

ONE ACRE FUND

Managing Soil Acidity with Lime

2015 Trial Report



Kelvin Owino/ One Acre Fund.

Background

Soil acidity is a major constraint to agricultural productivity throughout Africa. Soil pH is a critical driver of toxic elements in the soil as well as plant nutrient availability. The critical threshold of soil acidity is 5.5, below which aluminum becomes toxic to plants. Optimum soil pH is around 6.5. At this pH, aluminum is no longer toxic and other soil nutrients become available for uptake by plant roots. An estimated 15 percent of all agricultural soils in Africa are affected by soil acidity. Lime is an excellent soil acidity control tool and is available throughout many countries of East Africa. However, cost and transportation difficulties preclude lime from being accessible to smallholder farmers. For lime to be effective at mitigating soil acidity, large quantities of it are required, and it is practically impossible to smallholder farmers to access one or more metric tonnes of lime. This report outlines the work of One Acre Fund to deliver lime and other soil acidity ameliorating tools to smallholder farmers in East Africa.

I. Results Summary

- **Current acidity management:** Currently One Acre Fund distributes travertine lime (an evaporative calcite deposit) at scale in Rwanda, but does not distribute agricultural lime in other countries of operation. However, by recommending practices like fertilizer microdosing and compost use, we hope to slow the rate of soil acidification on smallholder farms.
- **Primary product trials:** One Acre Fund ran three different lime trials in 2015, each composed of a number of different objectives and treatments:
 - Evaluate the effect of different calcitic lime micro-dose quantities on maize yield
 - Evaluate the effect of different types of agricultural lime on maize yields
 - Evaluate the adoption drivers of lime use
- **Potential value of intervention:** Yield effects ranged from -6 to +24 percent, depending on the location and application rate. This corresponded to profit changes of up to \$264/ha USD.
- **2016 trials:** One of our major research goals for 2016 is to better understand farmer adoption dynamics and drivers for lime, as well as the geographical areas where the impact of lime on soil acidity will be the greatest.

II. Product Rationale and Approach

- **Purpose:** The vast majority of smallholders in East Africa cultivate acidic soils. While the severity of soil acidity is variable, the Kenyan Ministry of Agriculture estimates that around 50 percent of smallholder farms in western Kenya have soil pH below 5.5 (optimum pH for plant growth is 6.5).
- **Rationale:** One Acre Fund currently trains farmers in various practices that can ameliorate soil acidification. These include alternative fertilizer choice, composting, and mulching. However, liming products are not currently offered. By successfully bringing lime products to scale in conjunction with soil management trainings, farmers may be able to reverse soil acidification.

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- **Our approach:** One major constraint to lime use is the quantity required to substantially change soil pH. Common lime recommendations are on the order of tonnes per hectare, several times greater than other inputs, seed, and fertilizer—which are measured in kilograms per hectare. In 2015, we evaluated lime application rates from 0.5 t/ha to 2.0 t/ha. In 2016, we will test the hypothesis that even lower application rates may result in positive yield and profit responses, trialing rates from 0.13 t/ha to 0.5 t/ha. We will also evaluate the yield response differences between calcitic and dolomitic lime, and the second-season maize yield effect of a single-season lime application.
- **Product selection criteria:** These trials were chosen based on the four criteria of impact (incremental dollar income added to the farmer), adoption (farmer demand), complexity (ability to realize return), and operability (scale potential). We have also integrated long-term evaluations, specifically with respect to soil and environmental health.

III. Partners Consulted

- In designing our soil acidity trials we consulted a variety of regional experts:
 - **IPNI** – Consultations on the likely effects of lower application rates of lime
 - **IFDC** – Consultations on crop responses to lime in East African environments
 - **AGRA** – Consultation on potential alternative lime application methods
 - **Homa Lime** – Supplier of calcitic lime for trials
 - **CNLS** – Soil sampling at the beginning and end of the lime trial
- These organizations were extremely helpful and excited to see their research and products being put into farmers’ hands.

IV. Trials Summary (Phases 0-2)

One Acre Fund tested improved maize fertilizer with a standardized trial phase process as summarized below.

Table 1. Lime and soil acidity trial outline from western Kenya and Rwanda.

