Do Improved Groundnut Seeds Make African Farmers More Food Secure? Evidence From Uganda

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Introduction & Background:

-Groundnuts are an important crop for eastern Ugandan smallholders since they are high in protein, resupply nutrients to the soil, and create storable wealth once dried.
-Groundnut rosette virus (GRV) is one of the leading causes of diminished groundnut yields in Uganda. The virus is unique to Africa and spread by aphids.
-GRV-infected plants are discolored and stunted; early infection can result in total yield loss.
-Chemical pesticides are available, but too costly for most smallholders.
-GRV-resistant seeds were developed by agronomists in 2002.

Research Questions:

-Does adoption of improved groundnut seed increase household food security?
-What household characteristics significantly affect household adoption of improved groundnut seed?

Model Specification:

-Treatment is non-random: households decide to adopt improved groundnut seed.
-Household food security and adoption of improved groundnut seed are likely affected by observed and unobserved attributes within a household.
-Adoption is likely endogenous.
-Obtain unbiased estimates of impact of adoption on food security through a two-equation treatment-effects model with endogenous binary adoption variable.
-Latent adoption not observed but estimated through the observed adoption decision.

Data:

-Primary survey data from Uganda collected in July and August 2011.
-Forty villages in Eastern Uganda randomly selected; 10 groundnut farmers randomly selected from each village

Results:

-For Teso sub-region households, adoption of improved variety groundnut seed significantly improves household food security scores. By adopting improved groundnut seed, food consumption scores increase by almost 18 points (equivalent to consuming pulses six days a week).
-Households outside of the Teso sub-region show a numerically similar, but statistically insignificant impact of improved seed adoption.
-Some household characteristics significantly influence adoption decisions though differences exist between the Teso sub-region and other parts of Eastern Uganda.

Simulations:

-Universal adoption of improved groundnut seed in Teso increases household food consumption scores by 6.5 percent.

-Expanding agricultural extension agent visits to all households increases improved groundnut seed adoption by 14.3 percent in Teso and 14.9 in other areas of Eastern Uganda.
-Closing the gender gap increases adoption by 2.9 and 2.8 percent for Teso and non-Teso households, respectively.

Conclusions:

-Differences exist between localities within Eastern Uganda in adoption and food security.
-Extension agents can help diffuse improved seed technology to farmers and help stimulate adoption.
-Food security increases for households in areas of high adoption (Teso), yet benefits to food security are unclear in areas of low adoption.
-Enhancing improved groundnut seed adoption in smaller narrowly focused area may yield greater gains in terms of household well-being.

Equations Tables & Pictures

Instruments for FCS equation:	
Dist. to Ag. Extension Agent	Visit from Ag. Ext. Agent in past 6
Indicator of awareness of improved seed	

$$A_i^* = \mathbf{X_{i'}}\boldsymbol{\beta} + \mathbf{Z_{i'}}\boldsymbol{\gamma} + \varepsilon_{i1}$$
$$FCS_i = \alpha A_i + \mathbf{X_{i'}}\boldsymbol{\beta} + \varepsilon_{i2}$$
$$A = 1\left[A_i^* > 0\right]$$

	Teso Sub-Region		Other Households	
Variable Name	***Mean***	***Std. Dev.***	***Mean***	***Std. Dev.***
Household Food Consumption Score[a]	57.593	23.406	64.228	19.666
Household uses Improved Seeds = 1[a]	0.788	0.410	0.326	0.470
Head of Household Gender (Female = 1)[a]	0.268	0.444	0.146	0.354
Head of Household Years Cultivating[a]	14.70	12.03	9.97	9.73
Aware of Rosette Variety Seeds = 1[a]	0.611	0.489	0.287	0.453
Improved Seeds Available near Village = 1[a]	0.763	0.427	0.275	0.448
Ag. Extension Agent Visit $\leq$ 6 months = 1[a]	0.167	0.374	0.298	0.459
a: Means significantly different at p-values below 0.05				

Other areas of Eastern Uganda

Food Security			Adoption	
Female Headed Household	+		Female Headed Household	-
Years Schooling	+		Years Schooling	-
Farmed Acreage (logged)	+		Family Size	-
Years Cultivating	-		Aware of improved seed availability	+
			Visit from Ag Extension Agent	+

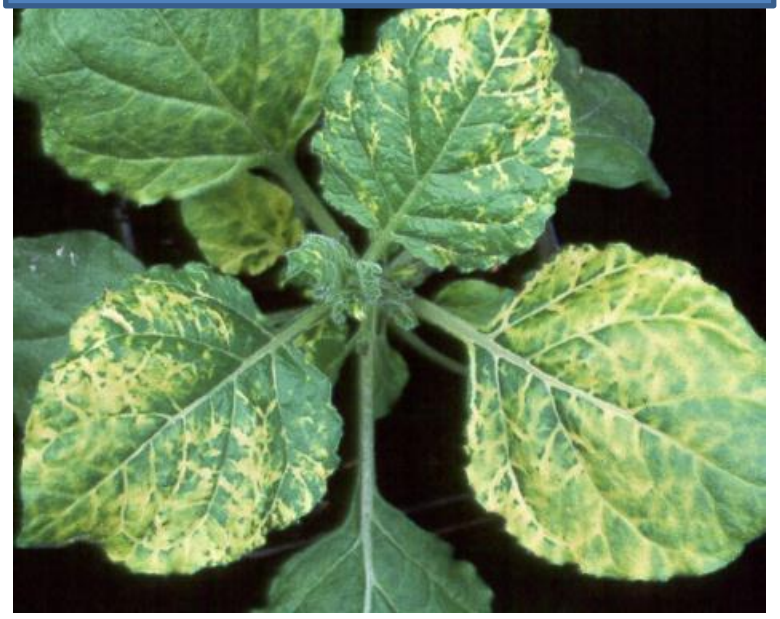
Teso Sub-Region

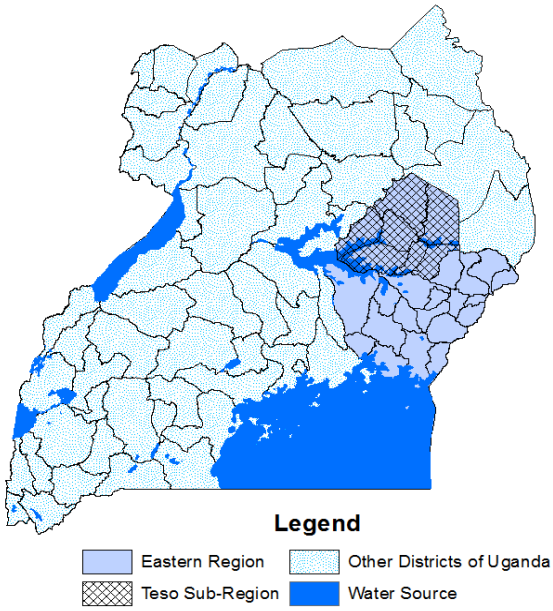
Food Security			Adoption	
Adopt Improved Seed	+		Female Headed Household	-
Years Schooling	+		Aware of improved seed availability	+
Farmed Acreage (logged)	+		Visit from Ag Extension Agent	+
Family Size	-			

Pictures:

Picture Source: ICRISAT.org

Picture Source: apsnet.org




Legend
Eastern Region
Other Districts of Uganda
Teso Sub-Region
Water Source

Picture Source: serbagunamarine.com