

Investment Case for Agricultural Lime in

RWANDA



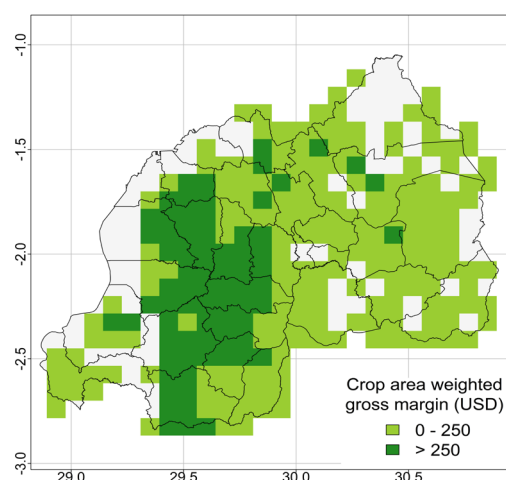
In Rwanda, 59% of soil is highly acidic; soil acidity reduces yields of major crops in the country thereby adversely impacting employment and threatening food security of the country, with an estimated 18.7% of households classified as food insecure and 38.6% marginally secure. While several solutions address soil acidity, lime is the most effective in the country due to its impact on acid soils over a relatively short period of time, availability, and relative low cost.

However, realizing significant uptake of lime is complex primarily due to: (i) the increase in yield resulting from application of lime is highly variable depending on crop type, seed variety, starting soil composition, and agronomic production factors; (ii) the full benefits of liming are distributed over multiple growing seasons; and (iii) limited data exists to calculate likely yield response. Consequently, there is limited proof of concept, leading to low lime uptake. Moreover, there exist varying degrees of challenges in the demand, supply and the enabling environment that further constrain the growth of the lime industry. Limited awareness and knowledge of soil acidity management and cost factors further reduce demand for lime. Supply side challenge is high cost of lime that is driven by capacity constraints, and sub-scale and inefficient distribution.

Given the complexity of the problem, identifying nodes of entry that are likely to move the needle in terms of economic benefit to suppliers and farmers is important. There is a need to identify crops, aligned with the national agenda, that have the highest yield response to lime to evaluate the potential impact of lime on livelihoods and economic surplus. Subsequently, understanding where these economic surpluses exist enables selection of 'nodes of entry'.

Potential areas to target

In Rwanda, the Eastern and Northern provinces possess 51% (700,000 ha) of the total cropland in the country, of which 26% is highly acidic ($\text{pH} < 5.5$). These two regions produce 52% of the country's food and cash crops. Moreover, while the Western and Southern provinces are the most acidic regions in the country and hence have a significant potential need for lime, greater soil pH in Eastern and Northern provinces compared to Southern and Western provinces results in small lime requirements and hence lower total cost of lime. Moreover, comparatively, high value crops in Eastern and Northern provinces result in higher economic surplus. Figure 1 presents the highest economic value areas and key crops in Rwanda.



Eastern province

Districts:

- Rwamagana, Gatsibo, Nyagatare, Ngoma, and Kirehe

Key crops:

- Sweet potato, and potato

Northern province

Districts:

- Gicumbi, Musanze, and Gakenke

Key crops:

- Potato, sweet potato

Figure 1: Highest economic value areas in Rwanda

Expected return

In the Eastern province, sweet potato, and potato have the highest potential economic surplus. As shown in Table 1, combined, these crops require 39,613.28 MT of lime to treat soil acidity with the potential to generate 5.39 million USD economic surplus by the third year, and a 3.96 million USD market for lime producers at a cost of lime of 100 USD/MT. Calculations are based on the sum of the first three years of surplus using a 50% discount rate for the second year and a 25% discount rate for the third year. In Northern province, potato, and sweet potato potentially produce the highest economic surplus. Combined, these crops need 17,811.16 MT of lime to treat soil acidity and can in turn generate 3.85 million USD in economic surplus by the third year, and a 1.78 million USD market for lime producers.

Table 1: Summary of economic opportunities for lime in the Eastern and Northern provinces of Rwanda

	Eastern province	Northern province
Total market size for lime (Mt)	39,613.28	17,811.16
Total market size for lime producers (USD)	3.96 million	1.78 million
Total economic surplus (USD)	5.39million	3.85 million

Realizing this economic surplus will require targeted investments to increase uptake of lime and improve commercial viability of supplying lime. Scaling demand for lime will require conducting awareness campaigns focused on why lime is needed, how it is used, and corresponding benefits. Access to infrastructure including demonstration plots, soil testing tools, and storage facilities closer to farmers can drive increase in lime demand. There is a need to earmark patient capital and innovative finance to support suppliers in quality production and improving their distribution systems. There is also a need to provide business support to processors in need to become investment ready. Investments to get to scale on the supply side could reduce costs.

Complementary interventions required

Strengthening the base of evidence in terms of different crop yield responses to lime and the impact of various factors (such as levels of pH and soil conditions) on yield response is critically needed before large investments are made in the sector. The yield response data used to develop this analysis is still in its early stage and is being refined, making it difficult to draw conclusive recommendations. Hence, refining the data before large investments are made in the lime sector is critical. Additionally, comparing lime to other potential interventions to improve crop yields is essential to select the most appropriate course of action.

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Contacts: For further details, please contact us: Moti Jaleta, m.jaleta@cgiar.org; João Silva, j.silva@cgiar.org; Jordan Chamberlin, j.chamberlin@cgiar.org

BILL & MELINDA
GATES foundation

WAGENINGEN
UNIVERSITY & RESEARCH

