Rock Phosphate – Long Rain Season, Rwanda (2014)

ONE ACRE FUND

Farmers First

PHASE:	Research Station	50 – 500 farmers	1,000 – 20,000 farmers	Full Scale

Introduction

Phosphorus is one of the most limiting nutrients to crop production in Sub-Saharan Africa. Due to the particular chemical reactivity between phosphorus and tropical clay minerals, total phosphorus can be high in many of these soils, but phosphorus availability can be low. In some soils, improving soil phosphorus availability can double yields. Rock phosphate may be a way to improve phosphorus availability. Rock phosphorus reacts with acid soil to release the phosphorus slowly over the cropping season. In addition, rock phosphorus is cheaper per kilogram (kg) than other phosphorus fertilizer, such as TSP or DAP. Rock phosphorus might be able to unlock the potential of famers' fields to enhance yields, increase food security, and create financial opportunity.

David Guerena/One Acre Fund.

1.7 t/ha	Climbing bean grain yield with mineral fertilizer only (tonnes per hectare)

1.6 t/ha	Climbing bean grain yield with mineral fertilizer plus rock phosphate

Context and Trial Rationale

- Rock phosphate could be an inexpensive way to improve the availability of phosphorus in farmers' fields.
- Rock phosphate may be a cost-effective way to enhance the yields of One Acre Fund farmers.

Major Intervention Configurations

- *Research:* One Acre Fund consulted a range of experts to identify commercially available, high-quality sources of rock phosphate. These organizations included the International Fertilizer Development Center (IFDC) and the International Plant Nutrition Institute (IPNI)
- *Trial Configuration*
    1) **Control season 1**: Local bean seed with 100 kg/ha DAP at planting and 50 kg/ha urea top dress
    2) **Treatment season 1**: Local bean seed with 100 kg/ha DAP at planting, 100 kg/ha Manjingu and 50 kg/ha urea top dress.
    3) **Control season 2**: Local bean seed with 50 kg/ha DAP at planting
    4) **Treatment season 2**: Local bean seed with 50 kg/ha DAP at planting and 100 kg/ha Manjingu top dress.

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A. Yield and Profit: The table below summarizes agronomic results

Trial	Configuration	Location /Date	Yield (t/ha)	Profit (USD/ha)	Profit Change vs. Trial Control (USD/ha)
1. Control: season 1 Local seed, 100 kg/ha DAP at planting, 50 kg/ha urea.	23 farmers	Rwanda, 2013 B-season	2.4	$641	N/A
2. Treatment season 1: Local seed, 100 kg/ha DAP at planting + 100 kg/ha Manjingu, 50 kg/ha urea	8 farmers	Rwanda, 2013 B-season	2.6	$698	+$57
3. Control: season 2: Local seed, 50 kg/ha DAP at planting	8 farmers	Rwanda, 2014 A-season	1.7	$587	N/A
4. Treatment season 2: Local seed, 50 kg/ha DAP + 100 kg/ha Manjingu	8 farmers	Rwanda, 2014 A-season	1.6*	$495	-$92

*Measured differences were insignificant at the p=0.1 level.

B. Adoption: *Low adoptability*

- There was a slight yield gain with rock phosphate in the firs season it was applied (2013 B season), however, in the following seasons the yields with rock phosphate were lower than the control.
- No farmer said they would voluntarily purchase rock phosphate.

C. Operability at Scale: *Low*

- Rock phosphate is a bulky material and will require additional delivery vehicles. In addition, the per-unit cost of rock phosphate – P (phosphorus) is much higher than other forms of phosphorus fertilizer (e.g. triple super phosphate). This makes the impact of rock phosphate relatively low.

Next Steps

In 2015, One Acre Fund will:

- Measure the long-term (three season) impact of rock phosphate on climbing bean yields.