Trial Name	Hypothesis	Treatments	Controls
Microdosing of calcitic lime in maize-based systems: Efficacy evaluation	Microdosing small amounts (<1 t/ha) of calcitic lime will significantly alter root-zone soil pH and result in greater maize grain yields.	1.) 123.5 kg/ha DAP, 123.5 kg/ha CAN, 0.13 – 0.50 t/ha calcitic lime 2.) 123.5 kg/ha DAP, 123.5 kg/ha urea, 0.13 – 0.50 t/ha calcitic lime	123.5 kg/ha DAP at planting and 123.5 kg/ha CAN at topdress, split into two applications (knee and shoulder height)

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<p>Comparative evaluation of dolomitic and calcitic lime in maize-based systems of Rwanda</p>	<p>(1) Site specific application of dolomitic and calcitic lime in the Congo Nile / Lake Kivu areas or Rwanda will ameliorate soil acidity constraints and Ca/Mg deficiencies and result in greater crop yields. (2) The positive yield effects of lime and travertine application in acidic soils will carry over multiple seasons.</p>	<p>1.) 1AF core program + 1.125 t/ha calcitic lime 2.) 1AF core program + 1.125 t/ha dolomitic lime 3.) 1AF core program + 1.125 t/ha calcitic lime + S, Zn, and B</p>	<p>123.5 kg/ha DAP at planting and 123.5 kg/ha urea at topdress, split into two applications (knee and shoulder height)</p>
<p>Targeted behavior modification to increase the adoption of lime</p>	<p>Offered in small quantities, farmers will purchase agricultural lime at market prices at levels comparable to other One Acre Fund products.</p>	<p>1.) A 1/8 acre calcitic lime product (25kg) 2.) Travertine offered in 5kg increments</p>	<p>N/A</p>

Table 2. Lime and soil acidity trial summary from western Kenya and Rwanda.

	Trial Phase			
	0	1	2	3
# Farmers	0	0	1,390	3,075
Yield Impact	N/A	N/A	-6% – 24% ¹	N/A
Profit Impact / ha	N/A	N/A	-\$241 – \$264	N/A
Adoption Level	N/A	N/A	N/A	0.8% (Kenya), 2.4% (Rwanda)
Key Activities / Trials	Preliminary Research 1. Desk research 2. Consultation with experts 3. Visiting 3 rd party trials	Research station trials: N/A	Farmer level trials: 1. Lime application rates 2. Different types of lime 3. Lime purchase rates	2016 district offering: 1. 1/8 acre lime package (25kg) 2. 5kg increments
Trial Objectives	<ul style="list-style-type: none"> Research potential easy, high impact soil acidity management interventions. 	N/A	<ul style="list-style-type: none"> Evaluate impact, complexity, and operability at a larger scale of promising lime interventions 	<ul style="list-style-type: none"> Determine existing demand for lime through purchase rates at the district level.

V. Trial Results

Microdosing of calcitic lime in maize-based systems: Efficacy evaluation

Trial Overview

Hypothesis: Microdosing small amounts (<1 t/ha) of calcitic lime will significantly alter root-zone soil pH and result in greater maize grain yields.

¹ Range of the yield impacts of the noted phase 2 configurations.

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Summary: In 2014, a 14 percent maize yield increase was found when calcitic lime was applied in the seed holes at planting at a rate of 0.5 t/ha. In 2015, we evaluated lower application rates under a range of growing conditions. Application rates included 0.13, 0.25, and 0.5 t/ha. Lime was applied at planting with DAP (123.5 kg/ha), spaced at 75 x 25 cm. Additionally, we trialed the same application rates but in conjunction with increased nitrogen fertilization by the replacement treatment rate was pared with a control and all treatment-control pairings were applied in separate trial sites.

Impact

Given the degree of acidity measured in our Bungoma South trial district and the 2014 yield response to microdosed application, we expected to see a substantial yield and profitability increases from all lime application levels. However, we assumed that response magnitudes would decline with the declining application rate.

Table 3. Initial yield and profit results from on-farm lime trials with maize in western Kenya, long-rain season 2014.

