Kenya | 2016 Long Rains | Bush Bean Disease Management

ONE ACRE FUND

Farmers First

PHASE:	(1) Research Station	(2) 50 – 500 Farmers	(3) 500 – 20,000 Farmers	(4) Full Scale

Introduction

Bush beans are the second-most widely grown crop in the areas where One Acre Fund operates. In addition to increasing farmer dietary diversity, beans also contribute to income diversification and can improve soil health. However, farmer yields are typically low due to improper disease and pest management. It is estimated that diseases like Common Bean Bacterial Blight (CBBB), Angular Leaf Spot (ALS), and root rot can reduce yields by 40% to 100% percent.[1]

Because bean disease management products are relatively expensive, it is important to evaluate various levels of crop protection for the effects on yield and profitability.

-98 to 37%	**Range of profitability of bean disease management products compared to the control**
60 to 118%	**Increase in yields of complete bean disease management practice compared to the control**
95%	**Percent of farmers growing common beans in Western Kenya**
17,038	**One Acre Fund farmers adopting improved bean seed in 2016**

Objectives

- To evaluate the effectiveness of various combinations of bean disease management products for increasing bean yields and profitability.

Hypotheses

- Intensive disease management will lead to increased yields and profitability compared with current One Acre Fund bean production practices.

Methodology

One Acre Fund Research Station: Ekero (Western) and Gucha-Kisii (Nyanza) crop research stations

Agro-ecological Parameters:

Station	Altitude	Mean Annual Rainfall	Mean Annual Temperature
Ekero	1,318 masl	1,400 mm	21.1˚C
Gucha-Kisii	1,750 masl	1900 mm	20.3˚C

[1] http://pdf.usaid.gov/pdf_docs/pnabe125.pdf

Ekero and Gucha-Kisii Research Stations:

Variety	Seeding rate (kg/ha)	Planting fertilizer - DAP (kg/ha)	Plant spacing (cm)	Row spacing (cm)	Hand weeding	Fungicide at planting - Trichoderma (kg/ha)	Lime at planting (kg/ha)	Fungicide at flowering	Fungicide at podding
Control: Rosecoco	79	123.5	10	50	2 times	-	-	-	-
Treatment 1: Root rot resistant KK8	79	23.5	10	50	2 times	0.21	-	-	-
Treatment 2: Root rot resistant KK8	79	23.5	10	50	2 times	0.21	200	-	-
Treatment 3: Root rot resistant KK8	79	23.5	10	50	2 times	0.21	200	0.5 kg/ha Ortiva & 0.5 kg/ha Score	0.5 kg/ha Ortiva & 0.5 kg/ha Score

Experimental design: Randomized complete block design, with 6 replicates

Variables measured: Bush bean yield, pest and disease presence

Results

Measured pest and disease presence for both stations[1]

Plots with Common Bacterial Blight (%)	Plots with Angular Leaf Spot (%)	Plots with Grasshoppers (%)
35	43	25%

Ekero Station Trials

Treatment	Yield t/ha (vs control %)	Profit USD/ha (vs control)
Treatment #1: KK8 Beans + DAP + Trichotech	0.67a[2] (+81%)	-$1 (-98%)

[1] There were no differences in disease presence between the research stations.

[2] Evaluated at p = 0.05. Yield followed by a similar letter indicates no statistically significant difference between other yield numbers followed by the same letter.

Treatment #2: KK8 Beans + DAP + Trichotech + Lime	0.57a (+54%)	-$22 (-63)
Treatment # 3: KK8 Beans + DAP + Trichotech + Lime + Ortiva + Score	0.81b (+118%)	$15 (-74%)
Control: Rosecoco Beans + DAP	0.37a	$59

Evaluated at p = 0.05, yield with followed by similar letters indicates no significant difference.

Gucha-Kisii Trials

Treatment	Yield t/ha (vs control %)	Profit USD/ha (vs control)
Treatment #1: KK8 Beans + DAP + Trichotech	1.29a (+25%)	$125 (-4%)
Treatment #2: KK8 Beans + DAP + Trichotech + Lime	1.31a (+27%)	$120 (-8%)
Treatment # 3: KK8 Beans + DAP + Trichotech + Lime + Ortiva + Score	1.65b (+60%)	$178 (+37%)
Control: KK8 Beans + DAP	1.03a	$130

Interpretation and Discussion

The less intensive bean disease management treatments (Treatment 1 & 2) did not lead to significantly higher yields at either location. However, Treatment 3 had significantly higher yields at both locations – although it was only more profitable than the control at the Gucha-Kisii station. The high cost of the disease management products remains a barrier to achieving profitability—even with higher bean yields. For example, Treatment 3 costs $150/acre in total to implement.

Operationally, this is still complex because logistics would need to deliver pesticides separately from seed, we would need to provide training on pesticide applications, and we would have to sell personal protective equipment.

Next Steps

Because Treatment 3 had significantly higher yields at each location, trials are planned for the Long Rain 2017 growing season to evaluate various levels of this package to determine the minimum effective dose. These trials will help to determine the critical level—if any—that this practice can both increase bean yields and remain more profitable than current farmer practices.