51. This system consists of both a computer and a software collection. It appears to be able to handle germplasm data entry and most retrieval operations needed for germplasm collections of small size. It is in an early developmental stage in terms of software, documentation, and knowledge of reliability and problems.

52. This kind of system could be valuable for introducing computing in situations where data storage and retrieval would otherwise be impossible.

However, it should be observed that the micro-computers now in use could be perceived as a solution to general computing needs in situations where larger and somewhat more expensive machines would be more suitable.

53. It should be recognized that an involvement of IBPGR in the distribution of micro-based systems carries with it the potential liability for costs associated with continued maintenance of hardware and software.

54. It is too early to assign benefits to this project. This project is unlikely to provide a general solution because of national differences in customs, support services, etc. but a micro-based approach could be helpful in many cases.

### 3.4 General Observations

55. The most common reaction to the costs and benefits for the tangible products of the Boulder group seems to be that rather limited gains have been made at a high cost. Over and over this group has reported new, often very sensible, undertakings followed by nothing tangible. Projects seemed to have been identified for action and then apparently forgotten. New enthusiasms seem to have consistently taken precedence over completing older undertakings.

## 4. Sponsorship of Hardware and Software; Payment of Development Costs

56. The micro-based system is an interesting project and it may merit considerable additional investment. It should not be financed by IBPGR just as further development and distribution of EXIR should not be promoted by IBPGR. IBPGR should not be in a position of sponsoring hardware or software because:

(i) It is an organization pooling skills involving germplasm and is not a natural depository of computing knowledge and experience. It is not in a good position to supervise or evaluate computer projects.

(ii) IBPGR should be in a position that favors the objective assessment of options when a client is considering computing alternatives. That is less likely to occur when the success of an IBPGR development project is weighed in terms of frequency of adoption. It is less likely to occur when those providing advice are much less familiar with alternatives than with materials they have developed or are sponsoring. Even though the current official position on EXIR is that it is nothing special and not worth the cost of maintenance support, shipment of EXIR to IITA and ORD 1/ -Korea is pending. Both institutes have the same equipment as ICRISAT which has its own system operational. It is not clear that EXIR is operational for the computers of those institutes.

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1/ ORD = Office of Rural Development.

(iii) IBPGR has to be in a position of trust with its clients or prospective clients. That position is put in jeopardy by sponsorship of products that will not always be the best available. It is also put in jeopardy by failing to provide maintenance for products promoted by IBPGR.

5. Computing - A Wider Context

57. The Panel met with four of the persons who are (or were) actively involved in promoting the development of the germplasm information network. Each stated the same message, a message that most of us had already heard from CG centres and other sources. The following emerged:

(i) Management of germplasm information is a low priority item for most, if not all, centres that belong in the CGIAR system. When computing activities for an agricultural organization are considered, germplasm data management is an infrequent activity that has to be reconciled with many, many other activities. It is not just germplasm that is endangered. Research results are just as perishable and sometimes much more urgent.

(ii) Promotion of germplasm data management without regard to other computing needs is ill-advised and sometimes could be expensive. There are times when doing so makes it less likely that an organization will be disposed to cooperate with IBPGR programmes.

(iii) Satisfying the computing requirements of a germplasm network is more likely to occur if IBPGR is perceived as supporting a balanced approach to the computing needs of its potential clients than if IBPGR is perceived as promoting over-emphasis on germplasm data management. As it is now being pursued, the current micro-based technical assistance effort could be an unbalanced promotion of germplasm needs.

## VI. FUTURE NEEDS AND DEVELOPMENTS

### 1. General

58. In the light of conclusions reached in preceding paragraphs, the Panel identified three key areas for IBPGR activities, namely:

(a) The assembly of catalogues of collections and of genetic resources workers; this work has already begun but should be accelerated.

(b) The development of agreed descriptor lists, crop by crop, and their translation into computable form; this work, too, has begun but it, too, should be accelerated.

(c) The promotion of a basically new attitude to computing founded on the substitution of a dispersed system of ad hoc arrangements for highly specific purposes for the present heavy commitment to a single centre on a long-term basis.

59. Items (a) and (b) in the preceding paragraph call for no elaboration. They are fundamental to the development of any information system and serious computing work in any crop is impossible until they shall have been satisfied. The Panel noted that progress has been made in both but that there is yet a very long way to go.

60. Item (c) in paragraph 1.1 proposes a radical change in current arrangements. It is founded on the beliefs that, despite some useful achievements in the development of EXIR, the process was not cost-effective (page 15) and that commitment to a single source of computing expertise is risky and inefficient. The Panel noted that computing skill is widely dispersed through the world and that specific questions could usually be matched by specific expertise. The Panel therefore concluded that the Board would do well to adopt the following principles:

(a) identify specific, limited problems;

(b) identify appropriate consultants by way of institutional mechanisms discussed later herein;

(c) negotiate or help others to negotiate agreements (usually of a relatively short-term nature) to attack those problems;

(d) avoid long-term commitments to any specific consultants, systems or hardware.

61. The Panel thought that items (a)-(c) should improve cost-effectiveness of the whole and that item (d), as an act of policy, was important in guaranteeing and being seen to guarantee the Board's objectivity.

62. Specifically, the Panel suggests:

(1) The immediate formation of an ad hoc committee to assist the Executive Secretary in producing a directory of persons and products that might be useful in meeting computing needs for germ plasm information. This group should be drawn from a variety of sources representing as much variation in computing backgrounds as practicable. It should have a definite target date for completing its task and should recognize that it is being asked to provide a first approximation rather than a polished product. This temporary committee should also develop plans for periodic updating of this directory by the Secretariat.

(2) The formation of an advisory committee that will report to the Executive Secretary and will assist in the process of identifying and monitoring sources of advisory help in computing. This committee should emphasize diversity of backgrounds and include some persons who are well informed on germ plasm information problems, and some who are knowleadgeable about general computing needs in agricultural organizations. Members of this committee will not serve as computing advisors, but will advise the Executive Secretary on persons suitable for this work and later assist in assessing the performance of advisors.

(3) Neither the ad hoc committee nor the advisory committee should contain representatives of computer manufacturers, software houses, or other vendors of computing products. Appointments suggestive of conflicts in interest should be carefully avoided.

2. Contents of the Core Programme

63. After deliberation, the Panel agreed that the following activities should be maintained in the core programme of IBPGR in the field of genetic resources information:

(a) the development of agreed minimum descriptor lists and their translation into computable form;

(b) the promotion of machine-readability of genetic resource information;

(c) the provision of maintenance services to existing users of EXIR;

(d) small ad hoc software developments.[1/]

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1/ Although the Board agreed in February 1979 that no major software development should continue, the development of the micro-computer based system still involves some software development.

64. The Panel also recommended that the following activities should be added to or strengthened within the core programme:

(a) the assembly of directories of existing collections, institutions and research workers involved in genetic resource conservation;

(b) the provision of advisory services of short duration to institutions engaged in the development of genetic resource information systems in developing countries and the promotion of longer-term arrangements for advisory services and technical assistance;

(c) regional consultations on the development and use of genetic resource information systems for specific crops;

(d) training in matters relevant to the core programme.

65. The Panel considered that certain ongoing activities should not be included in the core programme of IBPGR. These are the following:

(a) technical assistance to national genetic resource information programmes;

(b) the sponsorship and supply of specific hardware and software;

(c) any substantial development activities of new software for genetic resource information systems;

(d) any software development concerned with the processing of data that is not directly a part of genetic resource work (e.g. plant breeding, statistics, operational research, management and accounting).

66. The exclusion of the above activities from the core programme of the IBPGR as recommended above should not be interpreted as negating the very useful catalytic role which the Board should play by means of special projects and promotion of technical assistance by other institutions.

## VII. CONCLUSIONS AND RECOMMENDATIONS

67. Before presenting its conclusions and recommendations, the Panel notes that a number of difficulties were experienced in the accomplishment of the mission. A thorough assessment of the impact of the IBPGR programme at Boulder would have required a series of consultations with international and national genetic resources centres. This did not prove feasible and will have to be made as part of the broader evaluation of the impact of IBPGR when the quinquennial review is carried out. More time would have been necessary also for discussions with members of the Board, of the Advisory Committee and also of TAC and CGIAR in order to understand fully their attitude vis-à-vis the programme under review. Finally, the Panel could not examine the future plans of IBPGR for this programme beyond 1979 as these were being prepared at the time of the review.

68. The Panel therefore recommends that its conclusions and recommendations should be considered essentially as an input in a wider process of review of IBPGR activities.

69. The Panel stresses that the establishment of an international system of information, documentation and communication on plant genetic resources is an essential complement to the international efforts of the Board in ensuring the collection and conservation of plant genetic resources. These conservation and collection efforts would have little value if the collections were not adequately documented and if this information were not readily accessible by the users, first, for monitoring the collection and conservation process, and, second, to facilitate the distribution and use of material on request. Another justification for the work of the IBPGR in this field is the major catalytic role which the development of an international information system is likely to play indirectly in inducing a better organization and management of the existing collections and in identifying gaps which in turn will call for further exploration and conservation work. For these reasons, the Panel recommends that IBPGR continue to devote a substantial portion of its resources to the field of information. This however calls for significant changes in the present programme as indicated below.

70. The Panel recognizes the many difficulties and obstacles faced in the development of an international information system on plant genetic resources. This is an enormous task. Progress has been slow and TAC/CGIAR should not expect spectacular results or a completion of this work in the next couple of years. It may well take 15-20 years to establish genetic resources collections for major crops and the associated international programme of information, documentation and communication. Any assessment of the results of the programme should take into account the magnitude of the task and the problems involved.

71. The leading result of the Boulder programme is an increased awareness and an improved understanding of the needs and problems. This programme should be seen as a pilot experiment in which different concepts, approaches and techniques were successively tried and which provided valuable experience for all concerned.

72. Nevertheless a number of results have been achieved already. This includes: (a) the development of the EXIR system, a system which is a collection of programmes for storing and managing genetic data; (b) the development of personnel having expertise in this field. This expertise has now spread not only to other places in United States but also through the training and cooperative programmes promoted at Boulder to a number of developing and developed countries. (c) In cooperation with the Crop Advisory Committees, the development of common sets of descriptors for cataloguing the collections of several crops. Although there is still a long way to go before a wide-scale adoption and use of these descriptors, they constitute an essential step in that direction. (d) Stimulation of the cataloguing of the material contained in certain collections. A significant result, which is not entirely attributable to IBPGR but to which IBPGR has contributed significantly, is the development of a programme of systematic cataloguing of one of the largest sets of genetic resources collections of the world, that of the United States. The programme has also assisted several IARCs in their work in this field, and accelerated recently its technical assistance to several national collections in developing countries, in Latin America in particular.

73. The problems now before the IBPGR relate essentially to the scope and priorities of its future work and to its organization and management: (a) the Board is confronted with a situation where a series of IARCs and national programmes in developed countries are already well advanced in the development of their genetic information systems for specific crops but usually with different software and hardware. It is very unlikely that these advanced programmes will now change their information systems to any significant extent. This may not be necessary, however, as they are or may be made sufficiently compatible for the purpose of communication of information and exchange of genetic material.

(b) Most of the national collections in developing countries have yet to be catalogued and documented. This offers considerable opportunities for developing internationally compatible information systems but requires also a considerable amount of specialized advisory services, personnel training and equipment for a long period.

