Sasakawa Africa Association

THE USE OF PROMOTED FERTILIZERS AND IMPROVED SEED IN THE SELECTED INTERVENTION AREAS OF LIRA, NTUNGAMO, JINJA AND MITYANA DISTRICTS

REPORT

Frances Nakakawa[1], Juliet Nakitende[2] and Ramzy Magambo[3]

2016

Monitoring, Evaluation, Learning and Sharing Theme

[1] Thematic Coordinator, SG 2000 - Uganda
[2] Program Officer, SG 2000-Uganda
[3] Program Officer, SG 2000-Uganda

ACKNOWLEDGEMENT

The authors acknowledge financial and technical support from Directors and staff of SG2000 - Uganda; District Production Coordinators, SG 2000 – Uganda District Coordinators, Extension Agents (EAs), Community Based Facilitators (CBFs), host farmers of SG 2000 – Uganda demonstrations and other farmers. We appreciate the contribution of enumerators and data entry technicians, and the core research team in capturing, cleaning and managing data for this report.

ACRONYMS AND ABBREVIATIONS

CBFs	Community Based Facilitators
CPE	Crop Productivity Enhancement
PPP&MA	Public Private Partnerships and Market Access
VSLAs	Village Savings and Loans Associations

Table of Contents

List of Tables

List of Figures

1 BACKGROUND

Sasakawa Global 2000 (SG 2000) Uganda has been one of the major institutions that have supported Uganda's agricultural and rural development for the last 25 years and in particular Government's effort in the fight against hunger and poverty. It has remained a strong and principal partner to Government in its recent concerted efforts to rid Ugandans of poverty. Through the Crop Productivity and Enhancement (CPE) theme, SG 2000's main aim is to offer resource-poor smallholder farmers who are constrained by low crop productivity a range of technology options and trainings (through field demonstrations and indirectly through skills, information and knowledge flow) designed to promote their economic advancement by improving the productivity of on-farm activities but at the same time strengthening capacities of national extension systems in the country.

Beneficiary farmers have over the past seasons been exposed and trained by the extension agents on the use of new and improved seed varieties as well as fertilizer use among other technologies and practices. The MELS theme found it imperative to undertake an adoption study to provide evidence of the extent to which the above promoted technologies are up taken among the smallholder farmers.

1.1 Objectives

The overall objective of this study is to have evidence on the use and adoption of selected technologies particularly; fertilizer and improved seeds.

Specifically, the study set out to;

1) Assess level of knowledge and attitudes/perceptions towards the disseminated technologies/practices
2) Quantify levels of use of the different crop technologies disseminated
3) Examine enabling and unfavorable factors to use of the crop technologies
4) Give recommendations to improve use of promoted improved maize crop technologies

2 METHODOLOGIES

This section explains how the study was conducted. It gives detailed information about the study design that was used, the sampling procedure and size (both quantitative and qualitative). It further shows how data were collected, analyzed and reported.

2.1 Study Design

A descriptive cross sectional design was used to collect both quantitative and qualitative data. Both quantitative and qualitative approaches were used in this study. The approaches and methodology that guided the study hinged on the following phases:

2.2 The preparatory/Pre-data collection phase.

In this phase, adaptation and review of the 2012 adoption and adaptation study tools was done. The tool was revisited and shared with the relevant themes-CPE as well as other themes and management to check on their content validity and also ensure that they enlisted all the required information. Comments arising out were used to refine the tools.

2.3 Preparation for actual field data collection, training of enumerators and data entry technicians

This involved recruiting data collection team-enumerators. The next step was to orient and train the data collection and entry team on the methodology and tools. Prior to embarking on the actual field data collection, an implementation strategy was developed detailing how the study will be conducted. A one-day workshop was organized to train enumerators and data entry technicians. At this stage contacts were then made with the extension agents on ground. This was intended to;

- Explain the purpose of this undertaking
- Select the sample Sub-counties, parishes and farmers.
- Agree on timing of data collection; convenient venue, day and time to hold the key informant interviews

2.4 Sampling Strategy

Purposive and random sampling techniques were used to select 4 Districts from which the sample farmers were randomly selected on the basis that i) that the farmer received crop production related interventions. This was directly related to the achievement of the following;

a) The 4 Districts of Lira, Ntungamo, Jinja and Mukono purposively selected.
b) Compared to the East and West, more Districts covered from the Central and Northern regions because of a wider coverage.
c) 1 sub-county was purposively selected from each District.
d) From each sub-county, 2 parishes were purposively selected.
e) From each Parish, 2 groups were selected and from each group, 8 farmers were randomly selected giving a total of 192 farmers.
f) 4 District coordinators-1 from each District was interviewed
g) 8 Field Extension Workers (EW)-1 from each Sub county were interviewed
h) 16 CBFs were interviewed-1 from each Parish
i) The overall sample for the study was 284.

Table 1: Sample size

Spatial Distribution of Sample Population	Region	District	No. of Subcounties	No. of Parishes	No. of groups from Sample drawn	No. of Farmers	CBFs	EWs	DCs	Total
	North	Lira	2	4	8	64	4	2	1	71
	West	Ntungamo	2	4	8	64	4	2	1	71
	East	Jinja	2	4	8	64	4	2	1	71
	Central	Mityana	2	4	8	64	4	2	1	71
Total			**6**	**16**	**32**	**256**	**16**	**8**	**4**	**284**

2.5 Data collection Methods

In this phase, the study used both quantitative and qualitative methods for data collection. Data was obtained through employing individual farmer interviews and key informant interviews.

2.6 Data Management and Analysis

This involved data coding, entry, cleaning and processing. Data coding and entry were undertaken simultaneously with data collection. Analysis of salient issues was immediately undertaken after field data collection.

2.7 Reporting, sharing and feedback.

A draft report was prepared for presentation during the community feedback meetings. Results were then shared in the review meeting with all the implementation themes present to inform future decision making but also receive comments to improve the report.

3 RESULTS AND DISCUSSIONS

In this part of the report, field results are discussed. The discussions centered on household socio- economic characteristics (that centered on age of household head, land ownership, main occupation of the household head, membership to groups-collective action, average monthly contribution), access to trainings on use of seed and fertilizer, source of trainings, frequency of visit by extension workers, levels of adoption, reasons for not using, access to inputs as well as farmers opinions on the accessed inputs.

3.1 Farm Typology

Results on the typology of the farmer are important in telling the trends as aligned to the intervention logic. The study categorized the farmers into four; the fertilizer user, the fertilizer non-user, improved seed user and non-users of seed. Figure 1 below shows the disaggregation by District.

