Ensuring food security by promoting uptake and scaling up the application of agricultural lime to combat soil acidity in Kenya

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Abstract

Soil acidity is rapidly becoming a serious problem in Kenya. Acidic soils create production problems by limiting the availability of some essential plant nutrients and increasing that of the soil solution's toxic elements, such as aluminum and manganese, the major cause of poor crop performance and failure in acidic soils. Results from several decades of natural resource management (NRM) research have shown that farmers in different environments can increase their farm productivity by up to 5 times if they adopted sustainable soil fertility management (SFM) technologies that are already available. These technologies include the use of agricultural lime to combat soil acidity. However, despite the availability of several technologies, including liming, little impact has been registered so far because only a small proportion of research results or good practices are scaled up, accessed and utilized by the extension workers, farmers, Non-Governmental Organizations (NGOs), the Private Sector, and policy makers. This paper highlights the main policy-induced constraints with respect to use of agricultural lime in Kenya and the key steps that stakeholders, including government, need to take to remedy the situation. These include the need to prioritize soil acidity as a constraint within National Agricultural Research and Extension Systems (NARES). This can be achieved through development of comprehensive policy documents on crop yield increases due to use of agricultural lime for different cropping systems and agro-ecological zones. Secondly, the Government of Kenya needs to increase and maintain budgetary allocations to agricultural sector Ministries to a minimum of the 10% of Gross Domestic Product (GDP) as recommended by NEPAD and improve both input and output markets. In addition, the Government of Kenya need to develop, support and strengthen institutional frameworks such as research-extension linkages for efficient and effective coordination of soil fertility and land management by empowering them and providing the requisite resources. There is also need to fast track harmonization of the existing policies and institutional arrangements for efficient delivery of SFM technologies including use of agricultural lime.

Summary

Results from several decades of natural resource management (NRM) research have shown that farmers in different environments can increase their farm productivity by up to 5 times if they adopted sustainable integrated soil fertility management (ISFM) technologies that are already available. ISFM is a set of soil fertility management practices that use a combination of mineral fertilizers and organic inputs, improved germplasm, knowledge of how to adapt the practices to local conditions, and which ensures agronomic efficiency of applied nutrients in order to improve crop productivity. However, despite the availability of several technologies, including ISFM, little impact has been registered so far because only a small proportion of research results or good practices are scaled up, accessed and utilized by the extension workers, farmers, Non Governmental Organizations (NGO’s), the Private Sector, and policy makers.

This policy brief highlights the main policy-induced constraints with respect to liming as a practice within ISFM in Kenya and the key steps that stakeholders, including government, need to take to remedy the situation:

- There is need to prioritize liming as an ISFM practice within National Agricultural Research and Extension Systems (NARES). This can be achieved through development of comprehensive policy
documents on crop yield increases due to liming as an option within ISFM for different cropping systems and agro-ecological zones

- The Government of Kenya needs to increase budgetary allocations to agricultural sector Ministries to a minimum of the 10% of Gross Domestic Product (GDP) as recommended by NEPAD and improve both input and output markets.
- The Government of Kenya need to develop, support and strengthen institutional frameworks such as research-extension linkages for efficient and effective coordination of soil fertility and land management by empowering them and providing the requisite resources.
- There is need to ensure harmonization of the existing policies and institutional arrangements for efficient delivery of use of lime and other ISFM technologies

Context and importance of the problem

Acidic soils are have less than 7.0 pH values and cover about 13% (7.5 million hectares) of agricultural land of Kenya. Areas covered by acidic soils contribute significantly to the Kenyan economy through cash crop and dairy production (Kanyanjua et al., 2002). In the traditional ecological zone map of Kenya (Figure 1), areas with acidic soils are referred to as ‘tea–dairy’, ‘coffee–tea’ and ‘main coffee’ climatic zones (Jaetzold and Schmidt, 1982). This reflects the high potential for cash cropping and dairy keeping.

Figure 1: Acid soils distribution in Kenya

In addition to soil acidity, Land degradation is a major threat to food security and natural resource conservation in Kenya. As a result of catastrophic land degradation, soil-fertility depletion in smallholder farms is now recognized as the fundamental biophysical root cause for declining per capita food production, poverty and food insecurity. Yields for major staple crops such as maize will need to be raise from the current average level of 3 bags per acre to 15 bags per acre to avert a major food security disaster.