(c) Most of the centres, national or international, wish to develop data systems and install hardware which would not exclusively deal with genetic conservation aspects but also serve their needs for data processing in the field of plant breeding and other areas of agricultural research. Germplasm considerations should not be expected to dominate their choices.

74. IBPGR cannot attend to all these problems and should take note of the diversity of requirements by national and international institutions, in developed and developing countries, both in the narrow field of genetic resources information and in the adjacent fields of agricultural research. IBPGR should enhance consultation among users and invite their active participation in planning and priority-setting.

75. The Panel does not propose to define a structure and set priorities for the future programme since it had not the opportunity to review other related aspects of the IBPGR programme. Nevertheless some relevant points should be indicated:

(a) Although efforts to develop individual data bases in a standardized manner should continue, the primary requirement is the assembly of directories of existing collections, crop by crop. This task which is truly international in character should be part of the core programme of IBPGR and should be carried out centrally by its Secretariat with the help of the appropriate Crop Advisory Committees and working groups.

(b) Of equal priority is the continuation (through the core programme) of the development of minimum descriptor lists. This long-term task is also truly international in character and should be promoted by the IBPGR and its Advisory Committees.

(c) The Board should provide ad hoc advisory services to address the needs of organizations wishing to manage and exchange germplasm data. This should be done on a world-wide basis and make use of as broad a range of skills and backgrounds as possible. Ordinarily the funding of these activities will be by special project or bilateral arrangements except as needed for short-term (up to 4 weeks) assessments of needs and resources.

(d) The Board should not promote a world-wide adoption of any particular software or hardware but rather sponsor and sometimes support with its core resources, quite limited initiatives aiming at facilitating the compatibility of existing and future software and hardware systems so as to provide for international communication between these systems.

76. The Panel recommends that, when considering the above observations on the future information programme of IBPGR, the Board assesses the organizational and managerial implications of these changes. In particular, it seems essential that a new organizational structure provides the Secretariat with a clear responsibility and authority for programme formulation, implementation and budgetary control. All aspects of the programme will have to be considered in this context, but the Panel wishes to stress the need for giving greater responsibility to the Secretariat in formulating programme and budget proposals and in implementing the programme with any necessary technical guidance which the Secretariat may call upon for the purpose. The Board should also develop a mechanism for scrutiny of

programme proposals and of progress reports similar to those adopted by programme committees of the IARCs. In addition, the Secretariat should establish an expert group to advise on information-computing matters.

77. The Panel sincerely hopes that these recommendations will assist the Board in its efforts to promote international information exchange and communication on genetic resources; this profoundly important role should, the Panel believes, receive the full support of the CGIAR. The Panel further recommends that IBPGR with the help of the above recommendations, should formulate a detailed plan of work and budget for the next two years; these should be examined by TAC in the light of views expressed in this report. TAC may then wish to refer such questions as may arise to the Quinquennial Review Panel.

## List of Questions

1. Is there a broad agreement among the main potential users and beneficiaries of the programme on the general principles of cooperation and on common concepts and approaches regarding the establishment of an international information system on plant genetic resources?

2. To what extent and how were the diverse users concerned (IARCs, national programmes in developing and developed countries ...) consulted before and during the implementation of the programme? If necessary, what would be the mechanism to improve these consultations?

3. What is the structure contemplated for the international information network? How does this structure relate to that of the IBPGR, its crop advisory committees, working groups, its regional programmes and the global network of genetic resources centres, to the CGIAR system, to the national programmes and regional (EUCARPIA) and international (FAO) institutions?

4. What are the past and present roles of the different parties concerned* in the forward planning, formulation of the programme, decision-making, implementation and accountability?

5. What were the nature of, and the reasons for, the successive changes in the programme? How these changes relate to the mandate of IBPGR?

6. What is the degree of universality and versatility of the system developed by IS/GR as regards the different crops concerned, the number and type of characteristics to be handled, the compatibility with other existing systems, its use with different types of computers? Why is the system being adopted (or adapted) by some institutions and not by others? What are the main obstacles and constraints on the adoption and use of the system by the IARCs, by national programmes in developing countries, by national programmes in developed countries? What is being done by the programme to overcome these obstacles and constraints?

7. To what extent the lists of descriptors prepared for different crops are internationally accepted and provide for reliability and consistency in the description of the material and the information exchange? If necessary what should be the mechanisms to improve them?

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* IBPGR (its Board, its Executive Committee, its Advisory Committee, its Secretariat), FAO, the University of Colorado, donors, users, etc.

8. How was the balance maintained between international and national interests in the programme; between different functions of the programme (system development, data base development, system implementation, research, technical assistance and training); between different uses of the system?

9. What are the criteria and procedures used in identifying the institutions which cooperate with the programme and/or receive technical assistance from it? What are the principles and factors considered in allocating resources of the programme to cooperative activities with specific international and national centres?

10. Among the functions of the programme, what are those which correspond to continuing international requirements and those which are more limited in scope and duration? What are the priorities among these requirements? How should computing requirements of genetic resources information programmes be related to the other computing needs of agricultural research? To what extent (and why) should these needs be covered by IBPGR or by other sources of funding within the CGIAR or outside?

11. What was the rationale for the location of the programme at Boulder? Is this location still valid in the light of the changes brought to the programmes?

12. Are the present programme and resource allocation by the IBPGR reflecting the priorities? How would the programme and the budget be expected to develop over time? Would this affect the relationship and the distribution of responsibilities established between the Board, its Executive Committee, its Advisory Committee, the Secretariat, the University of Colorado, the IARCs and the institutions involved in the funding of the programme?

## List of Background Documents for the Mission

### 1. IBPGR documents

(i) General

A Review of Policy and Activities 1974-78 and of the Prospects for the Future (AGPE:IBPGR/78/24 - Fifth Draft)

A World Plan for Crop Genetic Resources Exploration 1980-1985 (AGPE/IBPGR/79/1)

The Documentation of Plant Genetic Resources - A Background Paper by D.J. Rogers (AGPE:MISC/4)

Work Plans for Genetic Resources Communication, Information and Documentation Systems (GR/CIDS) (AGPE:IBPGR/74/4C)

Extracts from the Minutes of the IBPGR Executive Committee Meeting and IBPGR Plenary meeting.

(ii) Progress Reports

Report dated 28 March 1975 (AGPE:IBPGR/75/19)

GR/CIDS Project Report to IBPGR and FAO (AGPE:IBPGR/75/35)

GR/CIDS 1975 Progress Report to IBPGR and FAO (AGPE:IBPGR/75/42)

IS/GR Annual Report 1976

(iii) Short Training Courses in Genetic Resources Information Systems

Report on the 1977 IS/GR Short Course (18 July to 26 August 1977)

Report on the 1978 GRIS Short Course (5 June to 14 July 1978)

(iv) Contracts

FAO Contract for 1975 (IBPGR funded)

FAO Contract for 1976 (IBPGR and FAO funded)

FAO Contract for 1977 (IBPGR funded)

IBPGR Letter of Agreement in support of programme in 1978 (IBPGR funded)

IBPGR Letter of Agreement in support of programme in 1979 (IBPGR funded; note some amendments are proposed to the Work Plan)

(v) The Current Work Plan 1978-79

IS/GR Last Quarter Report (Part I) and Work Plan for 1979 (Part II)

(vi) IBPGR Advisory Committee on the Genetic Resources Communication, Information and Documentation System (GR/CIDS)

Terms of Reference (AGPE:IBPGR/75/43)

Report of First Meeting (AGPE:IBPGR/76/7)

Report of Second Meeting (AGPE:IBPGR/77/6)

Report of Third Meeting (AGPE:IBPGR/77/36)

Report on visit to Boulder and Fort Collings, Colorado, 12-19 October 1978 by R.H. Demuth, J.T. Williams and A.H. Bunting (AGPE:IBPGR/78/38)

(vii) Descriptors

Descriptors for Wheat and Aegilops (AGPE:IBPGR/77/20)

Descriptors for the Cultivated Potato by Z. Huaman, J.T. Williams, W. Salhuana and L. Vincent (AGPE:IBPGR/77/32)

2. TAC Documents

Extracts from the minutes of the TAC Meetings no. 1, 2, 3, 4, 5, 6, 8, 9, 10, 13, 14, 16, 18, 19. TAC Secretariat, FAO, Rome

3. Others

- IS/GR Annual Report 1977. University of Colorado, Boulder, U.S.A., 1978.
- GDM - A computer based germ plasm management system. IS/GR University of Colorado, Boulder, March 1979
- Plant Genetic Resources Conservation and Use. National Plant Genetic Resources Board - USDA, March 1979
- IBPGR Advisory Committee on Information Management - Prospect for the Future - a personal view by A.H. Bunting. April 6, 1979

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1980



# Programme and Budget Proposals for 1981/82

International Board for Plant Genetic Resources

AGP:IBPGR/80/12
May 1980

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

# PROGRAMME AND BUDGET PROPOSALS FOR 1981-82

Rome, 1980

IBPGR Secretariat
Crop Ecology and Genetic Resources Unit
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, Rome 00100, Italy

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# I INTRODUCTION: OBJECTIVES AND MANDATE OF THE IBPGR*

The major task of the IBPGR is to organize an international network of plant genetic resources centres in order to ensure that the genetic diversity of important food crops and other plants - which represents one of the world's major natural resources - is adequately collected, is satisfactorily conserved, evaluated and documented, and is made available for use by plant breeders and other scientists. The successful accomplishment of this task will prevent the threatened loss of significant genetic diversity of many crops in a time of great change and development in agriculture and land use, including the introduction of new varieties, and will provide genetic resources for future progress in plant improvement.

The emerging IBPGR network includes centres concerned with specific crops or groups of crops, and centres concerned with all crops in a particular geographical area, national or regional. The IBPGR has accepted the responsibility assigned to it by the CGIAR to encourage and, where necessary, support an appropriate and coordinated global programme of genetic resources activities by these various centres, and to foster collaborative efforts among them.

More specifically, the IBPGR seeks:

- to identify the needs for exploration, collection, characterization and conservation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities, and to ensure that the materials conserved are made available for plant breeding and other specific activities as required
- to establish standards, methods and procedures for exploration and characterization and to determine minimum standards for conservation and regeneration of stocks of both seeds and vegetative material
- to arrange for duplicate storage of seed and vegetative stocks
- to promote technical meetings on crop genetic resources

* Since the objectives and mandate of the IBPGR have not changed over the past year, this section of the Board's Programme and Budget Proposals for 1981-82 is essentially the same as the comparable section in the Programme and Budget Proposals for 1979-80.

- to promote relevant training at all levels
- to develop a world-wide network of institutions, organizations, and programmes able to contribute to the Board's objectives
- to promote coordination of programmes to avoid unnecessary duplication and fill in gaps
- to strengthen the programmes of existing institutions and, where necessary, to encourage the establishment of new organizations, institutions and programmes, particularly in areas of major diversity
- to promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections
- to encourage the development and implementation of appropriate information storage and retrieval systems
- to help finance those parts of priority genetic resources programmes not adequately supported by other sources of finance.

Since its terms of reference were adopted in 1974, the Board's links with crop improvement and plant breeding institutions around the world have developed substantially, and it seems evident that this trend will continue.