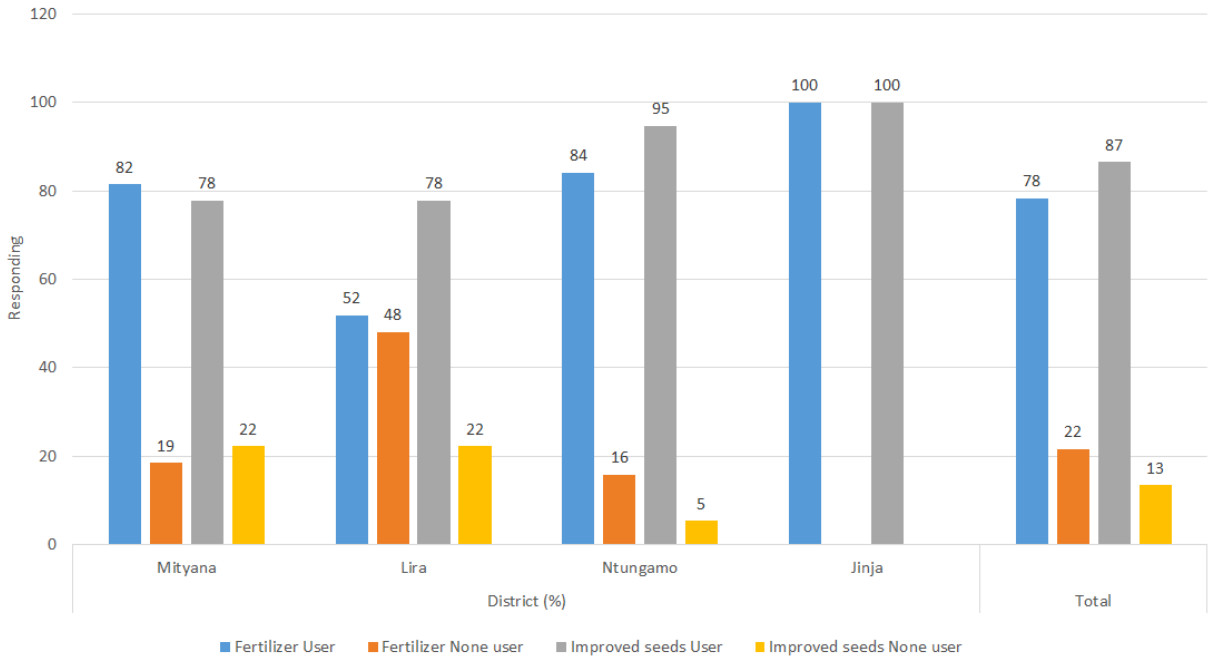


Figure 1: Farmer Typology

3.2 Household Domestic/Production Resources

Study findings on domestic resources and farm enterprises are presented in Table 2. Experience has shown in previous studies that household domestic resources have a significant correlation to uptake of promoted agricultural technologies. The study focused on the mean of the household head, household size, size of land and ownership, main occupation of the farmer as well as social capital.

Mean age of household head: The results indicated that the mean age of household heads was 42 years. However interesting to note is the deduction of the result with respect to productivity. The implication is that the sample farmers are within the age groups that are still energetic and productive. This finding is in agreement with what Oladeebo & Oladeebo (2008) found in rural Nigeria. They realized that credit institutions willingly give loan facilities to young and dynamic farmers who are more likely to adopt new innovations than the older farmers.

Household size: The mean household size of 7 persons across the study areas was slightly higher than the national average of 5 persons in rural households (Uganda Bureau of Statistics, 2010). Results also indicated that Jinja and Ntungamo had statistically higher number of household members than in Mityana and Lira (Table 2).

Table 2: Farmer Typology

District	Farm size (acres) for agricultural production	Avg no. of hh members	Avg. no of hh members; 0 to 14 years	Avg no. of hh members; 15 to 64 years	Avg no. of hh members actively involved in agricultural activities
Mityana	4	6	3	2	2
Lira	3	6	3	3	3
Ntungamo	2	7	3	4	3
Jinja	2	10	5	4	4
Total	3	7	3	3	3

Source: Adoption Study, 2016

Land ownership and use: Average land owned and available for agricultural production by a typical household was at least 3 acres while on average, households cultivated about 1 acre on average. Availability of a single input like labor is vital for enhancing farm productivity. Respondents were asked whether they use hired labor at production on their farms. The average family farm labor of 3 household members actively involved in agricultural activities shows that half of the household members offer labor on the farm with majority slightly found in Jinja.

Household head and Gender category: Results by District and area are presented in Table 3. Results showed that majority (69%) of households were headed by men. Area specific data

showed that there were virtually no female youth headed households in Lira, Ntungamo and Jinja Districts. This had no attest to the study.

Table 3: Household head and Gender category

Household category	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Female headed	11.1	7.4	5.3	20.8	11.3
Male headed	51.9	74.1	78.9	75.0	69.1
Female managed	3.7	7.4	10.5		5.2
Male Youth headed	25.9	11.1	5.3	4.2	12.4
Female Youth headed	7.4				2.1

Source: Adoption Study, 2016

Years of farming experience: Years of farming experience have been found to be highly related to adoption of promoted technologies in recent studies. Results from this study showed that the mean years of farming experience were at 11 years. Data by District showed that Jinja District had the highest average age of farmers reporting experience at 14 years followed by Lira, 11, Ntungamo 10 and Mityana, 9 in that order of importance.

Marital Status: Findings also revealed that 81% of the sample households were married but mainly in Ntungamo District (95%) than other Districts as presented in Table 4. A study by Tecklewold et.al (2006) revealed that marital status greatly influences opportunities for technological adoption. Key informants reported that households that are married are more stable to make decisions for agricultural investments than the unmarried.

Table 4: Household head and Gender category

Marital status	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Single	7.4	11.5			5.2
Married	74.1	73.1	94.7	87.5	81.3
Widowed	18.5	15.4	5.3	12.5	13.5

Source: Adoption Study, 2016

Education level: Through the Poverty Eradication Action Plan (PEAP) which formed Uganda's development agenda in the past decade, the education sector attracted substantial resources to improve human capital base. Ezeh and Nwachukwu (2010) observed that the level of education attained by a farmer not only increases his/her farm productivity but also enhances ability to understand and evaluate new production technologies and that the ability to read and write would enable farmers to better utilize effectively and efficiently whatever resources exist in the area. The study attempted to collect information on the highest education attainment of the household heads. Overall results indicate that, among the households that received formal

education, 46 percent attained a lower primary education, 16 percent secondary education. Table 5 shows different levels of education attained by District.

