ISSD Uganda

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Willingness To Pay for Certified Maize Seed in Northern Uganda

Effects of Information Sessions and Knowledge

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Integrated Seed Sector Development (ISSD) Uganda in collaboration with Wageningen, Development Economics Group, The Netherlands, conducted a study on the Willingness To Pay (WTP) for certified maize seed, Longe 5D variety by farmers in Northern Uganda, and whether providing an information session about certification and quality seed would increase willingness to pay for the certified seed. This brief summarises the findings of this research for seed sector stakeholders in Uganda.

Difference between quality seed and (improved) variety
Quality seed *means that the seed has high vigour, high germination, is pure without inert material, is uniform in size, shape and colour.*
Variety *means the population of plants which have common ancestors and which have certain characteristics and when reproduced sexually or asexually, retain their distinguishing characteristics/ genetic traits, e.g. early maturing, drought resistant, high yielding.*

Key messages

1) The combined results for the farmers' knowledge of certified seed source and price suggests that the farmers are, on average, well aware of where to buy certified seed and what it will cost. Nevertheless, knowledge on location and price do not necessarily lead to purchase, as only 12 percent (%) of the sampled farmers purchased certified seed from an agro-dealer.

2) On average, farmers are willing to pay half of the market price for certified seed. This means that the willingness to pay for certified seeds is below market price.

The percentage of farmers that state a willingness to pay for the seed price similar to that of the commercially sold seed at UGX 3,000 – 4,000 (2015 prices) is 12%. This matches the percentage of farmers that bought seed at agro-dealer shops in 2015. Therefore, the elicited willingness to pay matches the reality and the seed demand curve can be used for policy recommendations. The sensitivity of the willingness to adopt certified seed with respect to price is relatively high in the range of the current market prices

3) The information session on certified seed increased the farmers' knowledge but did not lead to a significant increase in stated willingness to pay. The randomized experiment shows little impact of providing additional information on the WTP for certified seed. This suggests that there are other barriers to adoption than information and awareness. Future research should therefore focus on other barriers to adoption, such as access, risk aversion, credit constraints, seasonal cash flow, and farmers' trust in certification and certified seed products.

Introduction

Improving agricultural productivity in Uganda is a policy priority, as agriculture provides a livelihood to approximately 65% of the population. Efforts to expand agricultural productivity in Uganda have, amongst others, focussed on technological change and specifically the adoption of yield enhancing seed varieties.

In the past, many new high yielding maize varieties have been released by breeders for commercialisation, but uptake of improved maize varieties remains persistently low. In Uganda with approximately 13% of farmers using certified seed accessed through agro-dealers, seed companies and through NGO/Government handouts (ISSD, 2014).

The Integrated Seed Sector Development (ISSD) is interested in understanding the determinants underlying the adoption of certified seed in general and maize seed in particular.

In Uganda maize seed is the most commercialised seed of the food crops. To get a better understanding of why the uptake of certified seed is persistently low, we elicit ed the WTP for certified maize seed amongst smallholder farmers in Northern Uganda.

This research is also interested in whether information about certified seed increases the willingness to pay. We therefore provided half the sample with an information session to find out if they would be willing to pay more if farmers are assured the seed is of good quality.

Methodology

To measure the willingness to pay, we used a 2kg pack of certified maize seed variety Longe 5D, which is a well-known variety in Northern Uganda. The two target districts were Dokolo and Nwoya, which are maize growing areas. The final sample included 1,009 farmers, of which 400 are in Dokolo and 609 in Nwoya. The survey took place in the first half of April, 2016, over a period of two weeks, which coincided with the late start of the first planting season. During the information session we showed a certified seed label and provided information on good quality seed (high germination, purity, uniform seed sizes).

Quality assured seed and farmer seed sources

Certified seed label

Uganda has a mandatory seed inspection system that recognises two seed classes: Certified seed and Quality Declared Seed (QDS). Certification is a process which translates unobservable levels of seed quality into observable attributes, allowing farmers to differentiate between different qualities of seed. Certified seed obtained from a formal source should reduce the risk of seed borne pests and diseases, guarantee high germination, physical and genetic purity.