As set forth in IBPGR's Annual Report for 1978, the Board's work falls into several principal categories: (1) activities designed to encourage and support collection, conservation and other measures necessary to assure the availability for future breeding programmes of the genetic diversity of specific crops of major economic importance (these activities are supported usually in response to global needs); (2) activities designed to assist in strengthening the genetic resources programmes of specific countries and regions, particularly centres of genetic diversity (such programmes include collection, storage, characterization and other activities); (3) information activities designed to assure that information concerning all major genetic resources collections is documented, so that at least the minimum necessary data about the accessions in those collections can be readily available to potential users; and (4) training programmes of various kinds designed to assure that trained personnel are available for the foregoing activities.

The Board's work in each of these categories consists primarily of providing encouragement and technical and financial support for the work of other organizations, national, regional and international, on plant genetic resources. The IBPGR has seen itself as an institution of limited life which would establish a global network of plant genetic resources centres, ensure that it works and then withdraw. It is not clear that this concept is still appropriate: it is evident that it will be more than ten years before the task is anywhere near completion. The Board has to remain alert to changing needs and its policy must maintain flexibility. Clearly, the Board's work will generate, partly as by-products, many services to crop improvement on the one hand, and to understanding of the ecological and evolutionary bases of the diversity of cultivated plants on the other. But the overriding objective of the Board is, and will continue to be, assuring that the genetic variability of the world's major economic plants remains available and accessible over the long-term to improve agricultural technology and thereby to increase global agricultural production. When this objective has been largely fulfilled there will still be the need for some management of the global network to assure the accessibility of material.

In the establishment of the global network, much of the Board's expenditure is designed as pump priming, i.e., to help set activities in motion which are then handed over for future funding to those who benefit from them. At the same time the Board remains closely associated with activities funded bilaterally by specific donors.

Indeed, the most significant result of the Board's work during its first few years has been the remarkable catalytic effect which its establishment and operations have had upon the genetic resources activities of many nations around the world and of many international, regional and national agricultural research centres. The agricultural research community has responded promptly and effectively to the lead which the Board has provided.

In several countries, new national organizations have been created to accelerate genetic resources programmes; in a number of others, new or increased funding has been provided for genetic resources work. All of the IARCs, which since their inception have been active in building up their germplasm collections, have now assumed a more general responsibility for promoting genetic resources activities in relation to the crops for which they have research responsibility. In addition, most of them have either established new germplasm units, or expanded their collection and evaluation programmes, or improved their seed storage facilities, or have taken action in several of these respects. Details of specific achievements and results are provided in Section III.

During the latter half of 1979, the Board was the subject of a TAC quinquennial review. The draft report of this review was discussed by TAC at its meeting in February 1980 and the find report will be considered by TAC in July 1980 and will thereafter be circulated to members of the CGIAR. These programme and budget proposals for 1981-82 take into account most of the major recommendations embodied in the draft report.

An important suggestion was that the Board, in order to allocate its resources in a logical way and according to appropriate priorities, should adopt a type of functional budgeting showing the distribution of its proposed expenditures by category of activity, by areas and by crops. Hence, in these programme and budget proposals an additional table (Table IV) has been provided showing a breakdown under these headings. The breakdown of costs by items has been retained in Table III to provide continuity with the previous programme and budget submissions and also because the operation of the programme by the Secretariat follows the categories outlined in Table III.

In its operations, the Board differs from the IARCs: it does not disburse its funds according to a limited number of major programme elements or thrusts but by means of a large number of relatively small contracts. For instance, in 1979, it had oversight of 72 outside contracts, all diverse in detail and structure, and employed through these contracts, and for its central operations, over 200 consultants for ranging periods of time. Moreover, the Board is flexible in the way it operates, tailoring its approach in each situation to the particular requirements of the case. For instance, when the work is urgently needed on a specific crop, the Board, depending on available information and expertise, may issue a contract to an institution to do the work, or it may organize a field mission through its Secretariat, or it may convene a group of breeders in an *ad hoc* technical meeting to advise on the most cost-effective way of proceeding.

In 1978 the Board estimated that there would be a period of maximum growth up until 1980 or 1981 and that thereafter its budgetary requirements would level off at around $3 million (in 1977 dollar terms). It sees no reason to change this estimate even though, in preparation for the quinquennial review, it assessed its own activities in 1974-78 fairly closely and carefully examined the prospects for its future work. A lengthy document detailing the Board's policies and activities was made available to the quinquennial review panel and was also provided to CGIAR members in 1979. There will be some, generally minor, shifts in emphasis in the 1981-82 biennium in response to the quinquennial review report. It must be emphasized, however, that the Board does not expect to fund more than a small fraction of the global programme. Its budgets, therefore, reflect, year by year, its assessment of the financial needs of those parts of the growing worldwide activity which are not funded in other ways and which it feels are ripe for support in terms not only of needs and human resources but also of administrative and physical infrastructure to do the work.

In the past five years the Board has learned a good deal about how to do the things its mandate requires it to do, and it has made a good start on many of them. Nevertheless, the narrative which follows shows that far more remains to be done. Moreover, as worldwide interest in genetic resources work has grown, the work initiated by the Board has catalyzed and provided essential information for a much larger amount of work done and paid for by others.

In connection with one aspect of its mandate -- the evaluation of collected materials -- the Board at its meeting in February 1980 sought to define the extent of its responsibilities. Plainly, at least one part of the Board's task is to assist plant breeders and others to develop uniform systems of descriptors for recording and communicating the results of evaluations made by them; the Board is, in fact, well along in the execution of this task. As for other aspects of evaluation, the Board proposes to adopt the distinction drawn by the quinquennial review panel between 'characterization' of collected materials -- a task for the genetic resources community -- and 'evaluation' -- a task for the breeders. For several years the Board has sought assurance, in connection with all IBPGR-supported collections, that characterization (or preliminary evaluation) of the material collected will be undertaken by an institution identified as responsible for this work. Moreover, the Board regards it as part of its mandate to assure, to the greatest extent possible, that genetic resource collections are properly evaluated and that appropriate links are created between the curators of the collections and the breeders undertaking the evaluation so that the evaluation results are fed back to the curators and included in their data banks for the benefit of potential future users of the material.

## II FUNDS REQUESTED FOR THE 1981-82 BIENNIUM

The total budget proposed for the 1981-82 biennium is $6,569,000 in 1980 dollars ($7,579,000 after provision for inflationary price increases of 10% each year). This biennial budget reflects requirements, expressed in 1980 dollars, of $3,225,000 for 1981 ($3,547,000 after provision for price changes) and $3,344,000 for 1982 ($4,032,000 after provision for price changes). Compared in terms of 1980 dollars, the proposed budget for 1981 represents an increase of 3.25% over the approved budget for 1980 and the proposed budget for 1982 represents an increase of 3.7% on the budget proposed for 1981. Both the proposed budgets for 1981 and 1982 represent substantial growth over the estimated expenditure for 1979 but modest increases over the approved budget for 1980.

The proposed increases are designed largely to finance expanded collection, conservation, characterization and other genetic resources activities within the priorities for crops[1/] and regions of the world identified by the Board. Funds will be used particularly to strengthen efforts on major crops and also to assist national programmes of the countries comprising the priority regions. This does not represent any significant shift in the emphasis of the Board's programme; rather, it represents the Board's expectation that, in the 1981-82 biennium, it will be able to realize more fully than heretofore its often-expressed intention to use the greater part of its resources to support field activities primarily organized by national programmes. To this end, the budget proposal provides for the phasing in of three new regional posts to help in this work. Other significant increases in the proposed budget are for conservation, so that safe-keeping of material keeps pace with collection, and for training. Finally, there is a significant increase in funds for the Secretariat so that the Board can be more effectively serviced and its programme more efficiently organized and supervised. All of these increases, it should be noted, respond to major recommendations of the quinquennial review panel.

No large new programme thrusts appear in the proposed budget. On the other hand, the budget allocation for support of information work has been substantially reduced, reflecting decisions made in 1979 which are set forth in the Board's mid-term report for 1979-80 and which are already being implemented this year. The allocation for this work represents only 14% of the proposed 1981 budget, as compared with 26% in 1978.

The Board has undertaken, to the best of its ability, to make projections of its likely budgetary requirements for 1983 and 1984. In real terms, these projections show little increase over the proposed budget for 1982. The Board wishes to underline, however, the provisional character of these projections and urges that they be regarded, not as firm estimates, but simply as indications of possible orders of magnitude which may well need substantial modification in the future.

## III SUMMARY OF ACHIEVEMENTS AND RESULTS

Among the Board's activities, the following may be singled out as particularly noteworhty:

> Five Crop Advisory Committees have been established -- for wheat, maize, rice, sorghum and millets and *Phaseolus* beans -- in cooperation (except in the early years for wheat) with the appropriate

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1/ Including a forestry project (see p. 34)

IARC. Each of these Committees serves as a bridge between the Board and the global community of scientists working on a particular crop. Each Committee has met twice and each has advised the Board about priorities in collection, conservation, characterization, documentation and use of the genetic diversity of the crop or crops with which the Committee is concerned.

For the five crops mentioned above, and also for potatoes, substantial progress has been made in drawing up internationally accepted systems of descriptors and some progress has also been made in assembling lists of accessions at the principal genetic resources centres concerned with these crops. In addition, minimum lists of descriptors have been agreed by expert Working Groups (and approved by the Board) for bananas and coconut, grape, tropical fruits, beet, cotton, coffee, winged bean, yams and taro.

A number of Working Groups and Consultations have been set up to advise the Board on global action for bananas and plantains, coconut, tropical vegetables, beet, groundnut and coffee. Plans of action recommended by these Working Groups have been approved by the Board and are being carried out.

The Board has supported and organized an intensive series of collections in the Mediterranean region, particularly of cereals and other crops in North Africa, where the risk of loss is substantial. Algeria, Greece, Italy, Libya, Portugal, Spain and Tunisia are all participating in collecting expeditions and preparations have been made for other countries to take part. Duplicates of all seeds collected are being stored, for the time being, for all the countries at the Germplasm Laboratory, Bari, Italy, but a regional plan has been developed to allocate responsibility for storage among Italy, Spain and Portugal.

The Board has revised its original plans to accelerate collection and conservation activities in Southwest Asia, where important genetic diversity is also in danger of being lost. Two field experts were recruited in 1978 and have operated under the guidance of a senior officer located with the Secretariat. In 1978 and 1979 they provided help for the expansion and implementation of the national genetic resources programmes in Afghanistan, Iran, Iraq, Pakistan and Syria, and the senior officer assisted the Turkish programme. In 1980, the Board is linking this programme more closely with ICARDA.

The countries of Southeast Asia, under the sponsorship and with the help of the Board, have formulated a regional plan of action and an organizational framework to assure its implementation. The governments of Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand approved this plan and work started in 1977. The Board has stationed an officer in the region to assist the participating governments in carrying out their programmes.

The Board convened a meeting of governmental representatives from the countries of South Asia (Bangladesh, Bhutan, Burma, India, Nepal and Sri Lanka) and is providing training for scientists and other genetic resources workers from these countries.