Table 5: Highest education level attained by District

Education level	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
None	25.9	55.6	21.1	29.2	34.0
Primary level	48.1	37.0	57.9	45.8	46.4
Secondary level	18.5	7.4	15.8	20.8	15.5
Tertiary college	7.4		5.3		3.1
University				4.2	1.0

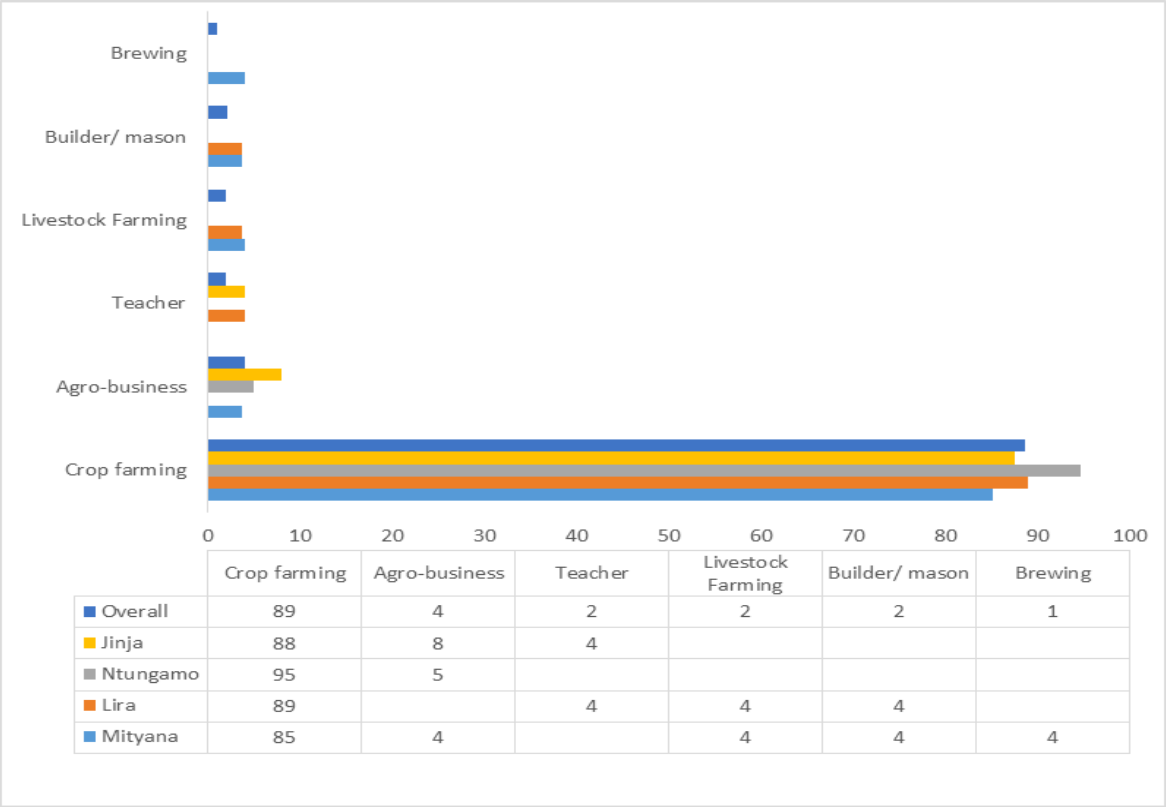
Source: Adoption Study, 2016

Data disaggregated by gender show that at least 40 percent of the female and 42.2 percent of the male household heads attained some secondary education compared to those who did not receive any formal education at all whose figures stand at 4.4 percent for female and 11.6 percent for male. These findings show that literate farmers across the categories are the majority in the study area. This was expected because the aspect of education is as much a critical and or a limiting factor to adopting technologies. Education levels influence extent of comprehension of extension messages. A Similar study by Omonona et al (2010) on the determinants of constraint conditions among farming households in southwestern Nigeria concluded that the level of education of rural farmers has great effect on the administrative productivity for credit access processing since they have low literacy level.

In a similar study by Daku (2002); Doss and Morris (2001) observed that education positively affected adoption of technologies. This is because education is expected to create a favorable mental attitude for the acceptance of new practices especially of management and intensive practices (Caswell et al., 2001). Education also is assumed to reduce the complexity perceived in a technology thereby increasing a technology's adoption. However, most studies that designed to establish the effect of education on adoption in most cases have always related it to years of formal schooling.

3.3 Main Occupation of farmer

Main occupation of a farmer has great influence on whether to use a technology or not. This however varies depending on perception. Overall results show that, majority (80) relied on crop farming. This was across all the study Districts although there were variations within the Districts. Figure 2 shows that Ntungamo District (95) had the highest proportion of farmers using reporting crop farming as main occupation. Gender disaggregated data revealed no significant differences (ρ=0.001) between female and male headed households in reference to main occupation.



	Crop farming	Agro-business	Teacher	Livestock Farming	Builder/ mason	Brewing
Overall	89	4	2	2	2	1
Jinja	88	8	4			
Ntungamo	95	5				
Lira	89		4	4	4	
Mityana	85	4		4	4	4

Figure 2: Main occupation of the farmer

These findings reflect the importance of agriculture in the study area as an economic activity. This study has showed a steady rise of the agricultural contribution to farmer incomes. This comparison is based on the national averages of 66 percent reported in the National Household Socio-Economic Survey 2010 report.

3.4 Membership to groups

Membership to groups plays a pivotal role in access to inputs. This is influenced by information transfer and communication. Narayan and Pritchet (1997) argue that social capital is regarded a better flow of information. The system of group guarantee and pressure by social network credit are important techniques to improve credit access and input credit in rural livelihoods. That is, institutions that seem to succeed in membership are institutions that have higher positive impact on households.

A study conducted in Tanzania by Narayan and Pritchett (1997) indicates that more households in villages with group affiliation report using credit for agricultural improvements. While in Indonesia, Grootaert (1999) indicates that households with higher social capital have higher chances of obtaining formal credit than those who act individually. However, according to Tonkiss (2000), the forms of social capital are not simply or necessarily direct links to a service.

Overall results indicate that over 90% of the households belonged to farmers' groups with almost all interviewed farmers from Ntungamo, Lira and Jinja reporting membership than Mityana District (Figure 3). By and large, membership in farmer groups was significantly (x^2=85.35, ρ=0.000) related to category of area implying that more membership in farmer groups is influenced by the presence of a given institution in that particular area. This was expected because, by the nature of SG 2000 operation, farmers are encouraged to be in groups and the entry point has always been the already exiting farmer groups.