In Uganda, there are approximately 23 registered seed companies (USTA, 2017), which go through external seed certification procedures. Once the seed is certified, the seed company is issued with a 'Blue' Government tamper proof label (see picture). Certified seed is sold directly by seed companies and/or distributed through agro-input dealer shops. In addition, Government and NGO programmes distribute certified seed for free.

Despite the apparent benefits of certified seed, many farmers are reluctant to move from traditional farming practices, relying on home saved seed or products from the local grain market. Table 1 below provides an overview of the seed sources farmers used in 2015 combined with the seed price paid for that seed.

Table 1: Farmer seed source and price paid per kg seed in 2015.

Seed source	%	Price (UGX) paid for 1kg of maize seed
Home saved seed	36%	0
Neighbour	6%	1,034
Family member	4%	518
Local grain market	28%	1,070
Farmers'multiplication group	6%	1,945
Agro-dealer	12%	4,222
Government	5%	0
Project/NGO	2%	0
Other	1%	1,050
Total	**100%**	**1,655**

As shown in table 1, 80% of the seed comes from informal sources such as: home saved, neighbours, family, local grain market and informal seed multiplication groups, while 19% comes from the formal market (agro-dealers and seed companies, government, NGOs), of which 7% is free handouts and only 12% purchased.

The major gender difference in access to seed sources is between local grain market and agro dealers. The other sources are more or less similar.

Respectively, 32% and 24% of female and male farmers access seed from the local grain market.

Six percent (6%) of female farmers access seed from the agro dealer, while 16% of male farmers access seed from agro-dealers and seed companies.

Table 2 below shows the different varieties that farmers grow in Dokolo and Nwoya districts. As shown, on average 64% of the varieties are local, with a large variation between the two districts.

Table 2: Maize seed varieties per District and average willingness to pay per variety cluster

Maize seed variety clusters	Dokolo	Nwoya	Total	Average WTP for 1 kg of maize seed
	%	%	%	UGX
Local variety	49%	73%	64%	1,631
Longe 1, 4, 5, 5D (OPV)	31%	17%	22%	1,776
Longe 6H, 7H, 8H, 10H (Hybrid)	8%	8%	8%	1,882
DK 8051, DK 8071	3%	0%	1%	1,784
Other	9%	2%	5%	1,575
Total	**100%**	**100%**	**100%**	**1,635**

Farmers' knowledge on certified seed sources and seed price

Table 3 summarizes the farmers' knowledge on certified seed sources, suggesting that they are reasonably well informed about where to purchase certified seed.

The agro-dealer shop was the formal source for certified seed most often mentioned; by 51.7% of the farmers. Just over a fifth of the farmers mentioned Government handouts as formal source, while 11% heard about or experienced seed handout by a project/NGO.

Over half of the sampled farmers were able to correctly separate between certified seed sources and improved variety sources, as the latter can also be obtained from informal seed sources.

We found that 51.3% correctly mentioned only formal sources, with 34.4% referring to one source, 11.6% to two sources and 5.3% identifying all three formal sources. The remaining 48.7% either did not know any formal source or also referred to informal sources.

Table 3 provides an overview of farmers' knowledge of the price for certified maize seed Longe 5D variety. Less than half (44%) of the farmers in the sample stated that they are familiar with the price of Longe 5D. The 2016 market price for OPV maize at agro-dealers was approximately UGX 2,500-3,000 per kg. We observed that the average price stated by farmers, of UGX 3,093, is close to the actual market price range. It should be noted, that agro-dealers also sell hybrid seed, which is more expensive, costed approximately UGX 7,000 per kg. Farmers in Nwoya who purchased certified seed at agro-dealers shop were on average most accurate.