Board support for collection activities not undertaken within the framework of regional programmes has been intensified in order to collect particularly sorghum and millets in the Sahelian zone; rice, roots and tuber crops and legumes in various parts of Africa; forage legumes in Latin America; potatoes in Chile and Argentina; and groundnuts and maize in several countries of South America. These have been the major Board-financed collection activities; in addition, a number of other collecting missions have been undertaken, in many different parts of the world and for a whole range of different crops, at the instigation or with the support of the Board.

The Board has designated, in consultation with the centres concerned, institutions responsible for maintaining the world's major base collections of seeds of the principal food crops. These centres form part of the Board's global network, in which well over 60 national, regional and international agricultural research institutions participate.

The Board has developed and published recommended standards for the engineering and design aspects of long-term seed storage facilities. It has also supported research and training in seed conservation technology.

The Board has assisted in the development and installation of appropriate documentation systems to store and retrieve information concerning major genetic resources collections in several countries.

The Board has supported the expansion of training programmes designed to provide adequate numbers of personnel in the developing world trained for genetic resources work, has organized several short technical courses and has provided fellowships for training.

## IV PROGRAMME ELEMENTS

The proposed 1981-82 budget is contained in the appended tables, which also include other information relevant to consideration of the budget proposals:

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|---|---|---|
| Table I | - | Summary of Costs by Programme Activity 1978-84 |
| Table II | - | Summary of Sources and Application of Funds |
| Table III | - | Breakdown of Costs by Items: 1979-84 |
| Table IV | - | Summary of Costs by Function: 1981-82 |

### 1. Information and Documentation Activities

In July 1979, in its revised mid-term report on the Programme and Budget for 1979-80, the Board reported to TAC a revision of its programme on information. In October 1978, the work of the IS/GR Program of the University of Colorado at Boulder, Colorado, USA, was reviewed by a Board mission. As a result of that review, the emphasis of the IS/GR Program, was changed from developmental work at Boulder to the provision of technical assistance in the field to specified centres which hold major genetic resources collections and which needed and requested help in organizing the information about those collections. The change was specifically agreed to be an experiment until the end of 1979. Primary responsibility for information work was given to the Secretariat. An Information Officer's post in the Secretariat was filled by means of consultancies in 1979 to organize descriptor work and provide advice to centres other than those which were being assisted by the IS/GR Program. A full-time Information Officer was appointed early in 1980.

Considerable progress was made in 1979 on the information front as a result of this reorganization. By the end of 1979, lists of descriptors and descriptor states had been agreed for wheat, maize, rice, sorghum, potato, coconut, tropical fruits, banana, apricots, grapes, yams, taro, beet, cotton and winged bean. Similar lists will be agreed in 1980 for the following: millets, *Phaseolus*, groundnut, mung bean, brassicas, eggplant, tomato, *Capsicum* and several others.

In 1979, the IS/GR Program assisted INTA in Argentina to organize the documentation concerning its germplasm collections of maize and potato at Pergamino and Balcarce and to put that documentation into machine-readable form. It also helped train INTA scientists to continue this work. Similar assistance was provided by IS/GR to ARARI for all crops in Turkey and to INIA for beans, maize and other crops in Mexico; comparable work started at CATIE in Costa Rica and in Brazil. In addition, through the efforts of the Secretariat, arrangements were made for the documentation of the extensive Japanese wheat collection to be translated into English and for a directory of the world's major wheat collections to be compiled. Also as a result of work by the Secretariat, the first edition for a comprehensive directory identifying and describing all known seed collections will be issued during 1980, as well as a preliminary listing of collections of certain vegetatively propagated crops, with emphasis on tropical varieties.

The cost of maintaining the IS/GR Program at Boulder, and the undesirability of concentrating so much of the Board's information work in a single institution, particularly one whose past record of performance had been uneven, continued to be a matter of concern to the Board in 1979. Accordingly, the whole question of support to information work was reviewed at an extraordinary meeting of the Board's Executive Committee on 18-20 June 1979, with the assistance of an international panel of outside experts. At that meeting, a revised programme of work, together with its organizational implications was worked out. Under this revised programme emphasis is to be put on helping specific important centres clean up the data on certain priority crops and putting these into machine-readable form. This work will be the central responsibility of the Secretariat. The special relationship with the IS/GR Program terminated at the end of 1979.

The Secretariat has made arrangements to continue to provide assistance in 1980 to the Latin American and Turkish centres previously helped by the IS/GR Program in the documentation of their collections, and to extend similar assistance to Thailand.

In the view of the Board, the work at Boulder over the past three years has had important results. It has helped to make the world community of plant breeders and others who are concerned with genetic resources aware both of the importance of having collections properly documented and of the substantial problems involved in achieving this objective. The IS/GR Program has helped to identify these problems and the circumstances (or systems) in which they arise, with particular attention to those associated with the nature and assembly of the primary data. Finally, the Program has offered technical, and usually computer-based, solutions of some of the problems, particularly those of the assembly, retrieval and analysis of information and of the use of such information for the physical management and control of genetic resources collections.

The Board recognizes that to assemble, manage and use information about genetic resources effectively is expensive. The number of species, of individual accessions and populations within species, and of centres interested in holding and using collections, is large. Hence, the Board cannot, and will not attempt to finance all operations relating to genetic resources information. Nevertheless, the Board has stressed, and will continue to stress, the importance of proper documentation for the effective use of collections. To this end, it is necessary that information systems should be developed and installed which are simple for the users to operate and which do not require installation of large, costly computers.

The Board has summarized its responsibilities in connection with the information needs of its global genetic resources network as follows:

(a) Sponsor the development, and publish, internationally agreed descriptor systems for all major crops;

(b) Provide help, on the spot, to individual centres having major genetic resources collections, to organize their data and, where feasible, to assemble them in a form readable by whatever computing machine may be available to such centres;

(c) Facilitate the flow of genetic resources information among centres, where appropriate in machine-readable form;

(d) Encourage the dissemination of the results of evaluations so that they can be incorporated in appropriate data banks;

(e) Advise centres, upon request, how best to meet their genetic resources information needs;

(f) Ensure, and where necessary support, training relevant to the information functions at those centres, international, regional or national, holding significant genetic resources collections.

To carry out these responsibilities in 1981-82, the proposed budget includes support for:

(a) Identification of major seed collections and the production and dissemination of directories concerning them (item 1.1);

(b) Provision of assistance to centres in cleaning up and organizing data about their germplasm collections and, where appropriate, putting the data into machine-readable form (item 1.2);

(c) International Working Groups on Descriptors (item 1.3);

(d) Training on documentation (item 1.4);

(e) Planning and programme development; use of consultants for specific technical tasks relating to the overall programme (item 1.5);

The total cost for these items is estimated to be $330,000 per annum.

2. Regional Activities

The Board has not found it feasible to look to regional institutions for the implementation of any substantial part of its programme. With a few important exceptions, national sensitivities have so far proved too strong, and regional institutions too weak, to permit such a course.

The Board has therefore found it necessary in a number of instances to proceed by helping to build up national programmes in countries where important genetic diversity exists and, where appropriate, linking such national programmes together through regional meetings at governmental or professional level. Different regions have adopted different approaches. For example, in Southeast Asia the cooperative programme has agreed to establish a regional seed conservation centre in the Philippines and to share out other regional responsibilities, but without any country assuming an overall leadership role. In Meso-America (now called the Mexico, Central America and Caribbean region), the centre established at Turrialba, Costa Rica, with funding from FR Germany, is functioning as the regional centre it was intended to be. In South and Southwest Asia, on the other hand, the countries wish to see almost entirely autonomous national units. The Board is aware of the sensitivities in different regions and will continue to bear them in mind as it advances its programme.

The establishment of a national programme requires that the national government make budgetary provision for the work. In cases where no such budgetary provision has been made, external funding for collection, storage, training or other work, while it may serve to arouse interest and to prompt the government to further action, is not likely by itself to be very effective.

The Board has identified the following regions for priority action: Mediterranean; Southwest Asia; South Asia; Southeast Asia; Ethiopia and Eastern Africa; Mexico, Central America and the Caribbean; the Andean zone; and Brazil. In addition to supporting programmes in six of these eight priority regions, the Board is providing modest support, during the present biennium, for national programmes in several parts of South America (including the Andean zone) and Africa. In 1980, a regional meeting will be held for the countries of the Andean zone and the Government of Japan has agreed to host an IBPGR-sponsored symposium on the genetic resources of the Far East and the Pacific Islands.

As matter of policy, the Board does not intend in the immediate future to help finance many new regional programmes, except possibly in the Mexico, Central America and Caribbean region, the Andean zone and the Pacific. On the other hand, the Board does expect to intensify activities in Africa. Direct IBPGR financing has in the past gone for work in the Mediterranean, Southwest Asia, South Asia, Western Africa, Eastern Africa and Latin America and this will continue in 1981-82. Three of these regions (the Mediterranean, Southwest Asia and Southeast Asia) will account for the largest part of the total allocations for regional activities in the proposed budget ($732,000 out of a total of $1,289,000 in 1981 and $724,000 out of a total of $1,324,000 in 1982).

The proposed budget for 1981-82 allocates the funds assigned to each priority region for certain reasonably well-defined activities. These include support to national programmes, regional officers (where applicable), training, conservation (both seed and vegetatively propagated crops) and incidental items such as in-country costs related to documentation and travel of personnel. In the case of Southwest Asia, FAO is executing the programme on behalf of IBPGR and hence a project servicing cost is included.

As far as possible, the funds allocated for each region represent a package containing elements of support for work on collection, characterization, conservation, documentation and training. Each region will require a different mix of assistance, depending on the strength of the national programmes, the expertise and physical facilities available within the countries of the region, the specific crops which characterize the area, and the work already accomplished.

The major regional efforts to be supported in 1981-82 are:

2.1 Mediterranean: Collections have been undertaken in this region since 1975, first with UNEP support and subsequently with IBPGR financing. The collections in the earlier years concentrated on the countries of North Africa, particularly Algeria and Tunisia, with emphasis on the traditional varieties of wheat and barley which are rapidly being displaced by the spread of new varieties. The work has been expanded to take in other crops, especially forages and grain legumes, and to involve more countries: Spain, Portugal, Greece, Egypt and Libya as well as Algeria and Tunisia. Since 1976, the work has been based on the Germplasm Laboratory of the Italian National Research Council at Bari, Italy and in 1980 the coordinating functions will be outposted from the Secretariat to Bari.

In addition, several of the IBPGR Crop Advisory Committees and Working Groups have recommended specific collections in this region, especially wheat in many parts of the region, maize and *Phaseolus* in Spain, beet in Greece and Yugoslavia, millets in southern Spain and the oases of North Africa, and forages in North Africa. In 1979 and 1980, a number of collecting missions have been or will be undertaken in countries of the region, with crops in addition to wheat and barley being collected in response to some of the foregoing recommendations, and to collect other important crops such as legumes.

At present, regional documentation is centred on Bari, which also plays a central part in characterization. Also, the Bari laboratory is a major store for the seed material collected, although the Board is helping to finance seed storage facilities in Spain for legumes and Portugal for maize.

In March 1979 a first regional meeting was held at FAO, Rome, at which government representatives were present. Although no formal action programme was produced at that meeting, efforts to increase collaborative links were discussed. While the Board foresees the major part of the collecting work being completed within a few years, the need for financing is not likely to decrease because, as the exploration activities slow down, increased support will be required for some time for conservation, characterization, documentation and other activities important to plant breeders. In addition, it is apparent that there is urgent or even emergency work needed on fruits and vegetables and plans for this will be drawn up in 1980.