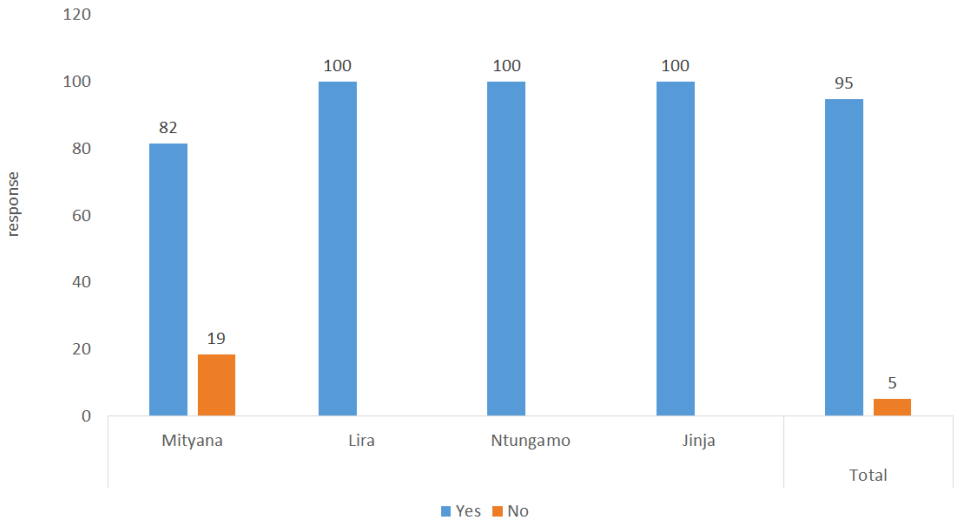


Figure 3: Household Membership in Groups

3.4.1 Main focus of the group

Respondents were requested to give the major activity for their groups. These included but not limited to savings and credit, crop production, as well as labour selling (Figure 4). Across the areas, results indicated that majority (94) of the respondents reported savings and credit as the major group activity. This holds true because SG2000 has made tremendous efforts in creation and operationalization of VSLAs.

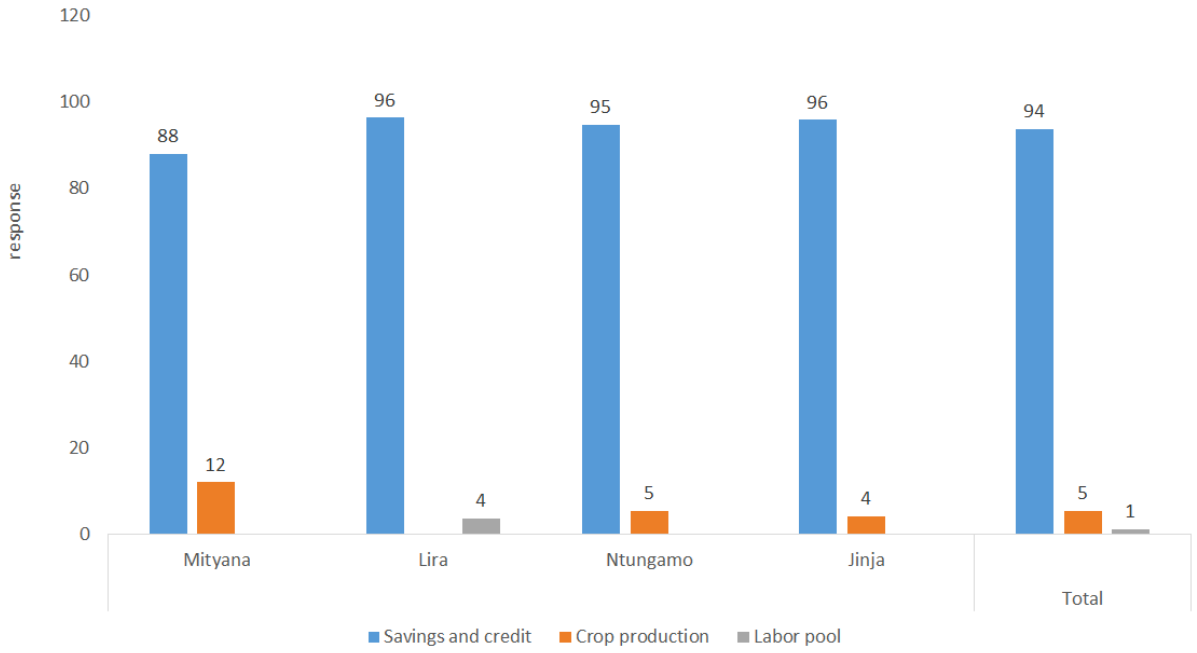


Figure 4: Main focus of the group

3.4.2 Average monthly contribution to VSLA

The poor do not in many cases save or invest for the future (Dufflo et al 2006). Global demand for agricultural commodities and increasing technological capacity for higher yields and returns has made agriculture an increasingly attractive investment option. Oladeebo & Oladeebo (2008) claim that the more money the farmer has, might have positive effect for investment. This therefore leads to increased possibility of adopting improved technology which might increase the income generating ability of the farmer and consequently leading to more loans being repaid. Rosenzweig (2001) suggests that establishing financial institutions in rural areas for smallholder farmers would be considered an adequate financing strategy in improving their livelihoods through agricultural adoption practices than otherwise.

From the results, it is shown that on average, farmers contributed about 14000/= per month. Results by District showed higher contributions in Lira than other Districts (Figure 5) Key informant interviews indicated that the higher proportions of households saving more money, was attributed to the orientation of farmer groups towards the activities of informal financial institutions like VSLAs, absence of banks offering favorable agricultural loans and the common practice of farmers not keeping their saving in formal financial institutions. The risks involved in farm production in a situation of absence of farm insurance further inhibits farmers' ability to get input credit or use of anticipated crop produce as a collateral in financial institutions.

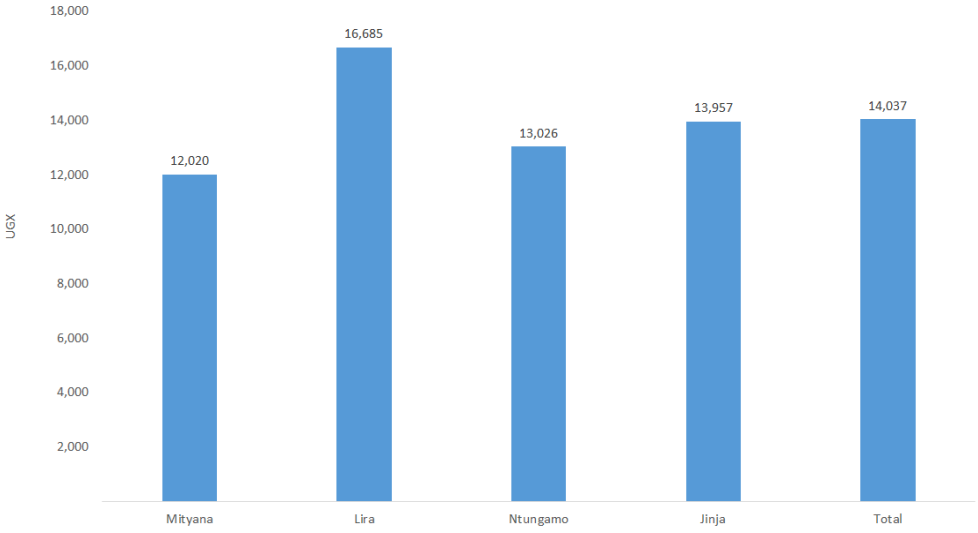


Figure 5: Average monthly savings

3.5 Access to trainings on use of improved seeds and fertilizers

Overall, findings revealed that 85% of the total sample had accessed trainings on use of improved seeds and fertilizers. This was a high performance above the 50% mark. By and large, District data showed that all (100%) farmers in Jinja District had accessed trainings followed by Ntungamo and Lira in that descending order as presented in Figure 6.