Table 3: Knowledge on certified seed sources

Formal seed sources known	Percent
Agro-dealer	51.7
Government extension	20.3
Project/ NGO	11.0
Number of seed sources indicated correctly	**Percent**
At least one incorrect answer or no answer	48.7
Only correct answers	51.3
Mentioned one correct formal source	34.4
Mentioned two correct formal sources	11.6
Mentioned all three correct formal sources	5.3

The combined results for the farmers' knowledge of certified seed source and price suggests that the farmers are, on average, well aware of where to buy certified seed and it's cost. Nevertheless, knowledge on location and price does not necessarily lead to purchase, as only 12% of the sampled farmers purchased certified seeds from an agro-dealer

Table 4: Farmers knowledge of the price of 1 kg certified OPV maize seed Longe 5D

	Dokolo	Nwoya	All
All	3,236	3,010	3,094
Seed source			
Home saved seed	2,962	3,197	3,143
Neighbour	5,125	1,854	2,624
Family member	5,310	4,083	4,729
Local grain market	1,983	2,660	2,507
Farmers' seed multiplication group	4,415	2,500	3,796
Agro-dealer / seed Company	3,567	3,098	3,254
Government extension	1,457	3,886	3,076
Project/ NGO	3,667	3,536	3,575
Other	3,500	3,500	3,500

Willingness to pay for certified maize seed

The auctions reveal a willingness to pay for 1 kg of certified seed at UGX 1,635 on average (Table 5), which is roughly half of going market price at the agro-dealer. Interestingly, the WTP in Nwoya, where the adoption of certified seed is lowest, and is 18% higher than in Dokolo (UGX 1,744 and 1,480 respectively). For female farmers we observe a slightly lower WTP than for men (UGX 1,570 and 1,682 respectively).

Table 5: Actual price paid for maize seed and willingness to pay for certified seed (UGX for 1 kg)

	Actual price paid for any seed	Willing to pay for certified seed
Full sample	1,655	1,635
District		
Dokolo	1,573	1,480
Nwoya	1,701	1,744
Gender		
Male	1,986	1,682
Female	1,164	1,570
Seed source		
Home saved seed	.	1,631
Neighbour	1,034	1,631
Family member	518	1,804
Local grain market	1,070	1,610
Farmer seed multiplication group	1,945	1,552
Agro-dealer / seed company	4,222	1,995
Government extension	.	1,296
Project/ NGO	.	1,347
Other	1,050	1,443

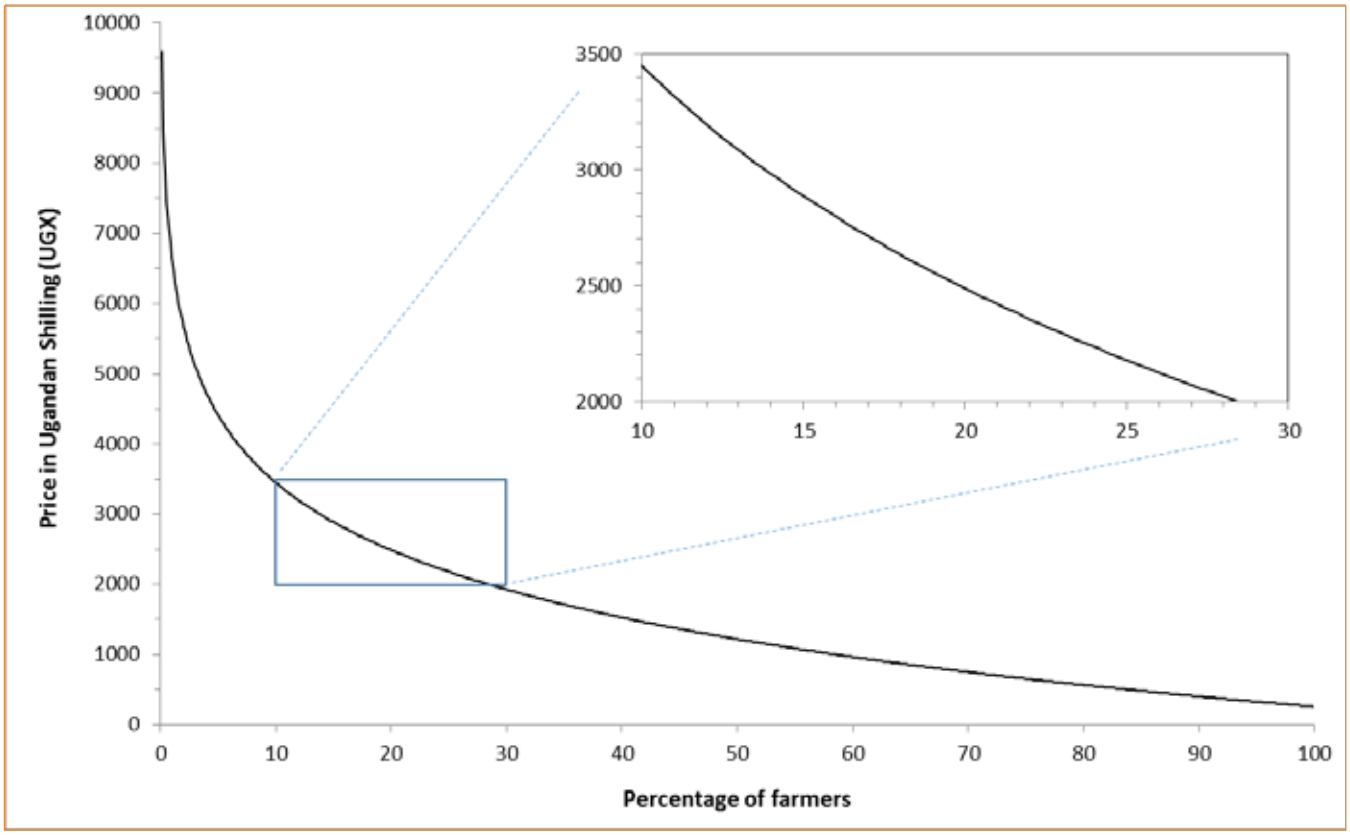
The reported WTP differs by the source where farmers recently obtained seed. Farmers that bought seed at an agro-dealer or seed company report the highest average WTP of almost UGX 2,000. Although this is closest to the market price, it is about half of what these farmers are actually spending at agro-dealer shops. This can partly be explained by some farmers buying hybrid seed, which is more expensive than OPV seed. Farmers that have received Government or project/NGO handouts report the lowest WTP[1].