As a European programme (see p.27) becomes operational in 1980, links will need to be created between that programme and the activities being supported by the IBPGR in the Mediterranean region, particularly in the countries of southern Europe. At the same time, the Board intends to ensure that the genetic resources activities financed by it in North Africa complement any collection programmes proposed for specific crops in that area by ICARDA. Moreover, arrangements have been made to assure the availability to ICARDA of duplicates of all seeds collected in the Mediterranean region under IBPGR-sponsored programmes. However, at least until ICARDA develops adequate genetic resources facilities, the IBPGR will have to continue to support collections in North Africa, since genetically diverse materials are still being rapidly lost there through changes in agricultural practices.

2.2 Southwest Asia: The Board assumed financial responsibility as of 1 July 1976 for the support of genetic resources work in six countries of Southwest Asia (Afghanistan, Iran, Iraq, Pakistan, Syria and Turkey) which had previously participated in a regional project based at Izmir, Turkey, funded by SIDA and operated by FAO. Following a reassessment of the situation in 1977, the Board decided to place two field officers in Karaj, Iran, to assist not only the Iranian national programme but also the national programmes of Afghanistan, Pakistan and Syria. These officers were both in post by March 1978 and their work was supervised by a senior officer located in the IBPGR Secretariat at FAO headquarters, who himself has collaborated especially with the Turkish programme. The political unrest in the area in 1979 and in early 1980 led to various changes. The post of one of the field officers officers was abolished when its incumbent resigned, and the second officer was transferred fron Iran to Iraq. In late 1979, following discussions with ICARDA, the Board decided to move the remaining field officer from Iraq to ICARDA headquarters at Aleppo, Syria. In 1980, this officer will help to implement the IBPGR programme for the region, operating out of ICARDA, and will also act as a catalyst for the emerging ICARDA programme.

The proposed allocation of $760,000 for Southwest Asia for the 1979-80 biennium was an overestimate since personnel costs will not be as high as expected. For the coming biennium, it is estimated that $596,000 is likely to be required. This sum will pay for the continuation of the Board's field officer, and consultants; in addition, it will finance some training activities and enable the Board to provide other help for collection, conservation and characterization efforts, as may prove necessary.

The Board recognizes that support to the Southwest Asia region is critical and time is fast running out. The Board's Secretariat hosted a meeting of country representatives in October 1979 when the crop priorities were clearly defined. It is expected that some effort in the future must go to forages and a limited number of fruit species; and collecting will have to be mobilized in countries of the region other than the six listed above.

The Board continues to have excellent cooperation with ICARDA, which has research responsibility for certain of the Board's priority crops in parts of the Southwest Asia region.

2.3 South Asia: Although a regional meeting for South Asia was convened in India in 1978, at which proposals for cooperative action were discussed, an operationally effective regional programme has yet to develop. However, the Board has supported activities (especially training) in Bangladesh, Bhutan, Burma, Nepal and Sri Lanka, and has worked closely with the Indian National Bureau of Plant Genetic Resources. Some, but not dramatic, increase in Board support for activities in this region is foreseen for 1981-82, reflected in proposed allocations of $110,000 per annum. The Board has asked the governments in the region to designate liaison officers and when they have all been designated regional cooperation should improve.

2.4 Southeast Asia: The countries of Southeast Asia (Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand) have moved faster than those of any other region in developing a specific programme of genetic resources activities. Late in 1976, technical experts from these countries, with help and encouragement from the Board, agreed on a plan of action for the region and on organizational arrangements to implement the plan.

The governments of the participating countries all appointed representatives to a regional committee, which met in July, 1978 and July, 1979. They are being assisted by a regional genetic resources officer appointed by the IBPGR and stationed, since mid-1979, at FAO regional headquarters in Bangkok. Support will continue for exploration and collection as part of the activities of national programmes, and the Board will modestly increase its 1981 budgetary allocation for Southeast Asia to $220,000 (from $190,000 in 1980) primarily to finance expanded field activities. The priorities for action relate to the following crops: rice, durian, rambutan, soyabean, coconut, mango, banana, indigenous vegetables (especially amaranth, bitter gourd, winged bean, eggplant, *Ipomoea aquatica*, yardlong bean) and tuber crops (especially cassava, sweet potato, yams, aroids and Zingiberaceae). However, this does not exclude action on other indigenous species which will be undertaken by national programmes. If other countries of the region, such as Viet Nam, Democratic Kampuchea and Lao, decide to join in the regional effort, some additional support is likely to be required.

2.5 Western Africa: Collections in Western Africa, especially of sorghum, millets and rice, have been supported by IBPGR since 1976, partly with UNEP funds. In addition, the work of the Germplasm Collection Unit of IITA, with emphasis on grain legumes, roots and tubers, and *glaberrima* rice and its associated wild species, has been regional in character. The Board originally allocated $50,000 in its budget for 1979 and $60,000 in its budget for 1980 for collections in the region and for support of emerging national programmes. The national programmes, however, have been slow to develop, resulting in a reduction of the 1979 allocation to $40,000. The Board plans to increase its efforts in this region, however, and therefore proposes that the allocation for Western Africa in 1981-82 should be at the level of $120,000 per annum. A regional officer will be appointed for accelerating the emergence of national programmes, for developing cooperative regional linkages, for helping to carry out other aspects of the Board's work in Western Africa and for maintaining close liaison with the programmes of IITA and ICRISAT, as well as with those of ORSTOM/IRAT, GTZ and other donors.

2.6 Eastern Africa and Ethiopia: From 1977 to date the Board, in cooperation with UNEP and ICRISAT, has supported the collection of sorghum and millets in several Eastern African countries. In early 1979 the Board reduced its allocation to this region from $50,000 to $40,000, but events have moved quicker than expected. For example, close collaboration became feasible for the first time with the Ethiopian Genebank funded by the FR Germany, and discussions were held with GTZ concerning a proposed national genebank in Kenya. Cordial contacts were also established with Malawi, Somalia and Tanzania. As a result, the Board foresees expansion of activities in this region, with requests for support already received from Ethiopia, Mozambique and several other countries. The proposed budget allocation has therefore been increased to $137,000 for 1981 and to $150,000 for 1982. This proposed allocation includes provision for a regional officer to be appointed in 1981.

2.7 Latin America: Although in Latin America the Board's highest priority regions are Mexico, Central America and the Caribbean, and Brazil, the Board has, since 1977, supported genetic resources activities in many different countries, designed in large part to stimulate and strengthen national programmes. During the present biennium, the Secretariat has been assisted in this work by a part-time senior consultant. Following regional meetings at CATIE in Costa Rica in 1979 and a proposed one for the Andean zone in 1980, the Board expects to be in a position soon to formulate a more comprehensive and systematic programme of action for Latin America. The Board found it necessary to increase its budget allocation for Latin America from $50,000 per annum to $65,000 for 1979 and $100,000 for 1980. Since activities are developing rapidly in this region, with strong national programmes emerging in Mexico. Costa Rica, Brazil, Peru and Argentina, the Board proposes to allocate $140,000 for 1981 and $155,000 for 1982. There is clear need for a Board officer to concentrate on this region, whether stationed at headquarters or in the field, and the appointment of such an officer in 1981 is contemplated.

2.8 Far East/Pacific: The Board originally anticipated that a symposium for this region would be held in 1979 but this was delayed until late 1980. The symposium will be sponsored by the Board and hosted by the Government of Japan. It is expected that a plan of action will be agreed upon at this meeting and the Board has provisionally allocated $50,000 in 1981 and $65,000 in 1982 to support such a plan.

2.9 Europe: The Board has followed with interest the initiatives by EUCARPIA to encourage collaborative efforts in Europe and endorses the UNDP/FAO European Cooperative Programme unanimously approved by 23 countries at a meeting in Geneva in December 1979. The Board will be closely linked to this programme since its Secretariat in FAO will have responsibility for the technical backstopping of the European programme. The European programme will, of course, form an essential component of the IBPGR global network.

## 3. Crop Specific Activities

The Board has always regarded support to collecting activities as one of its primary responsibilities. Much of this work is carried out under item 2 (regional activities) but additional collections recommended by Crop Committees and Working Groups need to be financed as crop specific activities.

The Board proposes to allocate $250,000 in 1981 and $275,000 in 1982 for item 3.1 to allow the continued collection of priority crops in many different parts of the world to proceed at an accelerated pace and also to permit tasks subsequent to collection to be carried out.

When the Board established its five Crop Advisory Committees, it did not envisage the need for many *ad hoc* Working Groups. However, experience has shown the need for groups of experts to meet as and when necessary to advise on the best utilization of Board funds for urgent activities on other priority crops. For instance, following a consultant's report in 1978, the Board convened a meeting of experts on vegetables for the tropics and the recommendations from that meeting led to an allocation of funds for vegetables previously not foreseen. As a matter of policy, the Board has agreed to move forward on 3-4 new crops per year in the period 1980-1985.

The decision of the Board in 1977 assigning priorities to various crops for genetic resources purposes has proved extremely useful in guiding the Board's work. The Board has emphasized, and will continue to emphasize, work on the crops in the three highest categories of priority as well as on forage plants, tree fruits and nuts, and vegetables.

Of the seven crops which have priority 1, either globally or regionally, the Board has already taken significant action with respect to wheat, rice and *Phaseolus* beans. However, much remains to be done on sorghum and millets, and the Board has done nothing on barley, for which ICARDA has indicated that it will take responsibility. On sugar beet, the Board has started work in the Mediterranean in association with breeders and the industry. On coffee, information about existing collections in Africa has been assembled by FAO and an IBPGR Working Group will report to the Board in 1980.

Among the 16 crops of second priority, it seems that progress could rapidly be made from existing bases (partly in the IARCs and partly IBPGR regional activities) on chickpea, groundnut, soyabean, cowpea and the Asiatic Vignas, and on sweet potatoes, bananas, cotton, sugarcane, rubber and cocoa. A good deal of work is already being done on all of them, by the Board or other agencies. The next stages should not be technically difficult.

Of the 13 third priority crops, so much has already been done on maize that relatively little may remain for the Board to do on this crop. The IBPGR has in the past few years supported the collection of maize in most emergency situations. It should be possible to do a good deal reasonably rapidly on oats and rye, on pigeon pea and beans, and on peas. The IBPGR started important cooperative work on beans in Latin America in 1979 in association with CIAT. In *Brassica*, the Board may expect important help from India and AVRDC. Similarly, in connection with olive and safflower, the Mediterranean, Ethiopian and Indian programmes may be looked to for substantial assistance.

There remain over 20 crops of fourth priority. The Board has not yet determined what action, if any, it should take with specific reference to these crops.

As already noted, the Board has organized five Crop Advisory Committees, all of which are now co-sponsored by the appropriate IARC. They consist of a Rice Committee, co-sponsored by IRRI: A Maize Committee, co-sponsored by CIMMYT; a Sorghum and Millets Committee, co-sponsored by ICRISAT; a *Phaseolus* beans Committee, co-sponsored by CIAT; and a Wheat Committee, co-sponsored by CIMMYT. Each of these Crop Advisory Committees has already had a second meeting, and all will meet again as necessary. These Committees and the Working Groups mentioned above are an invaluable aid to the Board in obtaining the views of the scientific community working on those particular crops concerning the priorities for collection and conservation.