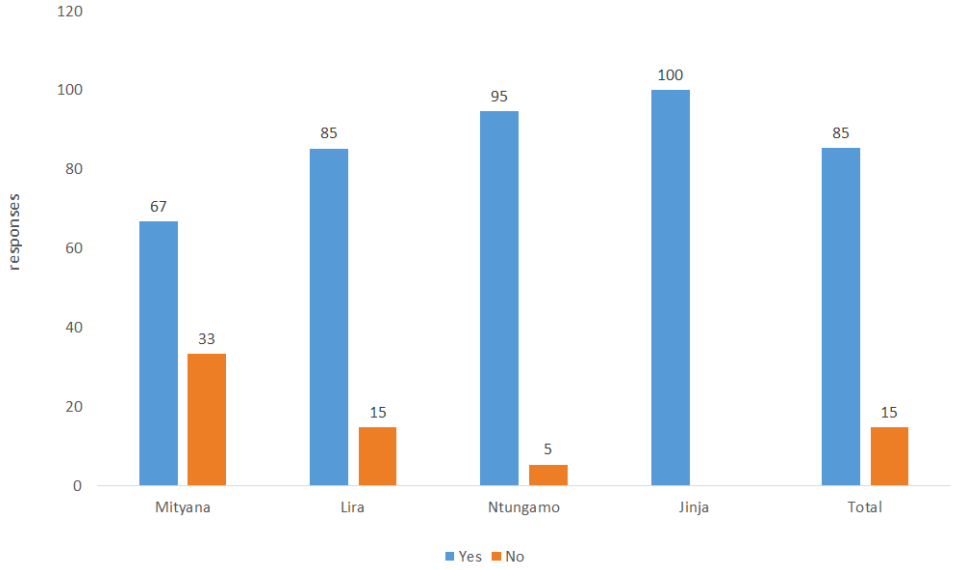


Figure 6: Access to trainings on use of improved seeds and fertilizers

3.5.1 Source of training

The major source of trainings across the sample Districts was SG2000 reported by over 80% of the responding farmers. Important to note is that through the Extension agents facilitated by SG2000 Uganda trainings were also extended to farmers. These include Community Based Facilitators (CBFs) and Extension workers as well as some outstanding model farmers within the areas of operation.

Table 6: Source of training

Source	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Sasakawa Global 2000	50	100	89	96	86
Farmer Group Members	11		6	4	5
District Farmers Association	22				5
NAADS Service Providers'	6		6		2
Demonstration sites	6				1
Uganda Seed Development Association (USDA)	6				1

Source: Adoption Study, 2016

3.5.2 Average No. of times a farmer was visited by an Extension worker

On average, farmers reported to have been visited at least twice in a given season although the first season of 2015 witnessed slightly more visits. On average, Ntungamo District had more visits in the first season than other Districts (Figure 7).

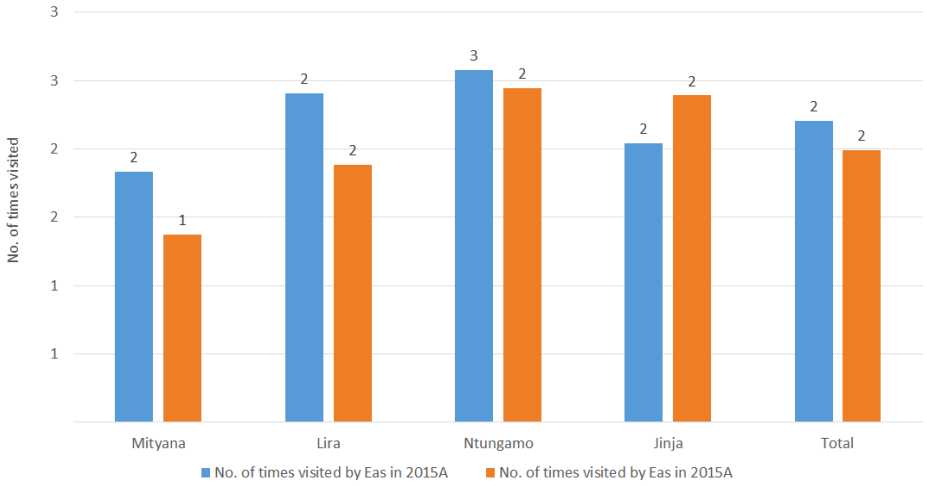


Figure 7: Average no. times a farmer was visited by an Extension worker

3.6 Awareness and access to SG 2000 - Uganda technologies

3.6.1 Awareness of maize crop improved varieties.

A producer must make decisions on cultivating certain crops, use of crop inputs, pest management, harvest, postharvest, marketing, and sale (Naomi & Priya 2012) based on information available to them about potential effects of the practices on the productivity at the agricultural product value chain cycle. As such, SG2000 Uganda's interventions focus on providing knowledge and skills to enable farmers make decisions geared towards improving their productivity.

The study results revealed that approximately 40% of the farmers across the four Districts were aware of at least one improved maize variety (Table 7). This proportion suggests that about two in every five households had heard about an improved maize variety. This therefore signifies a more two-fold multiplier effect by the initial nucleus demonstration host households. By and large, longe 10 followed longe 5 were singled out as the most known maize crop varieties. Kenya Hybrid, Longe 1 and DK were less popular. However, this could perhaps be attributed to the fact that these are older series.

Table 7: Awareness of improved maize crop varieties

Variety	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Longe 10	41	65	35	25	43
Longe 5	18	19	47	71	38
Longe 4	14	4			5
Pana	14				3
Longe 7	5		12		3
Longe 6	5	4		4	3
DK		8			2
Longe 1	5				1
Kenya Hybrid			6		1

Source: Adoption Study, 2016

District disaggregated data revealed higher proportions (65%) of farmers in Lira and Jinja (71%) reporting more awareness of longe 10 and longe 5 than their counterparts in other Districts. This suggests technology spill-over was higher in the same Districts compared to the other two Districts. Therefore efforts towards technology awareness should be directed more to those varieties that farmers report better performing and where Districts wise, awareness is still low.