Comparing willingness to pay for 1 kg of OPV maize seed, farmers that are exposed to hybrids are willing to pay relatively more than those using other seed varieties, while farmers using local varieties are willing to pay the least (refer to Table 2).

Farmers using OPVs are willing to pay about half the market price (UGX 1,776 per kg).

In terms of age effect, younger farmers in Dokolo were willing to pay significantly more than older farmers. Looking at the poverty score, WTP is consistently higher amongst wealthier farmers, suggesting farmers' wealth may play an important role in adoption processes. Other factors that are likely to determine farmers' WTP include district and technology level. WTP in Nwoya was substantively higher than in Dokolo, implying that average WTP varies amongst different locations within the country, and/or the free seed distribution that was impending in Dokolo affected the WTP. Farmers that use more advanced farming practices are also willing to pay a higher amount for certified seed.

Figure 1 Adoption-price curve for certified seed



[1]Limitation of the study: during the time of data collection in Dokolo district, Government initiated free maize seed distribution. The activity posed a threat to our experiment by hindering farmers' incentives to purchase and we therefore increased the sample size in Nwoya and reduced the sample in Dokolo to sub-counties that did not yet receive the consignment at sub-county headquarters. Statistical analysis confirmed that this did not affect the statistical power of the sample.

Price elasticity of adoption

The variation revealed in WTP can be used to construct an adoption-price curve for certified seed. This curve reflects how willingness to adopt certified seed varies as prices change by plotting prices for 1 kg of seed against the percentage of farmers that have stated a WTP of at least that price. The subsequent downward sloping curve, drawn in Figure 1, indicates that the propensity to adopt certified seeds increases as the price decreases.

Interestingly, the curve becomes less steep in the relevant market price range of UGX 2,500-3,000, which suggests that the willingness to buy certified seed increases more than proportionally when prices decrease. The relevant section of the curve for the UGX 2,000-3,500 per kg is enlarged in the top right inlay. Translating the curvature to a 'price elasticity of adoption' which informs us that at a market rate of UGX 2,500, a 1% reduction in price is associated with a 2% increase in adoption of certified seed. This suggests that the rate of adoption is highly sensitive to price at current market price levels.