In the proposed budget for the 1981-82 biennium, an allocation of $100,000 per annum has been made to support special studies and continuation of the work of the Crops Committees and Working Groups so that the Board may be advised by the communities of breeders with respect to the action needed on specific crops.

## 4. Forest Genetic Resources

As previously reported to TAC and the CGIAR, the Board has decided that in the field of forest genetic resources, it will concentrate on trees for rural fuel, domestic timber supplies and soil stabilization in the more arid regions of the developing countries. In 1979, it supported a series of exploratory investigations designed to inform the Board whether and how to support exploration, collection and evaluation of forest genetic resources in genera and species which are not at present receiving significant attention

(*Acacia*, *Prosopis* and *Eucalyptus* spp.) except in Australia. As a result the Board expects to be called upon to fund a few urgent forestry projects in 1981 and 1982. The proposed budget for the biennium provides an allocation of $275,000 for such projects.

5. Conservation

The Board will continue to identify and to work out arrangements for specific institutions to undertake responsibility for long-term storage or other forms of conservation for the great majority of the priority crops. By the end of the next five years, this activity should be nearly complete for the major seed crops in the sense that base collections will have been established for all of them and duplicates of the base collections will be held for safety in other centres. However, the Board must also assure that appropriate links exist between the centres having the base collections and those with active collections which are ultimately responsible for multiplication, regeneration, evaluation and exchange. Here the Board has a very active role to play, particularly in relation to dissemination of material. It intends to help finance equipment for such seed stores in developing countries provided that they undertake to store material for the benefit of a particular region or for the global network as a whole. Item 5.1 in the budget is designed to provide funds for such equipment in countries which have not yet become organized into regional cooperative programmes. Costs for this equipment have increased 100 percent in the past 2-3 years and it is estimated that $150,000 per year will be required in the 1981-82 biennium.

The Board is supporting research at the University of Reading, U.K., on seed physiology related to storage conditions. This investigation deals primarily with "orthodox" seeds which store best in cold, dry conditions. The Board is also following with interest preliminary research dealing with "recalcitrant" seeds which rapidly lose their viability under all conditions so far tested. A status report was commissioned on existing information relation to recalcitrant seeds and a research project has been funded at Reading; in 1981 more emphasis will be laid on investigations relating to the conservation of recalcitrant seeds. Altogether, the Board expects to allocate $75,000 per year to studies of seed longevity during the biennium.

The Board has not in the past been able to devote sufficient attention to vegetative collections and intends in the next five years to pay more attention to these ($90,000 for the 1981-82 biennium). Although a study on quarantine problems was commissioned in 1976, little action has been taken and some of the problems addressed will require further consideration, particularly when the movement of material into vegetative collections is contemplated. The Board expects to place more emphasis on these collections and has made budgetary provision to support some basic research on methodology ($40,000 in 1981 and $50,000 in 1982).

A major problem facing the curators of collections around the world is the need to regenerate material. In some cases, the costs involved have limited essential regeneration activity. Accordingly, the Board proposes to make available $35,000 in 1981 and $50,000 in 1982 for this work.

6. Training

In 1978 and 1979 the Board allocated about 7 percent of its total budget to training (including the training components of regional activities). It proposes in 1981-82 to increase its support of training to the level of $180,000 in 1981 and $200,000 in 1982 in addition to the components financed through the regional programmes. The proposed allocation includes $70,000 for postgraduate courses, an additional $30,000 to cover fellowships and study tours, and $80,000 (1981) and $100,000 (1982) for short technical courses.

The 1981-82 budget proposes to continue support to the University of Birmingham to pay for the additional staff necessary to enable the University's International Training Course in Conservation and Utilization of Plant Genetic Resources, to accept more nationals of developing countries as participants than would otherwise be possible.

The Board has organized a number of short technical training courses: on techniques of exploration, hosted by the National Biological Institute, Bogor, Indonesia (1977, 1978 and 1979), and by the National Bureau of Plant Genetic Resources, India (1979); on wheat and its wild relatives, hosted by ARARI, Izmir, Turkey (1977) (and to be hosted by ICARDA in 1980); on aspects of seed technology for genebank personnel, hosted by the University of Edinburgh, U.K. (1978 and 1979 and proposed for 1980); on management of information about genetic resources, jointly supported by FAO and the IBPGR and hosted by the IS/GR Program in Boulder, Colorado, USA (1977 and 1978); and a regional documentation course in the Philippines (1979). In 1980 there will be four courses on techniques of exploration (at IITA, at INTA Argentina, NBPGR India, and one in Thailand relating specifically to vegetatively propagated material.

Item 6.4 of the proposed budget provides for an allocation of $36,000 for a Technical Conference to be organized by the IBPGR, in association with FAO, in 1981. This proposed Conference would follow on similar Technical Conferences held by FAO in 1967 and 1973, to which all governments were invited to send representatives. A Board committee has been designated to start preparations for this Conference.

7. General administration

The Board has tried to keep administrative costs to a minimum but these increased in 1979-80, mainly to finance a necessary expansion of the Secretariat.

The funds allocated under this heading for the 1981-82 biennium are for the following purposes:

Board Meetings and Missions (items 7.1 and 7.2 in Table III): The 1979-80 approved budget included an item of $120,000 to cover the annual meeting of the Board and meetings of its Executive Committee. Because of increased travel costs, the comparable item of the 1981-82 budget has been increased to $140,000. On the other hand, as the Secretariat has become stronger, the need for the Chairman and members of the Board to undertake specific assignments has significantly decreased. Hence, the budgetary provision for this activity (item 7.2) has been reduced from $40,000 per annum in the present biennium to $30,000 per annum in 1981-82.

Publications (item 7.3, Table III): Provision of $20,000 per annum was made in the budget for 1979-80 to cover the cost of normal Board publications and also the publication of special studies commissioned by the Board and of reports of the Board's Committees and Working Groups; for the next biennium $105,000 will be required for this purpose, reflecting the increased scope of the Board's work. Full implementation of the quinquennial review panel's recommendations on publications may require this allocation to be increased even more.

Secretariat (items 7.4 - 7.6, Table III): Provision has been made in the Board's budget in past years to pay the cost of secretaries working in the Secretariat. In 1978 it was necessary to add a professional staff member to the Secretariat, in addition to those provided by FAO. Following the reorganization of the information work in 1979 and the expansion of Board activities approved for the 1979-80 biennium, further strengthening was necessary some of which was paid for by FAO and some by the IBPGR. For 1981-82, the Secretariat will be composed and paid for as follows:

| | | Professional Staff | | Administrative/secretarial staff |
|---|---|---|---|---|
| Provided by FAO | 1981: | $193,500 (4 staff m.) | 1981: | $59,000 (3 staff members) |
| | 1982: | $193,500 (4 staff m.) | 1982: | $59,000 (3 " " ) |
| Funded by IBPGR: | 1981: | $100,000 (2 staff m.) | 1981: | $130,000 (5 staff m. ) |
| | 1982: | $100,000 (2 staff m.) | 1982: | $130,000 (5 " " ) |

It is not expected that the number of officers in the Secretariat will be increased in 1981-82 over the number who will be in post at the end of the present biennium.

In addition to the Secretariat staff, the Board proposes to increase the numbers of its regional officers, as indicated above in the discussion of item 2, "regional activities".

Quinquennial Review: In accordance with CGIAR procedure, the IBPGR was the subject of a quinquennial review in 1979. The Board originally proposed a budgetary provision of $35,000 for this review but later increased the provision to $50,000. The final report of the review panel will be considered by TAC and the CGIAR in the second half of 1980.

8. Other Items

Contingency: The Board's present budget contains a contingency item of $100,000 per year. It is expected that most of this allocation will be used in 1980; a significant portion has already been allocated to a programme on tropical vegetables. Despite the Board's expanding programme, the contingency item has been set at the same level in the proposed 1981-82 budget and in the projections for 1983 and 1984. This is believed to be a reasonable minimum in view of the Board's continuing need for flexibility and to enable the Board to seize unforeseen opportunities which arise.

Provision for Future Price Changes: A provision of 10 percent per year has been included in the proposed biennial budget for 1981-82 to cover future price changes. No comparable provision has been included in the projections for 1983 and 1984 because the Board has no basis for estimating at this time the extent to which prices may increase after 1982.

Capital Expenditure: The Board does not have any separate item in its budget for capital expenditures since, unlike the IARC's, the Board has no buildings or other capital facilities of its own. Moreover, the Board has not financed the construction of capital facilities and is unlikely to do so unless, under exceptional circumstances, some limited amount of such financing should prove to be necessary for seed storage in a developing country. On the other hand, a number of the Board's grants for exploration, conservation and other genetic resources activities have contained and will continue to contain modest amounts for equipment, such as vehicles and refrigeration equipment, where necessary to carry out programmes approved by the Board. It is estimated that about 8-10 percent of the proposed budget for 1981-82 will be used for this purpose, about the same level of expenditures as in 1979-80.

TABLE I

1981-1982 BUDGET

SUMMARY OF COSTS BY PROGRAMME ACTIVITY 1978-1984
(US$ thousands)

| | Actual 1978 | Actual 1979 | Approved Budget 1980 |
|---|---|---|---|
| 1. Information and documentation activities | 452 | 457 | 336 |
| 2. Regional activities | 642 | 789 | 1,095 |
| 3. Crop specific activities | 250 | 309 | 320 |
| 4. Forest genetic resources | - | 55 | - |
| 5. Conservation | 73 | 180 | 265 |
| 6. Training | 61 | 127 | 110 |
| 7. General administration | 237 | 377 | 377 |
| 8. All other: | | | |
| - Quinquennial review | | 50 | |
| - Contingency | | 25 | 100 |
| - Provision for price changes in 1979 and 1980 | | | 521 |
| 9. TOTAL CORE BUDGET IN 1980 DOLLAR TERMS | 1,715 | 2,369 | 3,124 |
| 10. Provision for price changes | | | |
| In 1981 | | | |
| In 1982 | | | |
| 11. GRAND TOTAL | 1,715 | 2,369 | 3,124 |
| Categories of expense: | | | |
| - Personnel services | 306 | 441 | 464 |
| - Contracts with others | 1,055 | 1,376 | 1,445 |
| - Equipment, supplies and materials | 45 | 78 | 90 |
| - Travel | 223 | 290 | 320 |
| - General operating expenses 1/ | 58 | 64 | 68 |
| - Fellowships 2/ | 28 | 96 | 116 |
| - Contingency | | 24 | 100 |
| - Provision for price changes in 1980 | | | 521 |
| Total in 1980 dollar terms | 1,715 | 2,369 | 3,124 |
| - Provision for price changes in 1981-82 | | | |
| GRAND TOTAL | 1,715 | 2,369 | 3,124 |