3.6.1 Source of awareness on improved crop varieties

Source of awareness on improved maize crop varieties was more skewed in favor of Sasakawa global 2000 reported by over 60% of the total sample. This low level of awareness was not expected the fact that SG2000 Uganda had been present in these areas much longer than 8 seasons. Awareness was more pronounced in Jinja District and followed by Ntungamo. Details are presented in Table 8.

Table 8: Awareness on improved maize crop varieties

Source of awareness	District name (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Sasakawa Global 2000	27	72.0	82	87.5	68
Farmer Group Members	27.3	12.0	5.9	4.2	12.5
Other farmers not in Group	9.1	8.0		8.3	6.8
NAADS Service Providers'	9.1		5.9		3.4
Radio	9.1	4.0			3.4
District Farmers Association	9.1				2.3
Demonstration sites	4.5				1.1
Political leaders/ Politicians	4.5				1.1
Agro shop			5.9		1.1
Other NGOs		4.0			1.1

Source: Adoption Study, 2016

3.6.2 Awareness of soil fertility technologies

Similar to the above, awareness of soil fertility technologies was not impressive. However, considering specific technologies, DAP fertilizer emerged the most known technology across all the four study Districts with over 80% of the farmers expressing awareness although Mityana District had a lower scale.

Table 9: Awareness of soil fertility technologies

Technologies	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Inorganic fertilizers (DAP)	67	92	90	96	86
Inorganic fertilizers (UREA)	13	4	5		6
Animal manure	17	4	5	4	8
Composting and organic manure	4				1

Source: Adoption Study, 2016

3.6.3 Source of awareness on soil fertility technologies

Table 10 below presents details on the sources of awareness on soil fertility technologies.

Table 10: Source of awareness on soil fertility technologies

Source	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Sasakawa Global 2000	17	79	79	83	63
Farmer Group Members	33	8		13	14
Other farmers not in Group	13	4	5	4	7
Other NGO	17				4
Radio	13				3
NAADS Service Providers'			11		2
Extension Workers		8			2
Demonstration sites	4				1
Stockists			5		1
District Farmers Association	4				1

Source: Adoption Study, 2016

3.7 Levels of use of the different crop technology packages

This section presents and discusses results addressing the specific objective of determining the levels of use of the two promoted technologies by smallholder farmers. It is divided into three major sub-sections. The first sub-section presents the use of promoted crop technologies. The second sub-section reveals the major adopted technologies, types of technologies adopted first, preferences for the adopted technology and dis-adopted technologies. Reasons for dis-adoption are discussed in the third section.

3.8 Use of Promoted technologies

In their study of adoption of imported technology, Enos and Park (1988) define technology as "the general knowledge or information that permits some tasks to be accomplished. Although their focus was non-agricultural, the definition fits agricultural technologies given that technology is aimed at easing work of the entity to which it applies. Most technologies are therefore consequently termed 'labor-saving', 'time-saving', 'capital-saving' or 'energy-saving'. To economists this implies saving on resources that are scarce. While quoting Roger's earlier work of 1962, Feder (1985) define adoption as "a mental process an individual passes from first hearing about an innovation to final utilization". The interest for this study was the level of use.

3.8.1 Use of fertilizers

Overall results reveal that over 70% of the farmers had used fertilizers in 2015. Use of fertilizers was high among households in Jinja, Ntungamo and Mityana Districts respectively. There was a significant difference across the gender categories. By and large, lower proportions of use were reported in Lira District across the gender categories compared to other Districts. Figure depicts the differences in Districts.

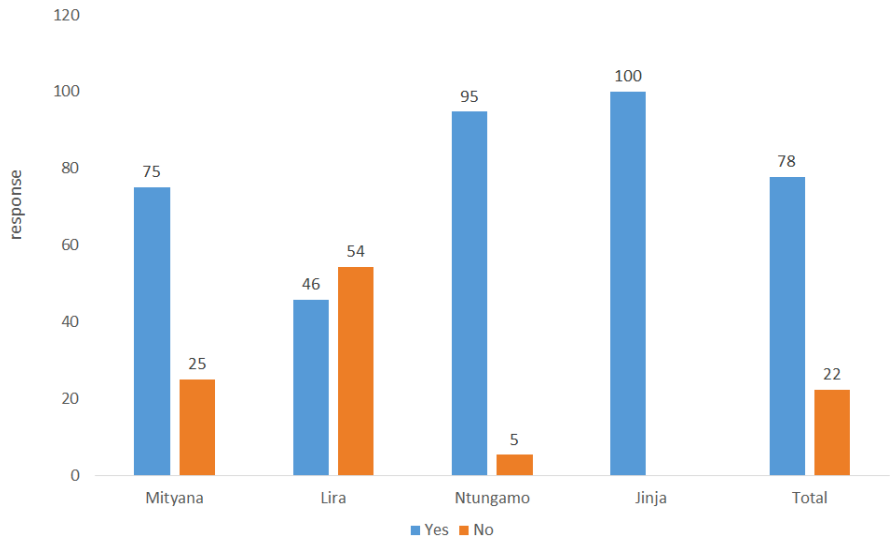


Figure 8: Average no. times a farmer was visited by an Extension worker

3.8.1.1 Average quantity of soil fertility technologies used

There was slightly more use of fertilizers in the second season compared to the first season of 2015. Other details by type of a particular fertilizer are presented in Table 11.

Table 11: Average quantities of fertilizers used by season

District	Technology	Quantity 2015A	Quantity 2015B
Mityana	Inorganic fertilizers (DAP)	10	16
	Inorganic fertilizers (UREA)	3	4
	Animal manure	30	21
	Mean	13	16
Lira	Inorganic fertilizers (DAP)	8	5
	Mean	8	5
Ntungamo	Inorganic fertilizers (DAP)	6	6
	Inorganic fertilizers (UREA)	2	3
	Animal manure	200	200

	Mean	21	21
Jinja	Inorganic fertilizers (DAP)	13	11
	Animal manure	7	7
	Mean	13	11
Total	Inorganic fertilizers (DAP)	10	10
	Inorganic fertilizers (UREA)	2	3
	Animal manure	59	48
	Mean	13	14

Source: Adoption Study, 2016

3.8.1.2 Reasons for not using fertilizers

Reasons for not using fertilizers are summarized in Table 12. It is evident that farmers do not use fertilizers because they are expensive. Also, lack f adequate cash to purchase the fertilizers limits farmers. Ideally most of the reasons were institutional in nature. This is a situation which can be taken up by PPP&MA as recommendation from this study. Lack of adequate knowledge on use of fertilizers was more pronounced in Mityana District compared to other Districts under study.