Trial	Trial Type	Location / Date	Yield (t/ha)	Profit (USD/ha)	Profit Change vs. Trial Control
Control 1: CAN: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha	On-farm n=200	Kabula, Kenya	2.92	\$785	NA
		Mwikhupo, Kenya	4.01	\$1,157	NA
1. CAN + 0.5 t/ha lime: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha + 0.5 t/ha lime	On-farm n=200	Kabula, Kenya	3.06	\$849	\$61
		Mwikhupo, Kenya	4.9	\$1,349	\$192
Control 2: CAN: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha	On-farm n=200	Mabusi Kenya	4.77	\$1,430	NA
		New Huruma, Kenya	4.39	\$1,300	NA
2. CAN + 0.25t/ha lime: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha + 0.25 t/ha lime	On-farm n=200	Mabusi Kenya	4.81	\$1,469	\$39
		New Huruma, Kenya	4.48	\$1,348	\$48
Control 3: CAN: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha	On-farm n=200	Harambee, Kenya	3.15	\$885	NA
		Khaoya, Kenya	5.18	\$1,577	NA
3. CAN + 0.13 t/ha lime: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha + 0.13 t/ha lime	On-farm n=200	Harambee, Kenya	4.44	\$1,135	\$250
		Khaoya, Kenya	5.48	\$1,656	\$79
Control 4: CAN: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha	On-farm n=200	Ekitale, Kenya	4.20	\$1,213	NA
		Tulumba, Kenya	3.68	\$1,036	NA
4. Urea + 0.5 t/ha lime: Variety WE 1101, 123.5 kg/ha DAP, 123.5	On-farm n=200	Ekitale, Kenya	3.68	\$1,168	-\$45
		Tulumba, Kenya	3.69	\$1,081	\$45

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kg/ha urea, 53,000 plants/ha + 0.5 t/ha lime					
Control 5: CAN: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha	On-farm n=200	Musikoma, Kenya	3.32	\$927	NA
		Muyayi, Kenya	4.06	\$1,179	NA
5. Urea + 0.25 t/ha lime: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha urea, 53,000 plants/ha + 0.25 t/ha lime	On-farm n=200	Musikoma, Kenya	3.81	\$1,045	\$118
		Muyayi, Kenya	4.52	\$1,295	\$116
Control 6: CAN: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha CAN, 53,000 plants/ha	On-farm n=200	Bulondo, Kenya	3.38	\$955	NA
		Lunao, Kenya	6.35	\$1,967	NA
6. Urea + 0.13 t/ha lime: Variety WE 1101, 123.5 kg/ha DAP, 123.5 kg/ha urea, 53,000 plants/ha + 0.13 t/ha lime	On-farm n=200	Bulondo, Kenya	3.49	\$1,006	\$51
		Lunao, Kenya	6.77	\$2,071	\$104

There were no clear relationships between lime application rates and yield responses. Irrespective of the rate, lime application with a CAN topdress increased yields by an average of 13 percent, while lime application in conjunction with a urea topdress increased yields 4 percent. However, there was a very wide variability in yield responses by trial site location. The magnitude of the yield response ranged from -12 percent yield to +40 percent. Soil measured at Harambee—the site with the greatest yield increase—had the lowest pH and available phosphorus and the highest aluminum among the twelve lime trial sites. Yield response to lime application is highly tied to the initial soil pH, and soils with low (below 5.5) pH will be expected to respond more significantly than soils with higher pH (>5.5).

Adoption

Cost: The current market price for lime in Kenya is \$60 USD/tonne. Based on this price, the cost of the lime application rate used in this trial ranges between \$5 – 30 USD. These costs are low relative to the total cost of the average One Acre Fund package, \$100 USD per farmer. Initial farmer surveys did not find additional labor requirements to be a major barrier.

Complexity: The microdosing of lime adds negligible complexity to the current planting and fertilization trainings if the same hole is used for both lime and fertilizer.

Preference: Lime adoption was 3 percent in the district where the trials were run. In other districts, the adoption rates were well below 3 percent. As the price point of lime is relatively low and the yield responses were good in many districts, the low adoption seems to be driven by lack of basic knowledge about the relationship between soil acidity and lime.

Operability

Sourcing: Homa Lime is an established local lime supplier in western Kenya. However, it is unclear if they will be able to supply their product at a larger scale. There are other potential suppliers such as

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Athi River Mining (ARM) outside of Nairobi, but the cost per ton from ARM is higher, largely attributable to greater transport distances.