1/ Including project servicing costs
2/ Fellowships not itemized as a category in previous submissions
3/ $35,000 allocated to vegetable development programme under item 3
4/ Before provision for price changes in 1983
5/ Before provision for price changes in 1983 and 1984

| Current Estimate 1980 | Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|---|
| 336 | 330 | 330 | 660 | 350 | 350 |
| 1,105 | 1,289 | 1,324 | 2,613 | 1,455 | 1,455 |
| 320 | 350 | 375 | 725 | 390 | 390 |
| - | 125 | 150 | 275 | 150 | 150 |
| 245 | 340 | 375 | 715 | 375 | 375 |
| 120 | 216 | 200 | 416 | 220 | 220 |
| 427 | 475 | 490 | 965 | 500 | 500 |
| 65 3/ | 100 | 100 | 200 | 100 | 100 |
| 486 | | | | | |
| 3,104 | 3,225 | 3,344 | 6,569 | 3,540 | 3,540 |
| | 322 | 322 | 644 | 322 | 322 |
| | | 366 | 366 | 366 | 366 |
| 3,104 | 3,547 | 4,032 | 7,579 | 4,228 4/ | 4,228 5/ |
| 490 | 600 | 600 | 1,200 | 615 | 615 |
| 1,439 | 1,775 | 1,919 | 3,694 | 2,065 | 2,065 |
| 100 | 110 | 110 | 220 | 120 | 120 |
| 320 | 370 | 355 | 725 | 360 | 360 |
| 78 | 120 | 110 | 230 | 120 | 120 |
| 126 | 150 | 150 | 300 | 160 | 160 |
| 65 | 100 | 100 | 200 | 100 | 100 |
| 486 | | | | | |
| 3,104 | 3,225 | 3,344 | 6,569 | 3,540 | 3,540 |
| | 322 | 688 | 1,010 | 688 | 688 |
| 3,104 | 3,547 | 4,032 | 7,579 | 4,228 | 4,228 5/ |

TABLE II

1981-1982 BUDGET

SUMMARY OF SOURCES AND APPLICATION OF FUNDS
(US$ thousands)

| | Actual 1978 | Actual 1979 | Current Estimate 1980 |
|---|---|---|---|
| SOURCE OF FUNDS | | | |
| 1. Core operations | | | |
| a. Unrestricted: | | | |
| - Australia | 79 | 79 | 80 |
| - Belgium | 126 1/ | | 100 |
| - Canada | 134 | 129 | 130 |
| - Denmark | | | 55 |
| - France | | 50 | 80 |
| - Germany | 150 | 273 | 220 |
| - Italy | | | 50 |
| - Japan | | 300 | 400 |
| - Netherlands | 100 | 150 | 150 |
| - Norway | 124 | 112 | 110 |
| - Sweden | 300 | 167 | 165 |
| - UK | 167 | 351 | 270 |
| - UNEP | | 148 2/ | 100 |
| - USA | 460 | 500 | 750 |
| - World Bank | 200 | 205 | 365 |
| - Unidentified sources | - | - | - |
| - Unexpended balance from previous year | -99 | 212 | 342 |
| - Earned income applied in year | 7 | 35 | 10 |
| sub-total | 1,748 | 2,711 | 3,377 |
| b. Restricted: | | | |
| - Unexpended balance from previous year | 179 | | |
| - Less: Earned income from Restricted Grants applied to core unrestricted above | | | |
| sub-total | 179 | | |
| c. Total core operating funds | 1,927 | 2,711 | 3,377 |
| 2. Capital | | | |
| 3. Special projects | | | |
| 4. TOTAL FUNDS | 1,927 | 2,711 | 3,377 |

1/ 1977 and 1978 pledges
2/ 1978 and 1979 pledges

| Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|
| 3,535 | 4,018 | 7,553 | 4,212 | 4,212 |
| 12 | 14 | 26 | 16 | 16 |
| 3,547 | 4,032 | 7,579 | 4,228 | 4,228 |
| 3,547 | 4,032 | 7,579 | 4,228 | 4,228 |
| 3,547 | 4,032 | 7,579 | 4,228 | 4,228 |

TABLE II (Continued)

| | Actual 1978 | Actual 1979 | Current Estimate 1980 |
|---|---|---|---|
| APPLICATION OF FUNDS | | | |
| a. Core operations | 1,715 | 2,369 | 3,104 |
| b. Capital | | | |
| c. Special projects | | | |
| d. Unexpended balances | | | |
| - Unrestricted core | 212 | 342 | - |
| - Restricted core | | | |
| - Capital | | | |
| - Working funds | | | |
| - Special projects | | | |
| - Total | 212 | 342 | - |
| e. TOTAL APPLICATIONS | 1,927 | 2,711 | 3,104 |
| MEMO: | | | |
| Total core operating funds required | 1,715 | 2,369 | 3,104 |
| Less: Unexpended balances from previous year | 80 | 212 | 342 |
| Less: Earned income applied from current year (excluding earned income included in core restricted grants) | 0 | 35 | 10 |
| Net core operating funds required from CG donors | 1,635 | 2,122 | 2,752 |

| Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|
| 3,547 | 4,032 | 7,579 | 4,228 | 4,228 |
| - | - | - | - | - |
| - | - | - | - | - |
| 3,547 | 4,032 | 7,579 | 4,228 | 4,228 |
| 3,547 | 4,032 | 7,579 | 4,228 | 4,228 |
| - | - | - | - | - |
| 12 | 14 | 26 | 16 | 16 |
| 3,535 | 4,018 | 7,553 | 4,212 | 4,212 |

TABLE III

BREAKDOWN OF COSTS BY ITEMS
1979 - 1984

1979 EXPENDITURE, CHANGES WITHIN THE 1980 BUDGET, BUDGET PROPOSALS FOR 1981 AND 1982 AND PROJECTIONS FOR 1983 AND 1984

| | Expenditure 1979 | Approved Budget 1980 |
|---|---|---|
| Activities | | |
| 1. Information and documentation activities | | |
| 1.1 Directories of collections and data services | 233,949 | |
| 1.2 Assistance to centres | 140,754 | |
| 1.3 Descriptor work | 25,847 | |
| 1.4 Training in information | 9,750 | |
| 1.5 Planning and programme development | 46,992 | |
| 1. TOTAL | 457,292 | 336,000 |
| 2. Regional activities | | |
| 2.1 Mediterranean | | |
| - Support to national programme | 69,929 | 80,000 |
| - Personnel | | |
| - Training | 19,922 | 30,000 |
| - Conservation | 56,000 | 50,000 |
| - Regional documentation | | 10,000 |
| - Travel | 15,466 | 20,000 |
| - Secretariat expenses | 10,000 | |
| sub-total | 171,317 | 190,000 |
| 2.2 Southwest Asia | | |
| - Support to national programmes | 48,395 | 118,000 |
| - Personnel | 92,681 | 160,000 |
| - Training | 25,952 | 40,000 |
| - Conservation | | |
| - Regional documentation | | 5,000 |
| - Travel | 12,367 | 15,000 |
| - Project servicing costs 1/ | 25,310 | 42,000 |
| sub-total | 204,705 | 380,000 |

1/ FAO is executing this regional programme on behalf of IBPGR
2/ A specific need in 1981 to overhaul seed stores established in the 1960's (Turkey)

| Current Estimate 1980 | Proposed Budget 1981 | Proposed Budget 1982 | TOTAL | Projections 1983 | Projections 1984 |
|---|---|---|---|---|---|
| 70,000 | 70,000 | 70,000 | 140,000 | | |
| 76,000 | 70,000 | 70,000 | 140,000 | | |
| 70,000 | 70,000 | 70,000 | 140,000 | | |
| 75,000 | 75,000 | 75,000 | 150,000 | | |
| 45,000 | 45,000 | 45,000 | 90,000 | | |
| 336,000 | 330,000 | 330,000 | 660,000 | 350,000 | 350,000 |
| 95,000 | 95,000 | 95,000 | 190,000 | | |
| 20,000 | 20,000 | 20,000 | 40,000 | | |
| 25,000 | 25,000 | 25,000 | 50,000 | | |
| 30,000 | 30,000 | 30,000 | 60,000 | | |
| | 10,000 | 10,000 | 20,000 | | |
| 10,000 | 10,000 | 10,000 | 20,000 | | |
| 10,000 | 20,000 | 20,000 | 40,000 | | |
| 190,000 | 210,000 | 210,000 | 420,000 | 220,000 | 220,000 |
| 78,000 | 63,000 | 63,000 | 126,000 | | |
| 150,000 | 95,000 | 100,000 | 195,000 | | |
| 40,000 | 40,000 | 40,000 | 80,000 | | |
| 40,000 | 40,000 2/ | 20,000 | 60,000 | | |
| 5,000 | 10,000 | 20,000 | 30,000 | | |
| 15,000 | 15,000 | 15,000 | 30,000 | | |
| 42,000 | 39,000 | 36,000 | 75,000 | | |
| 370,000 | 302,000 | 294,000 | 596,000 | 300,000 | 300,000 |

TABLE III (Continued)

| | Expenditure 1979 | Approved Budget 1980 |
|---|---|---|
| **2.3 South Asia** | | |
| - Support to national programmes | 66,256 | 80,000 |
| - Personnel | | |
| - Training | | |
| - Conservation | | |
| - Regional documentation | | |
| - Travel | | |
| sub-total | 66,256 | 80,000 |
| **2.4 Southeast Asia** | | |
| - Support to national programmes | 105,383 | 75,000 |
| - Personnel | 27,218 | 48,500 |
| - Training | 37,413 | 35,000 |
| - Conservation | 4,532 | |
| - Regional documentation | 173 | 5,000 |
| - Travel and Committee meeting | 13,951 | 15,500 |
| - Secretariat expenses | 9,483 | 11,000 |
| sub-total | 198,153 | 190,000 |
| **2.5 Western Africa** | | |
| - Support to national programmes | 36,490 | 60,000 |
| - Personnel | | |
| - Travel | | |
| sub-total | 36,490 | 60,000 |
| **2.6 Eastern Africa and Ethiopia** | | |
| - Support to national programmes | 46,983 | 65,000 |
| - Personnel | | |
| - Training | | |
| - Travel | | |
| sub-total | 46,983 | 65,000 |

| Current Estimate 1980 | Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|---|
| 45,000 | 50,000 | 50,000 | 100,000 | | |
| 45,000 | 40,000 | 40,000 | 80,000 | | |
| | 10,000 | 10,000 | 20,000 | | |
| | 10,000 | 10,000 | 20,000 | | |
| 90,000 | 110,000 | 110,000 | 220,000 | 160,000 | 160,000 |
| 75,000 | 80,000 | 80,000 | 160,000 | | |
| 49,000 | 50,000 | 50,000 | 100,000 | | |
| 35,000 | 30,000 | 30,000 | 60,000 | | |
| | 25,000 | 25,000 | 50,000 | | |
| 5,000 | 10,000 | 10,000 | 20,000 | | |
| 15,000 | 18,000 | 18,000 | 36,000 | | |
| 11,000 | 7,000 | 7,000 | 14,000 | | |
| 190,000 | 220,000 | 220,000 | 440,000 | 220,000 | 220,000 |
| 60,000 | 60,000 | 60,000 | 120,000 | | |
| | 50,000 | 50,000 | 100,000 | | |
| | 10,000 | 10,000 | 20,000 | | |
| 60,000 | 120,000 | 120,000 | 240,000 | 150,000 | 150,000 |
| 65,000 | 62,000 | 70,000 | 132,000 | | |
| | 50,000 | 50,000 | 100,000 | | |
| | 20,000 | 25,000 | 45,000 | | |
| | 5,000 | 5,000 | 10,000 | | |
| 65,000 | 137,000 | 150,000 | 287,000 | 170,000 | 170,000 |