An important observation for policy making is that at the market price of UGX 3,000 per kilo, 13% of the farmers are willing to pay this price. This corresponds with the number of farmers purchasing seed from a seed company or agro-dealer (refer to Table 1). What does this mean for seed companies? Supposedly seed companies lower their price from UGX 3,000 to UGX 2,500 then the market share for certified OPV maize seed would increase from 13% to 20% (refer to figure 1). This means that if seed companies sold 10,000MT this would increase to 15,400MT and the total turn-over would increase from UGX 30 million to UGX 38.5 million. Alternatively policy makers could consider a small subsidy on certified maize seed to increase adoption.

Effects of providing knowledge on WTP (experimental findings)

The randomized controlled trial finds no conclusive evidence of the effects or providing additional information about certified seed on the willingness to pay for it.

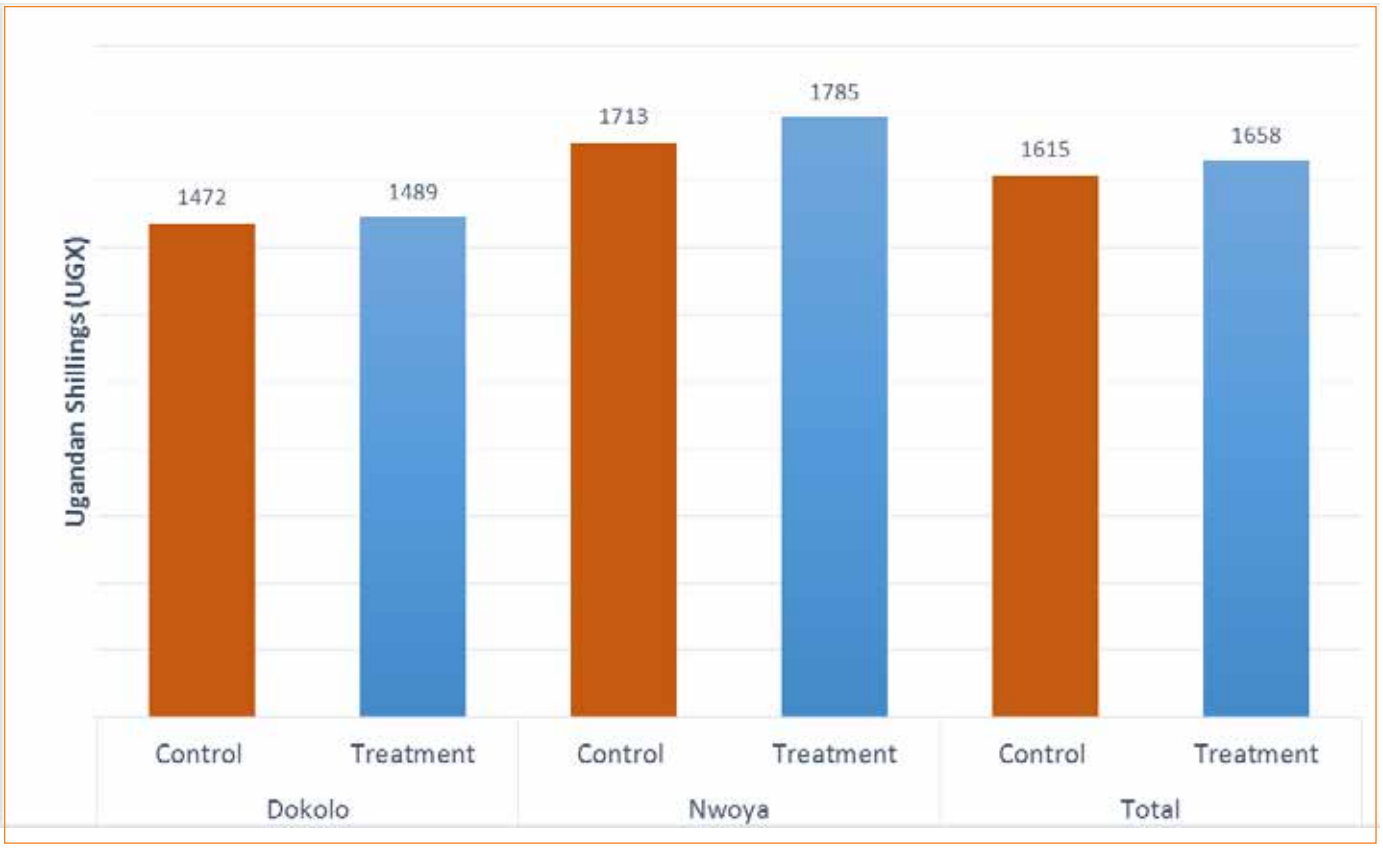
Figure 2 shows that farmers who were exposed to an information session were on average willing to pay 2.6% more than farmers in the control group that did not experience an information session.