Distribution: Lime would be among the bulkiest products that One Acre Fund has offered. At 0.5 t/ha application rate, our standard 0.2 hectare package would require 100kg of lime, approximately double the combined weight of seed and fertilizer offered as part of the core 0.2 hectare package (55kg). The common recommended lime rate is over 1 t/ha broadcasted across the whole farm. It is difficult to imagine a scenario where this would be feasible, as it would require mechanized transport and application. We believe microdosing of small amounts is the most viable mechanism.

Next Steps

1. Sell and distribute lime at the 0.5 t/ha microdosed application to farmers in three districts in Kenya.
2. Further evaluate maize yield response to a 0.5 t/ha micro-dosed application of lime across diverse growing conditions.
3. Investigate the drivers of lime adoption at scale; this includes requiring lime for selected farmers as a way to overcome the initial knowledge barriers.

Comparative evaluation of dolomitic and calcitic lime in maize-based systems of Rwanda

Trial Overview

Hypothesis: (1) Site-specific application of dolomitic and calcitic lime in the Congo Nile / Lake Kivu areas or Rwanda will ameliorate soil acidity constraints and Ca/Mg deficiencies and result in greater crop yields. (2) The positive yield effects of lime and travertine application in acidic soils will carry over multiple seasons.

Summary: Two separate trials evaluating calcitic and dolomitic lime were run in the Congo-Nile / Lake Kivu region of Rwanda in the 2015A season. The first trial compared calcitic and dolomitic lime, lime and micronutrients, and a no-lime control, all applied at planting.

Impact

Application of calcitic and dolomitic lime each produced 20+ percent maize yield increases compared to the program control, however, the difference in yield between these treatments was not statistically significant.

Table 4. Initial yield and profit results from on-farm lime trials with maize in western Rwanda, 2015A season.

Treatments	Trial Type	Location / Date	Yield (t/ha)	Profit (USD/ha)	Profit Change vs. Trial Control
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1. Program Control: Variety ZM 607, 100 kg/ha DAP, 50 kg/ha urea, 33,000 plants/ha	On-farm n=26	Congo Nile / Lake Kivu Rwanda, 2015A	2.35 t/ha	\$495	N/A
2. Calcitic lime: Variety ZM 607, 100 kg/ha DAP, 50 kg/ha urea, 1.125 t/ha calcitic lime, 33,000 plants/ha	On-farm n=29	Congo Nile / Lake Kivu Rwanda, 2015A	2.83 t/ha	\$666	\$171
3. Calcitic lime + micros: Variety ZM 607, 100 kg/ha DAP, 50kg/ha urea, micros (S, Z, B), 1.13 t/ha calcitic lime, 33,000 plants/ha	On-farm n=30	Congo Nile / Lake Kivu Rwanda, 2015A	2.92 t/ha	\$254	-\$241
4. Dolomitic lime: Variety ZM 607, 100 kg/ha DAP, 50 kg/ha urea, 1.125 t/ha dolomitic lime, 33,000 plants/ha	On-farm n=30	Congo Nile / Lake Kivu Rwanda, 2015A	2.82 t/ha	\$349	-\$146
5. Multi-season program control: Variety ZM 607, 100 kg/ha DAP, 50 kg/ha urea, 33,000 plants/ha, two seasons	On-farm n=25	Congo Nile / Lake Kivu Rwanda, 2015A	3.71 t/ha	\$852	N/A
4. Multi-season calcitic lime: Variety ZM 607, 100 kg/ha DAP, 50 kg/ha urea, 2.5 t/ha calcitic lime, 33,000 plants/ha, two seasons	On-farm n=25	Congo Nile / Lake Kivu Rwanda, 2015A	4.00 t/ha	\$930	\$78
5. Multi-season travertine: Variety ZM 607, 100 kg/ha DAP, 50 kg/ha urea, 2.5 t/ha travertine, 33,000 plants/ha, two seasons	On-farm n=25	Congo Nile / Lake Kivu Rwanda, 2015A	3.91 t/ha	\$910	\$58

These trials indicate that lime may be an effective tool to improve soil quality and increase agricultural productivity in Rwandan smallholder systems. However, dolomitic lime is more expensive than calcitic lime. As the yield differences between these lime types were marginal, calcitic lime may be a more economically viable option. Additionally, we found that the second season after lime application did not result in statistically significant yield increases relative to the control. However, this followed first-season maize yield increases of 43 percent and 30 percent for calcitic lime and travertine, respectively.

