

Farmers First

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

Introduction

Soybean was grown by 13 percent of One Acre Fund farmers in Rwanda during the 2015A season, on an average of 2.9 ares (1/100th of a hectare) of land per farmer. In 2015B, adoption was higher, with 29 percent of farmers growing soybeans on 1.5 ares. However, adoption is as high as 40-50 percent in some areas, including all districts in the East, Mugonero district in the west and Huye and Gisagara districts in the South. Furthermore, soybean demand is rising due to the recent construction of the SoyCo factory in Kayonza, which produces oil and animal feed.



Jesse Goldfarb/One Acre Fund

The Government of Rwanda is actively promoting soybean production in Rwanda, including through seed price subsidies that allow farmers to purchase seed for 0.2 USD/kg. Unfortunately, with current seed varieties, agronomic practices, and fertilizer application rates, yield is below potential and the crop is not competitive with common bean. However, research shows that with proper agronomy and soil fertility management, soybean is highly productive and has a greater nitrogen fixation potential than common beans.

12%	Increase in soybean yields from application of microbial inoculants	457%	Return on Investment (ROI) for a 10 g pack of microbial inoculant
30 kg/ha	Common bean average N fixation	80 kg/ha	N fixation of soybean treated with microbial inoculants

Context and Trial Rationale

- Soybean is a crop which is rising in economic and political importance in Rwanda. In the 2015B season, One Acre Fund Rwanda was mandated by the Land Water and Husbandry (LWH) program of the Rwandan government to sell soybean in the eastern part of the country.
- One Acre Fund Rwanda wants to offer a soybean package to farmers which offers the largest impact, both in terms of yield revenue and long-term agro-ecological impact through N-fixation.
- Bradyrhizobium (N-fixing symbiotic bacteria) are commercially available in Rwanda but not widely known or adopted.

Farmers First

- Several soybean varieties are commercially available in Rwanda from Seed Co. These include SC Squire and SC Sequel. In 2015B, One Acre Fund Rwanda sold SC Sequel to LWH East farmers due to the availability and quality of the seed lot. However, past research has shown that SC Squire might be a superior variety.

Major Intervention Trials

Trial Treatments:

This trial was run with 82 farmers in 7 different cells (4 in the East, 1 in the South, 2 in the West) in the 2015B season. Every farmer contributed 3 ares of land to the trial, divided into 4 sections of 75 m². All soybean was planted in rows 40 cm apart with 5 cm spacing between the seed. The following variations were tested:

- 1) **SC Sequel no rhizobium:** 100 kg/ha DAP
- 2) **SC Sequel with rhizobium:** 100 kg/ha DAP + 1 kg/ha rhizobium at planting
- 3) **SC Squire no rhizobium:** 100 kg/ha DAP
- 4) **SC Squire with rhizobium:** 100 kg/ha DAP + 1 kg/ha rhizobium at planting

A. Trial Results: The below table summarizes agronomic results:

Trial	Number of farmers	Days to maturity	Yield (tonne/ha)	Profit* (USD/kg)	Preferred by Farmer
SC Sequel, no rhizobium	82	97	0.8	3.24	10.1%
SC Sequel, with rhizobium	82	96	0.9	3.46	9.0%
SC Squire, no rhizobium	81	101	0.9	3.79	43.6%
SC Squire, with rhizobium	82	101	1.0	4.24	63.3%

*Assumes soybean grain sales price of 0.6 USD/kg, rhizobium cost of 0.1 USD/kg for a 10 g pack, SC Squire and Sequel cost of 0.5 USD/kg (the 2015B subsidized price), DAP cost of 0.6 USD/kg. This does not include the additional benefit from N fixation which we estimate to be around 78 USD/ha for soybean + rhizobium when compared to common bean.

B. Adoption: Low/Medium

- As soybean cultivation is fairly low across the entire program, it is unlikely that a soybean sales package will have wide adoption across the One Acre Fund Rwanda program.
- In 2015B, the government encouraged farmers to grow soybean for the SoyCo Factory in LWH East. In this region 31 percent of farmers bought soybean and the average adopter bought 4.2 kg of seed. Continued governmental facilitation for soybean production may substantially develop local demand for soybeans.
- Rhizobium alone would likely have very low adoption, but One Acre Fund Rwanda would bundle it together with soybean as one unit (1 kg seed plus 10 g rhizobium).

Farmers First

- A small sales trial of just this package was conducted in 2016A in 12 sites across 3 districts. Adoption was between 3-15%, district dependent.

C. Operability at Scale: *Medium*

- Soybean is very similar to bean seed in terms of supply, storage, packaging, and handling. We are already selling beans across the full program, thus we do not anticipate any operational barriers for soybean distribution.
- Both soybean and bean seed procurement are difficult at scale. This is principally due to underdeveloped production chains. Professionalism and reliability in soybean seed companies can be low. This has forced One Acre Fund to hand-sort and repackage seed lots in order to meet our internal quality standards.
- Due to the high oil content of soybean seed, seed storage time is lower than for maize and beans. After a few months of storage or with slightly rough handling, germination percentage drops significantly.
- Bradyrhizobium is a living organism and thus cannot be stored in hot conditions or in direct sunlight. However, in our trials we saw positive effects even without engaging in cold storage for the rhizobium.

Next Steps

In 2016, One Acre Fund will:

- In 2016B One Acre Fund Rwanda will conduct more trials on soybean to refine our planting method recommendations. We will also likely test Bradyrhizobium again.
- In 2016B One Acre Fund Rwanda will sell a package of SC Squire + Bradyrhizobium in three districts in the East to gauge adoption and follow up on subsequent impact and seed savings.