

Addressing Acidity and Degraded Soils, and Enhancing Soil Health through Input Subsidy Programs

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This note, prepared for the Impact Program's learning, provides a brief overview of how addressing soil acidity can improve the effectiveness of input subsidy programs. It showcases recent experiences in SSA countries in implementing soil health programs, highlighting key lessons on what has worked and not worked, and how programs that aim to restore soil health should be designed and implemented.

Context

Input subsidies have long been a cornerstone of agricultural policy in SSA. They aim to improve productivity, lower production costs, raise smallholder farmers' incomes, and enhance food security. In the six Impact Program countries—**Ghana, Kenya, Malawi, Senegal, Tanzania, and Zambia**—annual spending on input subsidies has averaged about US\$560 million over the last three years, accounting for a major share of agricultural public expenditure.

Traditional input subsidy programs, although designed to enhance agricultural productivity, often overlook the fundamental issues of soil health. These programs generally emphasize providing fertilizers and seeds at reduced costs without considering the soil's ability to effectively utilize these inputs. Soil acidity, which impacts about 25% of productive cropland in SSA, restricts nutrient availability and reduces crop yields. Consequently, this inefficiency leads to suboptimal returns to investment for both farmers and governments.

Healthy soils are the foundation of productive and sustainable agriculture, and play a vital role in ensuring food security, improving crop yields, and maintaining ecosystem services. By addressing soil health, input subsidy programs can enhance the effectiveness of fertilizers, improve crop yields, and ensure sustainable agricultural practices. This approach not only maximizes the impact of subsidies but also promotes long-term soil fertility and resilience against climate change.

How to Address Soil Acidity and Enhance Soil Health

Soil acidity and soil health programs are initiatives designed to improve soil quality by addressing issues such as low pH levels and nutrient deficiencies. These programs typically involve the application of agricultural lime to neutralize soil acidity, along with the use of organic and inorganic fertilizers to enhance soil fertility. In the context of input subsidy programs, these initiatives ensure that the soil can effectively utilize the subsidized inputs, leading to better crop yields and more sustainable farming practices.

Recent Experience and Lessons Learned

Countries across Africa—including **Kenya, Rwanda, Ethiopia, Malawi, and Tanzania**—are implementing diverse programs to restore soil health and boost crop yields through lime application, integrated soil fertility management (ISFM), and targeted soil mapping. The success of these initiatives relies on affordable lime supply chains, robust extension services, and locally adapted practices, all supported by digital soil mapping and public-private partnerships to scale.

In **Malawi**, soil acidity is a significant challenge affecting agricultural productivity. A notable initiative is the Soil Health Consortium of Malawi, who collaborate with local farmers by providing training on the benefits of liming and proper application techniques to neutralize soil acidity and improve crop yields. Additionally, the government has subsidized lime to make it more affordable for smallholder farmers. These efforts have led to increased awareness and adoption of liming practices, resulting in improved soil health and higher crop productivity.

Tanzania's implementation of soil health programs is showing promising results. The "Soil Health Program for Tanzania" aimed at addressing soil acidity through large-scale liming has demonstrated significant improvements in crop productivity. The program targeted regions with extremely acidic soils, applying lime to neutralize the acidity and improve nutrient uptake efficiency. The results showed a substantial increase in crop yields, with maize and beans showing yield improvements of up to 77% and 90%, respectively.

Ethiopia has successfully used agricultural lime and improved agronomic practices to enhance soil fertility and crop productivity, particularly for maize and legumes. Similarly, Kenya is addressing soil acidity and land degradation through ISFM, combining lime application, mineral fertilizers, and organic inputs. These interventions boosted maize yields by over 100%, improved soil pH, and enhanced nutrient availability in key highland zones.

In **Brazil**, the transformation of the Cerrado region from nutrient-poor soils to one of the world's major agricultural hubs serves as a successful example of large-scale liming programs. The Brazilian government initiated massive lime distribution, which, combined with other soil management practices, led to a fourfold increase in agricultural production. This success story underscores the potential of soil health programs to revolutionize agriculture in regions with acidic soils.

Design and Implementation Considerations

Key design features and best practices for soil acidity and soil health programs include:

- **Soil Testing and Mapping:** Conduct comprehensive soil tests to determine pH levels and nutrient deficiencies. This data is crucial for tailoring lime application rates and ensuring effective soil management.
- **Lime Application:** Applying agricultural lime at appropriate rates to neutralize soil acidity. The recommended application rate is typically two tons per hectare, but this may vary based on soil conditions.

- **Integrated Soil Fertility Management:** Combine lime application with organic and inorganic fertilizers to enhance soil fertility and improve crop yields. This approach ensures that the soil can effectively utilize the nutrients provided by fertilizers.
- **Farmer Training and Awareness:** Educating farmers on the benefits of soil health programs and providing training on proper lime and fertilizer application techniques. This is essential for ensuring the successful adoption of these practices.
- **Monitoring and Evaluation:** Implementing robust monitoring and evaluation frameworks to track the impact of soil health programs on crop yields and soil quality. This data will help refine and improve program implementation over time.

Soil acidity and soil health programs can face challenges, including **high costs** of lime and transportation, **logistical difficulties** in delivering lime to remote areas, and **limited farmer awareness** of the benefits of liming. Additionally, **restricted access to credit** often prevents farmers from purchasing necessary inputs, while **soil variability** requires tailored application rates for effectiveness. **The benefits of lime are not immediate**, sometimes taking years to materialize, and **robust monitoring and evaluation** can be difficult to implement. **Environmental factors**, such as heavy rainfall, may also impact the success of these interventions. Together, these challenges underscore the need for thorough planning, farmer education, and strong support systems to ensure program effectiveness.

Potential Impact and Next Steps

At the upcoming Impact Program regional learning events, participants will gain insights into best practices, cost and benefits of these practices, country experiences, and technical deep dives into the importance of addressing soil acidity and improving soil health to enhance crop yields, increase farmer incomes, and contribute to food security.

The event will provide a platform for stakeholders to share knowledge, discuss challenges and explore opportunities for scaling up soil health initiatives across SSA. Expected outcomes include a clear understanding of how to address soil acidity, practical tools for design and implementation, strategies for stakeholder engagement, and concrete actions plans for improving soil health in fertilizer subsidy programs.



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