







Towards improving access to high quality bean seed in Nicaragua: How much are farmers willing to pay?

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Motivation

Dry grain legume stylized facts:

- Self-pollinated crops like beans, cowpeas, pigeon peas, etc. are characterized by low volume (and frequency) of seed purchase
- Adoption of 'quality seed' as a technology is a fraction of adoption of 'improved varieties' for most legume crops in developing countries...why?



Reasons and Implications

- Low demand (or adoption of) 'quality seed'? Because:
 - 'Seed' is highly competitive with 'grain' as planting material (at least for 2-3 generations?)
 - Farmers may not perceive quality difference between 'seed' vs 'grain', and thus are not willing to pay higher price for 'seed'
 - Seeds are not available or the source may not be trusted



Reasons and Implications

- Seeds are not available (i.e., low supply of seeds), because...
 - It costs more to produce 'quality seed' than grain
 - Low incentive for private sector to produce seed, because of (perceived?) low demand for seed
- Implications:
 - Farmers grow low quality planting material (even those that are considered as IV adopters) → lowers productivity
 - The seed system has to rely on subsidies → not a sustainable option



Study setting and objectives

- No rigorous studies that have examined these demand and supply side dynamics in a systematic manner.
- Conducted studies to address above gap in Tanzania for beans, Ghana for cowpeas and Nicaragua for beans (just completed)
- This presentation focused on Nicaragua, where 3 types of bean seed are potential options available to farmers as planting materials
 - Certified seeds produced by seed producers or seed companies from foundation seed and its production/marketing is governed by seed certification regulations
 - Quality Declared Seeds (QDS) produced by farmer organizations, seed producing farmers from 'quality' seed and good practices, but does not go through the rigor of seed certification process
 - Recycled seeds saved from farmers' own harvested grain or bought at market
- Note: three types of seeds differ in production practices and thus vary in cost of production (certified is often 2-3 times the price of recycled seed)



Study setting and objectives

- This study (along with those in the other countries) was designed to address the following research questions:
 - For a *given improved variety*, what is the perceived and actual difference in the performance of bean/cowpea crop across seed types available in the market certified, QDS and farmer saved grain when the seeds are planted and managed by farmers under their conditions?
 - How does the observed differential performance of different quality seed products translate into farmers' willingness to pay (WTP) for these seed technologies?
 - Does the method of eliciting WTP (Auction versus Choice Experiment) result in different valuations (applies to Nicaragua study only).



Methodology

- Field experiments (1st research question)
 - Double-blind field experiments (FE) were established in 10 villages in north-western Nicaragua (one FE per village).
 - Each seed type for variety *phaseolus vulgaris* were procured by the researchers and given to the host farmers to plant on 10x10m plots using their management practices. Plots were assigned labels (O, □ and Δ) and referred to by this plot ID throughout the study. (Certified=O, QDS=□ and Recycled=Δ)
- Two field days were held in each village one at flowering stage (Field day 1) and one 2 weeks prior to harvest stage (Field day 2)
- During each field day, farmers completed plot performance evaluation and rating of plots based on observable characteristics
- On average, 23 Farmers from each village were surveyed and participate in Field day 2 (ranged from 10-50)



WTP Experiments (2nd and 3rd research questions)

- Once farmers had learned how the different types of seeds performed in the field, WTP auctions and real choice experiments (RCE) were carried out during Field Day 2 – only one chosen to count for payment
- For auctions, used Becker-DeGroot-Marschak (BDM, 1964) method, where participants do not bid against other people, but only against themselves
 - Endowment given to farmers for the seed auction/RCE (C\$40)
 - Each farmer was given a bidding sheet and asked to "bid" their maximum willingness to pay for 1lb. of seed of each type (O, □ and Δ) knowing that one seed type would be chosen randomly and the bid for that seed would then be compared to a randomly drawn price.
 - If a farmer's bid was greater than or equal to the randomly drawn price, then that farmer buys that seed for the randomly drawn price (NOT their bid).



WTP Experiments (2nd and 3rd research questions)

For RCE, we implemented a 12 choice orthogonal experiment. Each choice varied in seed quality (O, □ and Δ) and price (14, 21, 28 and 34) and included an opt out.

Choice # 1			
Seed Type	Seed Δ	Seed 🗆	Neither
Price per pound	C\$14/lb	C\$21/lb	
Which seed would you choose?	A.	B.	

- Farmers broke into 4 groups and each saw the choices in a different order.
- Farmers made choice knowing that if RCE chosen for payment that one of the 12 choices would be randomly chosen and their choice would be implemented.

(Certified=O, QDS= \Box and Recycled= Δ)



Rating Results

Farmer's rating of the BEST plot at two stages



Why Certified (type o) rated so low? Germination rate tests revealed GR low relative to QDS and even recycled (77.7% vs 91.3% and 85.7%) + Farmers indicated that QDS had more pods so higher yield potential



Auction Results

BDM Auction Experiment Average Bids

Average bidding price (C\$/lb.) for different types of seed (N=231)



- Differences in the mean prices between \Box and O/Δ are significant at p=0.01
- Differences between

 and Δ are not (using non-parametric Wilcoxon rank sum test)

(Certified=O, QDS= \Box and Recycled= Δ)

Farmers are willing to pay a premium for QUALITY seed

- Average price premium farmers are WTP for highest rated seed type (QDS seed) over lowest rated seed type (recycled seed) = 30%
- Similar to premium in Tanzania (also 30%), but lower than in Ghana (73%)





RCE Results

Real Choice Experiment Estimated WTP

Average WTP/price (C\$/lb.) for different types of seed (N=231)



- Differences in the WTP between \Box and O/Δ are sign. at p=0.01, between O and Δ at p=0.05
- WTP estimated using a mixed logit model in WTP space.
- Average premium farmers are WTP for highest rated seed type (QDS seed) over lowest rated seed type (recycled seed) = 44%...QDS over Certified premium is close to 90%



Key Findings

Implications/Further Research

Quality seeds can perform better in To increase productivity, it is not sufficient to promote only the adoption of improved terms of important characteristics varieties, but also quality seed relative to recycled seeds; Waiting on Need more experimental evidence on yields, but in Ghana yield differences productivity differences in seed types across were statistically significant crops and countries Farmers are able to perceive quality Further research is needed to assess the differences in planting material and quantity of seed farmers would be willing are willing to pay a premium for to buy at a premium price and the QUALITY seed frequency (to gauge the size of the demand) • Is the low demand for quality seed However, in practice farmers' use of products a trust (i.e., counterfeit or purchased certified seeds or QDS is inferior seed) or availability issue? much lower than reflected in the percentage of farmers WTP a premium How do we ensure quality seeds can/are sold to farmers? for quality seed



Thank You

Questions Welcomed