TABLE III (Continued)

| | Expenditure 1979 | Approved Budget 1980 |
|---|---|---|
| 2.7 Latin America | | |
| - Support to national programmes<br>- Personnel<br>- Training<br>- Conservation<br>- Regional documentation<br>- Travel | 64,985 | 100,000 |
| sub-total | 64,985 | 100,000 |
| 2.8 Far East/Pacific Islands | - | 30,000 |
| 2. TOTAL | 788,889 | 1,095,000 |
| 3. Specific crop activities | | |
| 3.1 Global programmes in priority crops | 236,046 | 220,000 |
| 3.2 Committees, Working Groups and Studies | 73,211 | 100,000 |
| 3. TOTAL | 309,257 | 320,000 |
| 4. Forest Genetic Resources | 55,560 | - |
| 5. Conservation | | |
| 5.1 Development and improvement of storage facilities | 54,287 | 150,000 |
| 5.2 Investigations of seed longevity | 122,535 | 65,000 |
| 5.3 Investigations of conservation of vegetatively propagated crops | | |
| 5.4 Support to vegetative collections | 2,754 | 50,000 |
| 5.5 Regeneration of collections | | |
| 5. TOTAL | 179,576 | 265,000 |

| Current Estimate 1980 | Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|---|
| 50,000 | 35,000 | 30,000 | 65,000 | | |
| | 50,000 | 50,000 | 100,000 | | |
| 30,000 | 30,000 | 30,000 | 60,000 | | |
| 10,000 | 10,000 | 20,000 | 30,000 | | |
| 5,000 | 10,000 | 20,000 | 30,000 | | |
| 5,000 | 5,000 | 5,000 | 10,000 | | |
| 100,000 | 140,000 | 155,000 | 295,000 | 170,000 | 170,000 |
| 40,000 | 50,000 | 65,000 | 115,000 | 65,000 | 65,000 |
| 1,105,000 | 1,289,000 | 1,324,000 | 2,613,000 | 1,455,000 | 1,455,000 |
| 220,000 | 250,000 | 275,000 | 525,000 | | |
| 100,000 | 100,000 | 100,000 | 200,000 | | |
| 320,000 | 350,000 | 375,000 | 725,000 | 390,000 | 390,000 |
| | 125,000 | 150,000 | 275,000 | 150,000 | 150,000 |
| 150,000 | 150,000 | 150,000 | 300,000 | 150,000 | 150,000 |
| 65,000 | 75,000 | 75,000 | 150,000 | 75,000 | 75,000 |
| 10,000 | 40,000 | 50,000 | 90,000 | 40,000 | 40,000 |
| 20,000 | 40,000 | 50,000 | 90,000 | 60,000 | 60,000 |
| | 35,000 | 50,000 | 85,000 | 50,000 | 50,000 |
| 245,000 | 340,000 | 375,000 | 715,000 | 375,000 | 375,000 |

TABLE III (Continued)

| | Expenditure 1979 | Approved Budget 1980 |
|---|---|---|
| 6. Training and Technical Conferences | | |
| 6.1 University courses | 63,253 | 35,000 |
| 6.2 Short technical courses[1/] | 48,803 | 75,000 |
| 6.3 Fellowships and Study Tours | 15,100 | |
| 6.4 Technical Conferences | | |
| 6. TOTAL | 127,156 | 110,000 |
| 7. General administration | | |
| 7.1 Meetings of Board and its Executive Committee | 67,144 | 60,000 |
| 7.2 Specific assigments undertaken by Chairmen and Board members | 29,282 | 40,000 |
| 7.3 Publications | 27,529 | 20,000 |
| 7.4 Travel (Secretariat and consultants) | 42,278 | 40,000 |
| 7.5 Personnel (Secretariat) | 171,269 | 182,000 |
| 7.6 Miscellaneous (including duplicating expenses) | 39,470 | 35,000 |
| 7. TOTAL | 376,972 | 377,000 |
| 8. All other | | |
| 8.1 Quinquennial review | 50,000 | |
| 8.2 Contingency | 24,514 | 100,000 |
| 8.3 Provision for price changes in 1980 | | 521,000 |
| 8. TOTAL | 74,514 | 621,000 |

1/ Special technical courses not included in regional activities
2/ $35,000 allocated to vegetable development programme under item 3.

| Current Estimate 1980 | Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|---|
| 50,000 | 70,000 | 70,000 | 140,000 | | |
| 40,000 | 80,000 | 100,000 | 180,000 | | |
| 30,000 | 30,000 | 30,000 | 60,000 | | |
| | 36,000 | | 36,000 | | |
| 120,000 | 216,000 | 200,000 | 416,000 | 220,000 | 220,000 |
| 60,000 | 70,000 | 70,000 | 140,000 | | |
| 40,000 | 30,000 | 30,000 | 60,000 | | |
| 30,000 | 45,000 | 60,000 | 105,000 | | |
| 50,000 | 60,000 | 60,000 | 120,000 | | |
| 212,000 | 230,000 | 230,000 | 460,000 | | |
| 35,000 | 40,000 | 40,000 | 80,000 | | |
| 427,000 | 475,000 | 490,000 | 965,000 | 500,000 | 500,000 |
| 65,000[2/] | 100,000 | 100,000 | 200,000 | 100,000 | 100,000 |
| 486,000 | | | | | |
| 551,000 | 100,000 | 100,000 | 200,000 | 100,000 | 100,000 |

TABLE III (Continued)

| | Expenditure 1979 | Approved Budget 1980 |
|---|---|---|
| 9. TOTAL CORE BUDGET IN 1980 DOLLAR TERMS (Rounded) | 2.369,000 | 3,124,000 |
| 10. Provision for price changes | | |
| In 1981 1/ | | |
| In 1982 1/ | | |
| 11. GRAND TOTAL (Rounded) | 2,369,000 | 3,124,000 |

1/ Provision for price changes at 10% in 1981 and 1982

2/ Before provision for price changes in 1983

3/ Before provision for price changes in 1983 and 1984

| Current Estimate 1980 | Proposed Budget 1981 | 1982 | TOTAL | Projections 1983 | 1984 |
|---|---|---|---|---|---|
| 3,104,000 | 3,225,000 | 3,344,000 | 6,569,000 | 3,540,000 | 3,540,000 |
| | 322,000 | 322,000 | 644,000 | 322,000 | 322,000 |
| | | 366,000 | 366,000 | 366,000 | 366,000 |
| 3,104,000 | 3,547,000 | 4,032,000 | 7,579,000 | 4,228,000[2/] | 4,228,000[3/] |

TABLE IV

1981-1982 BUDGET

ESTIMATED ALLOCATIONS BY FUNCTIONS
(% and US$ thousands)

A. GENETIC RESOURCES ACTIVITIES

| | 1981 | | 1982 | |
|---|---|---|---|---|
| | %1/ | $ | %1/ | $ |
| 1. Collecting | 26 | 828 | 26 | 869 |
| 2. Conservation | 15 | 484 | 15 | 501 |
| 3. Information | 14 | 451 | 14 | 468 |
| 4. Training | 15 | 484 | 15 | 501 |
| 5. Research | 3 | 96 | 3 | 103 |
| 6. Publications | 1 | 45 | 2 | 60 |
| 7. Administration | | | | |
| 7.1 Board expenses | 3 | 100 | 3 | 100 |
| 7.2 Secretariat expenses | | | | |
| - Headquarters | 9 | 290 | 9 | 290 |
| - Field | 13 | 407 | 12 | 412 |
| - Miscellaneous | 1 | 40 | 1 | 40 |
| 8. Price changes | | 322 | | 688 |
| | 100 | 3,547 | 100 | 4,032 |

1/ % allocated without taking into account prices changes

| | 1981 | | 1982 | |
|---|---|---|---|---|
| | %[2/] | $ | %[2/] | $ |
| 1. Cereals | 30 | 392 | 30 | 406 |
| 2. Food legumes | 26 | 332 | 25 | 339 |
| 3. Fruits | 10 | 129 | 10 | 135 |
| 4. Vegetables | 10 | 129 | 10 | 135 |
| 5. Roots and tubers | 10 | 129 | 10 | 135 |
| 6. Forages | 6 | 77 | 6 | 84 |
| 7. Industrial crops | 4 | 52 | 4 | 54 |
| 8. Forest trees | 1 | 12 | 1 | 15 |
| 9. Minor crops | 3 | 39 | 4 | 51 |
| sub-total | 100 | 1,291 | 100 | 1,354 |
| 10. Not allocated on a crop basis | | 1,934 | | 1,990 |
| 11. Prices changes | | 322 | | 688 |
| sub-total | | 3,547 | | 4,032 |

TABLE IV (Continued)

B. CROPS

| | 1981 | | 1982 | |
|---|---|---|---|---|
| | %[2/] | $ | %[2/] | $ |
| 1. Cereals | 30 | 387 | 30 | 406 |
| 2. Food legumes | 25 | 323 | 25 | 339 |
| 3. Fruits | 10 | 129 | 10 | 135 |
| 4. Vegetables | 10 | 129 | 10 | 135 |
| 5. Roots and tubers | 10 | 129 | 10 | 135 |
| 6. Forages | 6 | 77 | 6 | 81 |
| 7. Industrial crops | 4 | 52 | 4 | 54 |
| 8. Forest trees | 2 | 26 | 2 | 27 |
| 9. Minor crops | 3 | 39 | 3 | 42 |
| sub-total | 100 | 1,291 | 100 | 1,354 |
| 10. Not allocated on a crop basis | | 1,934 | | 1,990 |
| 11. Prices changes | | 322 | | 688 |
| sub-total | | 3,547 | | 4,032 |

2/ % do not include that part of the budget which cannot be allocated on a crop basis

TABLE IV (Continued)

C. REGIONS

| | 1981 | | 1982 | |
|---|---|---|---|---|
| | %[3/] | $ | %[3/] | $ |
| 1. Mediterranean | 17 | 229 | 18 | 280 |
| 2. Southwest and Central Asia | 25 | 336 | 24 | 371 |
| 3. South Asia | 10 | 135 | 9 | 140 |
| 4. Southeast Asia | 17 | 229 | 17 | 262 |
| 5. Latin America | 12 | 161 | 12 | 185 |
| 6. Africa | 17 | 229 | 19 | 295 |
| 7. Far East/Pacific | 2 | 27 | 2 | 31 |
| sub-total | 100 | 1,346 | 100 | 1,564 |
| 8. Not allocated on a regional basis | | 1,890 | | 1,802 |
| 9. Price changes | | 322 | | 688 |
| | | 3,547 | | 4,032 |

3/ % do not include that part of the budget which cannot be allocated on a regional basis.

# Record Removal Notice

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| File Title | Barcode No. |
|---|---|
| Consultative Group on International Agricultural Research [CGIAR] - G-12 - International Board for Plant Genetic Resources [IBPGR] - Documents - Volume 2 | 1762409 |

| Document Date | Document Type |
|---|---|
| 01 January, 1980 | Report |

**Correspondents / Participants**

**Subject / Title**

International Board for Plant Genetic Resources
Programme and Budget Proposals for 1981-82

**Exception(s)**

Information Provided by Member Countries or Third Parties in Confidence

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The item(s) identified above has/have been removed in accordance with The World Bank Policy on Access to Information. This Policy can be found on the World Bank Access to Information website.

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| Tonya Ceesay | 01-Dec-15 |