Adoptability

Cost: At a cost of \$47 USD per tonne, a one-acre application of travertine at 2.5 t/ha would cost a farmer \$1.17 USD. This is a relatively affordable price point for One Acre Fund farmers. However, in 2014B, despite a measured 30 percent yield increase there was a 58 percent profit decrease due to the extra costs of lime. This suggests that the cost of travertine lime may not be a viable financial decision for many farmers. It is possible that lower application rates may have the potential to increase farmer profit.

Complexity: Lime was applied prior to planting, rather than 2-3 months prior to planting, as is typically suggested. This is generally regarded as simpler and labor saving, as farmers are already engaged in planting activities.

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Preference: We are further investigating the drivers of lime adoption, but we have seen very low lime-adoption rates when made available. In 2015A adoption across the Rwanda program was 1.7 percent and in 2016A adoption was 2.4 percent. The increase in adoption is promising, though very slight. One Acre Fund will be investing heavily in understanding lime adoption dynamics in the coming seasons.

Operability

Sourcing: We are continuing to invest in ensuring that consistent and high-quality lime products are available and distributed to One Acre Fund farmers. We are currently engaged in harmonizing quality standards for lime products within our programs in the coming seasons.

Distribution: Agricultural lime is a bulky product. However, given small land sizes in Rwanda, the total quantity of lime that a single farmer is likely to purchase is not prohibitively large. The most commonly purchased lime quantity in 2016A was 25 kg, which is a fairly manageable amount of product for One Acre Fund to distribute using its current logistical platform

Training Complexity: The One Acre Fund lime application training is not a substantial increase from other trainings such as plant spacing and fertilizer application.

Next Steps

1. Sell and distribute travertine at scale in 2016A in 5 kg increments.
2. Invest further in understanding Rwandan farmer preferences for lime and how to make lime products more attractive to prospective clients.

Targeted behavior modification to increase the adoption of lime

Trial Overview

Hypothesis: Offered in small quantities, farmers will purchase agricultural lime at market prices at levels comparable to other One Acre Fund products.

Summary: An estimated 90 percent of One Acre Fund farmers in Rwanda and Kenya cultivate on soil with pH < 6.0. While the majority of One Acre Fund farmers may benefit from lime, a comprehensive understanding of the biophysical parameters needed for financially viable lime application is unknown. Purchasing dynamics and adoption drivers of lime also remain unknown.

Impact

Relative to the proportion of program farmers who would likely benefit from using lime, lime adoption rates are very low. In Rwanda, adoption rates for lime were 2.4 percent and 1.7 percent for the 2015 and 2014 seasons, respectively. However, adoption rates declined from 3.5 percent to 0.8 percent for the same time periods in Kenya.

Table 5. Initial results from a lime pricing adoption trial from Rwanda (2016A) and Kenya (LR 2016).

Trials	Trial Type	Location / Date	Adoption
1. Phase 4 sale: agricultural lime was offered across the Rwanda program during the 2016A season.	Full program sale	Rwanda	2,873 (2.4%)
2. Phase 3 sale: agricultural lime was offered in the Kenya program in three districts (of 29) for the 2016LR.	Three district sale	Chwele, Ndal, & Teso (Kenya)	202 (0.8%)

There is a clear lack of farmer demand for lime products. For any lime program to be successful, a focused effort has to be made to systematically understand the various adoption drivers.

Adoption

Cost: In Kenya, 25 kg of lime was sold for \$2 USD with instructions to apply the lime to 0.3 hectares of land, microdosed at planting with seed and fertilizer application. Even with the relatively low price of the total One Acre Fund package (around \$100 USD), a \$2 USD product is a fairly low entry point. Despite this relatively low price point, adoption rates were still less than 5 percent. In Rwanda, travertine is sold for less than \$0.05 per kg, which translates to \$1.17 for 25 kg.

Complexity: The farmers we work with are very compliant with One Acre Fund planting practices. Lime application adds marginal additional complexity.

