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.

Clos[...4.44, 0.146, 0.354
Head of Household Years Cultivating $a$: 14.70, 12.03, 9.97, 9.73
Aware of Rosette Variety Seeds $a$: 0.611, 0.489, 0.287, 0.453
Improved Seeds Available near Village $a$: 0.763, 0.427, 0.275, 0.448
Ag. Extension Agent Visit $\leq$ 6 months $a$: 0.167, 0.374, 0.298, 0.459

Equations Tables & Pictures

Instruments for FCS equation:

\[
\begin{align*}
A^*_i &= X_i \beta + Z_i \gamma + \epsilon_{1i} \\
FCS_i &= \alpha A_i + X_i \beta + \epsilon_{2i} \\
A &= I(\{A_i^* > 0\})
\end{align*}
\]

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a: Means significantly different at p-values below 0.05
<table>
<thead>
<tr>
<th>Other areas of Eastern Uganda</th>
<th>Teso Sub-Region</th>
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<tbody>
<tr>
<td><strong>Food Security</strong></td>
<td><strong>Adoption</strong></td>
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<tr>
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</tr>
<tr>
<td>Family Size</td>
<td>-</td>
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</tbody>
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**Other areas of Eastern Uganda**

- **Years Cultivating**: -
- **Aware of improved seed availability**: +
- **Visit from Ag Extension Agent**: +

**Teso Sub-Region**

- **Food Security**
  - Adopt Improved Seed: +
  - Years Schooling: +
  - Farmed Acreage (logged): +
  - Family Size: -

- **Adoption**
  - Female Headed Household: -
  - Aware of improved seed availability: +
  - Visit from Ag Extension Agent: +