Nevertheless, this difference is not statistically significant. It was tested whether the information session provided to the treatment group, did increase the knowledge of farmers; and statistical tests show that knowledge of the treatment group was significantly increased in both districts.

We find a significant positive relationship between information session interventions and farmers' knowledge score, implying that the information sessions indeed lead to enhanced knowledge. However, it did not lead to higher stated willingness to pay. This suggests that information and awareness are not barriers to certified seed adoption in Uganda.

Women cleaning Maize

Figure 2: Comparison of average WTP between treatment and control groups



On average male farmers pose a higher knowledge score compared to female farmers. However, despite the differences in knowledge, there is no evidence suggesting that female farmers have a lower WTP than male farmers. Looking at the actual purchases made during the study, there is no difference in the number of male and female farmers refusing to make the payment.

This suggests that women do not have a lower control over resource allocation within the household under the circumstances of this research (purchasing a 2 kg seed pack on the spot).

Land size, gender, social network and technology level are significantly associated with farmers' knowledge. We observed that farmers who cultivated larger plots in the previous season (2015B) had better knowledge about seed certification.

More so, we found that the common knowledge source about seed certification through social networks is also an important factor in determining farmers' knowledge. Farmers who were advised to use certified seed by their social network were on average willing to pay significantly higher amounts. The two observations imply that social networks play an important role in the process of certified seed adoption. Similarly, it was found that the technology level is positively associated with knowledge.

Wealth was highly associated with WTP, while no such link was found while examining the relationship with knowledge. In general, wealthier farmers are willing to pay a higher price (independent of whether they received the information session or not), while more knowledgeable farmers did not have a higher WTP. This implies that wealth factor is likely to be more important than knowledge in the process of certified seed adoption, highlighting the major role played by the budget constraints in farmers' decision making process.

Conclusion

The preliminary findings of this study confirm that the adoption of certified seeds remains low. Presently, only 20% percent of farmers use certified seed, while the average willingness to pay is about half the going market price. But the results also suggest that the lack of information and awareness plays a limited – if not negligible – role in frustrating the expansion of the certified seed market. The majority of our sampled farmers were informed on where to obtain certified seed as well as going market prices. Moreover, our randomized experiment shows that providing farmers with detailed information on certified seed and its benefits had no discernible effects on farmers' willingness to pay.

Interesting observations can be drawn from this study and can serve as input to further studies: As indicated in the section on price elasticity, the study shows that the current market share of certified seed matches with the percentage of farmers that are willing to pay the market price, combined with the wealth factor, this may indicate that price is a deferring factor for farmers to buy certified seed.

In addition, free hand-outs may be exacerbating this. At the same time, the low uptake of certified seed in Nwoya district may also be created by a low availability in shops or limited number of shops. Especially, since farmers in Nwoya district express a higher willingness to pay while the actual seed purchase from agro-dealers is lower.

Furthermore, women were equally able to make on-the-spot purchases for a 2 kg pack of seed, indicating that they have cash at hand, but may not be able to travel to agro-dealer shops easily. Nwoya district is relatively more remote compared to Dokolo. At the same time, the poverty score for Nwoya was lower than Dokolo.

Future research should therefore focus on other barriers to adoption, such as access, risk aversion, credit constraints, seasonal cash flow, and farmers' trust in certification and certified seed products.

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Colophon

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