Preference: Farmer preference for lime is not well understood. Given the low adoption rates measured over the past few years, we will be focusing our efforts on systematically understanding the barriers and drivers of adoption.

Operability

Sourcing: There are few lime suppliers in East Africa, though the ones we are working with have been able to supply our present needs. If adoption rates increase, it will substantially increase the amount of lime we will purchase.

Distribution: Lime is among the bulkiest products that One Acre Fund offers. At 0.5 t/ha application rate, our standard 0.2 hectare package (in Kenya) would require 100 kg of lime per farmer. Currently, the combined weight of seed and fertilizer offered as part of One Acre Fund’s core 0.2 hectare package is 55 kg. Inclusion of lime at this rate increases the amount of material distributed to each farmer two-fold. This amount of lime is much more manageable than the much larger quantities typically recommended, but still presents distributional challenges.

Training Complexity: As a new product, farmer trainings on proper lime use may be difficult. However, by microdosing, the lime application fits within the current fertilizer and planting trainings.

Next Steps

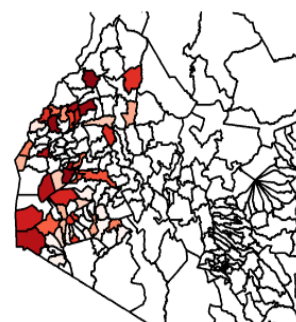
1. Survey adopters and non-adopters of lime in Rwanda to better understand stated farmer decision drivers.
2. Evaluate the effect of small-quantity free lime giveaways on following season lime purchase.
3. Evaluate the effect of increased information on farmer lime purchase.

VI. Conclusions and Next Steps

Soil acidity is a widespread problem in East Africa and one that requires a holistic approach. Intensive agriculture can be an acidifying practice, particularly in the tropics where soil is much more quickly degraded. This is exacerbated by low organic matter inputs and lack of lime use in most agricultural systems. Lime is an effective way to ameliorate soil acidity. Other soil health practices must be concurrently used. These include:

- Precision use and application of mineral fertilizer
- Applying mulch to reduce erosion
- Applying compost to increase soil organic matter levels

Promising Sub-Counties for Lime Intervention



Percent of Farmers
with Soil pH < 5.5
0.00 0.25 0.50 0.75 1.00

The benefit of lime application will vary by location and farming system and is a function of a number of environmental and economic variables. The above map identifies sub-counties in western Kenya, where the prevalence of severe acidity (defined as pH below 5.5) is high and strongly limits yields.

A. Yield and Profit

We have seen that yield and profit responses to lime application are variable and are dependent on soil conditions (ranging from 1 percent to 41 percent). Irrespective of application quantity, micro-dosed lime at rates of 0.5 t/ha or less produced an average 13 percent maize yield increase across six different operating sites. A 13 percent maize yield increase across the nearly 200,000 projected One Acre Fund maize farmers in Kenya would mean an additional 21,000 tonnes of maize production, worth an estimated \$7.6 million USD.

B. Farmer Adoption

Farmer adoption of lime has been very low – between 1 percent and 3 percent depending on the specific area of operation. These low rates contrast to an estimated 90 percent of One Acre Fund farmers in Rwanda and Kenya who cultivate acidic soils. Fundamental drivers of lime adoption are not known.

C. Operability at Scale

- We will continue to evaluate new potential lime suppliers to ensure that the highest quality products are available to client farmers.
- Operability of these configurations at full scale would require the following:
 - Distributing over 18,000 tonnes of lime, assuming a 0.2-hectare package and microdosed application.
 - Design and production of 150,000 standard sized lime application cups.
 - Writing of new trainings and the training of over 800 field officers.
 - Potential addition of hundreds of distribution trucks.

D. Next Steps

In 2016, One Acre Fund will:

- Distribute lime and lime trainings to clients who have purchased the product from One Acre Fund in both Kenya and Rwanda.
- Trial the One Acre Fund lime application method as well as other available lime products in different soil types to better define soil conditions and critical thresholds for profitable yield increases with lime.
- Focus efforts on the systematic identification of the principal barriers and drivers of lime adoption.
- Analyze soil samples distributed geospatially across our operating areas in Rwanda and Kenya to determine which areas are most likely to experience strong yield responses to lime application.