Table 12: Reasons for not using fertilizers

Reasons for not using	District (%)			Total
	Mityana	Lira	Ntungamo	
Technology is expensive	33	50	50	45
Lack of adequate knowledge	33	8		15
Lack of adequate capital	33	25		25
Scarce; not easily accessible/ available		8	50	10
Technology is time consuming		8		5

Source: Adoption Study, 2016

3.8.1.3 Use of improved maize varieties

Figure 9 examines the distribution of adopters in the participating Districts. Overall, more than half (76%) of the total sample acknowledged use of improved maize varieties. Data by District showed no significant differences in use although there were variations. Ntungamo followed by Mityana had the highest number of users.

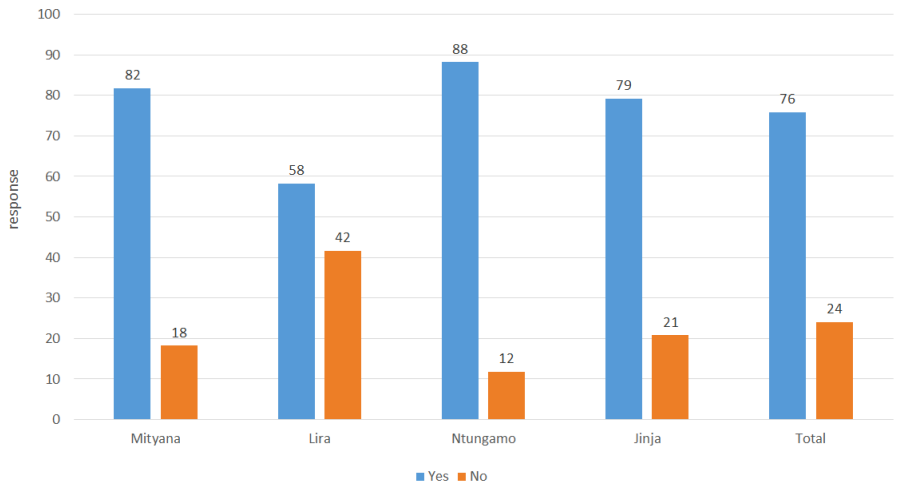


Figure 9: Use of improved maize varieties

Variety disaggregated data revealed that maize (Longe10 -Salongo) registered higher proportion of households growing crops using improved seeds compared to other varieties. This could be related to availability of markets and awareness levels as discussed in the previous sections.

3.8.1.4 Reasons for not using the improved maize varieties

Close association between independent variables was done by correlating reasons by the independent variables like education and age. Correlations indicated that age and experience of household head both in years were significantly correlated (ρ=0.001). In addition, total number of household members (household size) and number of household members involved in farming activities were significantly correlated (ρ =0.001); and annual farm income was positively and significantly correlated with cultivated area. However, explanatory reasons showed that maize varieties are costly and expensive indeed. Other reasons for not using improved maize varieties are presented in table 13 below.

Table 13: Percentage responses on reasons for not using of improved maize varieties

Reasons for not using	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Technology is expensive	33	36	33	60	41
Lack of adequate knowledge/ skill	33			40	14
Lack of adequate capital		27			14

Poor yield	33		33		9
Scarce; not easily accessible/ available		18	33		14
Fake/ substandard variety		9			5
Maize is less profitable compared to other crops		9			5

Source: Adoption Study, 2016

3.8.1.5 General Reasons for Dis-adoption of improved maize seed

Poor technology performance in terms of yields was an outstanding factor for farmers to stop using maize varieties. This was more pronounced in Ntungamo and Jinja with all farmers reporting this. Similarly, the cost of the seeds curtailed farmers from continuing use of the improved maize crops. Presence of fake seeds was also reported in Mityana District. Details are presented in the Table 14.

Table 14: Reasons for stopping to use the improved maize seed

Reasons why stopped	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Got fake/ substandard improved seeds	50				20
It's very expensive to acquire	50	100			40
Poor yield			100	100	40

Source: Adoption Study, 2016

3.9 Access to credit

Access to credit, whether cash or in-kind, enables smallholder rural farmers who constitute the majority of the population in most developing countries to invest in adoption of new technologies and practices aimed at increasing production and incomes. However, a number of factors, including lending policies and procedures, information asymmetries, poor infrastructure and small land holdings have been identified to limit the full exploitation of the agricultural potential in the rural economies (Mpuga 2004).

Households were asked whether they accessed credit why they asked for the loan from the different financial institutions. Results indicate that about 95 percent of the sample households actually accessed loans from formal, semi-formal and informal institutions. There seems to be an increase in borrowing given that the FINSCOPE survey in 2007 on access to financial services in Uganda had indicated that only 33 percent of the Uganda rural population had borrowed from financial institutions. This finding cannot be entirely conclusive but can be attributed to

time and space of 10 years between the two studies. Further analysis shows no significant differences across the four study Districts as presented in Figure 10. This is why majority of the farmers reported to getting their credit mainly from the informal institutions.

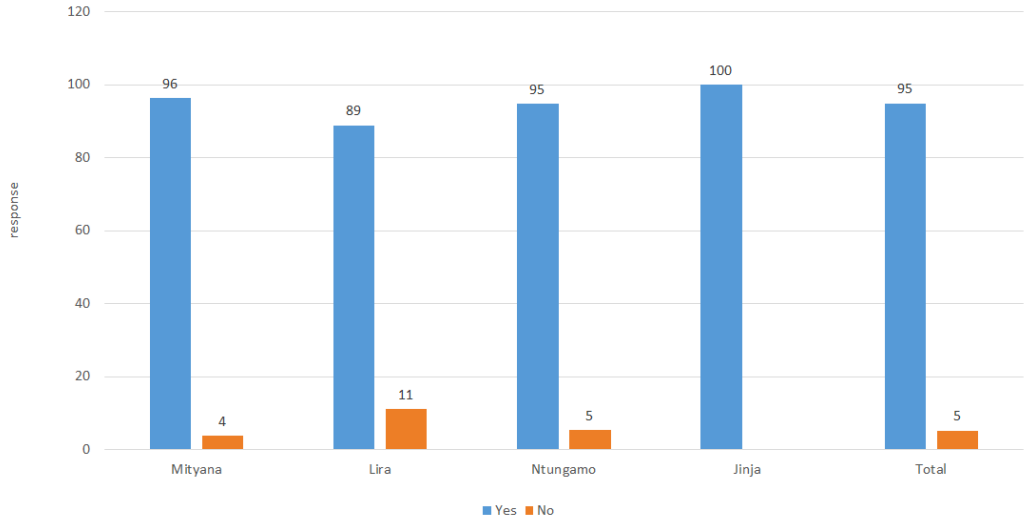


Figure 10: Access to credit

3.9.1 Purpose for the loan

The study sought to capture the reasons as to why farmers borrow money from financial institutions. Interesting to note is that farmers actually borrow for different reasons because they engage in different enterprises and each household has priority of engagement and investment for its own enterprise. The major purposes given were: i) for agricultural production; ii) to pay school fees; iii) to purchase agricultural inputs in that order of priority. Other reasons are presented in Table 15. The aspect of agricultural production (pay for hired labor, buy fertilizers and seeds, buy farm tools and purchase livestock) was treated as a whole credit package in this study. In reference to investment in agricultural production, findings by gender revealed that both female (21.9 percent) and male (26 percent) use the acquired credit mainly to buy fertilizers and improved seeds followed by payment for hired labor where figures for female and male stood at (12.3 percent) and (10.8 percent) respectively (Table 16 presents the details).