Several decades of Natural Resource Management (NRM) research to address this situation have produced copious amounts of results in their effort to halt soil acidity and the degradation of stressed environments and fragile ecosystems where poverty is increasing. However, production and availability of results has not been matched by a similar uptake. Lime materials have invariably been applied to soils in form of calcium hydroxide Ca(OH)\(_2\), calcium oxide (CaO) or calcium carbonate

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(CaCO3) to neutralize soil acidity. Addition of such materials has been found to stimulate crop growth and to also provide Ca2+ and have also lowered aluminium (Al) toxicity. Other workers have recommended use of Rock Phosphate (PR) to neutralize soil acidity (Kanyanjua et al., 2002; Nekesa, 2007). Past research has shown that farmers in different environments can increase their farm productivity by up to 5 times if they adopted sustainable integrated soil fertility management (ISFM) and liming technologies that are already available. However, relatively little impact has been registered because only a small proportion of research results or good practices are scaled up, accessed and utilised by the poor farmers, their support agents, and policy makers. As a result of this low uptake and utilization of the promising technologies, productivity at farm level has remained low and in many cases declined. Only ‘islands of success’ or working pilot schemes have been registered from many years of participatory research in Agriculture and Natural Resource Management (NRM).

**Key policy questions**

A number of key policy questions remain unanswered:

- In view of the identified dismal situation, the question for policy-makers for supporting agriculture is, then, how best to support farmers to increase productivity and income growth, especially for smallholders using available technology?
- What explains the poor performance of policy formulation, implementation and advocacy on the role of lime and ISFM? Despite Kenya having successfully implemented a fertilizer market reform policy, the place of lime, organic fertilizers such as manures and other green nutrient sources has not been addressed at policy level.
- Evidence from long-term experiments has shown that a combination of organic inputs, with modest amounts of mineral fertilizer, which is the core theme of ISFM, offers the most affordable and efficient means of addressing soil fertility decline and improving and sustaining crop yields. Application of lime to neutralize acidity would enhance achieving ISFM benefits.
- If the key policies that are shown to have a bearing on uptake and scaling up of lime use are related to awareness creation, marketing, public and private investment, taxation and credit, then, what can the government and other stakeholders do?

**Policy options**

Some of the key elements of remedying the situation include:

- Setting favorable overall conditions for growth of the Agricultural sector within the National Economic Development blueprints;
- Recognizing the public good role played by Agriculture;
- Recognizing the role of the private sector, and
• Remedying inputs and output market failures

These three building blocks of support for Agricultural Development act in concert: unless all three are attended to, then growth will be difficult to achieve.

• It is observed that most institutions dealing with lime usage are fragmented and lack the requisite human capacity and matching financial resources to implement their activities, especially the Ministry of agriculture. The scattering of lime issues across many policy documents has resulted in wastage of efforts and resources and in some cases conflicts and duplication of efforts between ministries, and departments. This calls for a more coordinated and harmonized approach and consolidation of efforts amongst different sectors. Moreover, the scattering of the issues across several sectors has resulted in overlapping of policies and the creation of some gaps in the policies themselves, and lack of clear ownership of the issues.

• Governments need to strengthen and increase the support of institutional frameworks such as research-extension linkages for efficient and effective coordination of soil fertility management including use of lime by empowering them and providing the requisite resources.

• Currently, investment in the Agricultural Sector in Kenya is lower than that recommended by NEPAD and both input and output markets are inefficient. For example percentages of national budget allocations for agriculture sector Ministries is between 4-5%. There is therefore urgent need for the Government to increase budgetary allocations to agricultural sector to a minimum of 10% of Gross Domestic Product (GDP) recommended by NEPAD and improve input and output markets as well as the Backbone Agricultural and Last Mile Infrastructure, such as roads with connection to the farm gates, marketing, storage and processing facilities. This in turn will enable the Agricultural Sector to drive the overall economic growth

Recommendations

• There is need for comprehensive policy documents showing productivity gains associated with soil fertility management, including liming for different cropping systems and agro-ecological zones in Kenya. Harmonization of the existing policies and institutional arrangements for efficient delivery of new and existing technologies will be useful in attracting investments in both the input and output markets.

• The Government of Kenya needs to increase budgetary allocations to agricultural sector Ministries to a minimum of the 10% of Gross Domestic Product (GDP). as recommended by the New Partnership for Africa's Development (NEPAD) and improve both input and output markets. NEPAD, an economic development program of the African Union, adopted at the 37th session of the Assembly of Heads of State and Government in July 2001 in Lusaka, Zambia. NEPAD aims to provide an overarching vision and policy framework for accelerating economic co-operation and integration among African countries.

• In addition, the Governments of Kenya needs to prioritize ISFM within National Agricultural Research and Extension Systems (NARES) as the single most important factor for increasing agricultural productivity in order to ensure food security. This prioritization of ISFM would ensure improved access to mineral fertilizers through harmonization of tariffs and/or subsidies, credit facilitation and elimination of non-tariff barriers.

• The Government of Kenya needs to strengthen and increase support for institutional frameworks such as research-extension linkages for efficient and effective coordination of Soil fertility management including use of lime by empowering them and providing the requisite resources. This would ensure mass production and dissemination of soil fertility management options including the use of lime targeted at all relevant stakeholders.

• There will be specific need to address the question of both Backbone Agricultural and Last Mile Infrastructure, such as roads with connection to the farm gates, marketing, storage and processing facilities.
References