The National Household Survey done by UBOS in 2010 had an aspect on purpose of credit in Uganda. The survey revealed that 7 percent of men and 7 percent of women headed households used financial institutions to get credit for buying farm tools and that 4 percent of men and 3 percent of female headed households used the credit to buy livestock. Oladeebo &

Oladeebo (2008) and Anyiro & Oriaku (2011) in Nigeria had the same results although the purchase of seeds and fertilizers was an overwhelming aspect in their two studies. The results from the three studies are not greatly deviate from this study and it is evident enough that the slight difference can be explained by the time and space between the three studies and this study.

Second to agricultural production was the need for acquiring business capital reported by (42 percent) female and (22 percent) male. This finding was not expected because literature has already indicated that male headed households are more business oriented than their counter parts the female headed households. However this does not mean that women do not engage in business. Actually earlier analysis in this study indicated that more women (13.3 percent) engage in non-farm activities than men (11.8 percent). Small businesses/petty trade were an integral part of the non-farm activities. UBOS (2010) reported that most female (27 percent) and male (25 percent) in Uganda in 2010 borrowed to get working capital. This is not far different from this study which found out that most female (32.9 percent) and male (23 percent) borrow to get business capital. The need to meet education and health expenses, payment of debts and purchase of land all stood at less than 6 percent.

Table 15: Purpose of borrowing

Purpose for the loan	District ()				Total
	Mityana	Lira	Ntungamo	Jinja	
Crop business/ trading	24	46	29	71	42
Farm operations/ activities	62	54	57	23	50
For inputs purchase	43	13	21	6	21
Poultry business	5				2
House construction/ repair	5		7		3
School dues/ fees	5				1
Machinery purchase			7		1
General business				6	1

Source: Adoption Study, 2016

3.9.2 Type of inputs for which money was borrowed

The type of inputs for which money was borrowed varied across the study Districts as presented in Table 16. Mainly, farmers borrowed to purchase seed of particular interest is Longe5, 10, 7 and DK series. Purchase of fertilizer was second to seed.

Table 16: Purpose of borrowing

Inputs	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Animal manure	12				6
DAP	25			67	24
Seeds	13				6
Dythen M45	13				6
Kawanda seeds	12				6
Longe 5	25		50	33	24
Longe 10		75			17
Longe 7			50		6
DK		25			6

Source: Adoption Study, 2016

3.9.3 Source of inputs

The source of inputs also relates to the adoption levels of that particular input. That is if after sales services are offered or not offered. Table 17 clearly shows that the major source of inputs was farmer home saved seed (44%) followed fellow farmers with in the communities (33%). Mityana District followed Jinja had the highest proportion of farmers sourcing inputs from their own confers.

Table 17: Source of inputs

Source	District (%)				Total
	Mityana	Lira	Ntungamo	Jinja	
Home	48	42	37	46	44
Fellow farmers	30	27	42	36	33
Store	15		11	5	6
Market	7	12	5		6
Trading center		15	6		6
Bulking center				14	3

Source: Adoption Study, 2016

3.9.4 Rating Quality of inputs

The quality of inputs has an effect on continuous uptake. By and large, over 80% of the interviewed farmers reported that the quality of inputs is very good. Very few (4%) reported it to be poor. Figure 11 show that Jinja followed by Lira District had the highest proportion of farmers reporting access to good inputs. Whereas Ntungamo and Mityana Districts had a slightly higher proportion of farmers reporting access to poor inputs, implications occur. This find is in tandem with earlier findings that showed that uptake in Mityana was low due to existence of poor inputs particularly seeds.

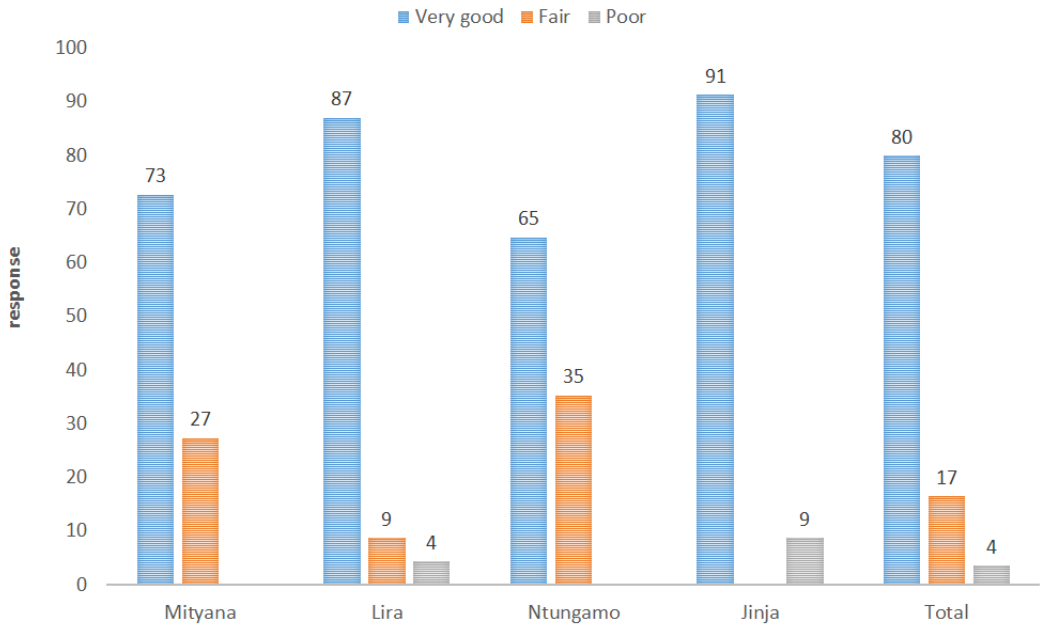
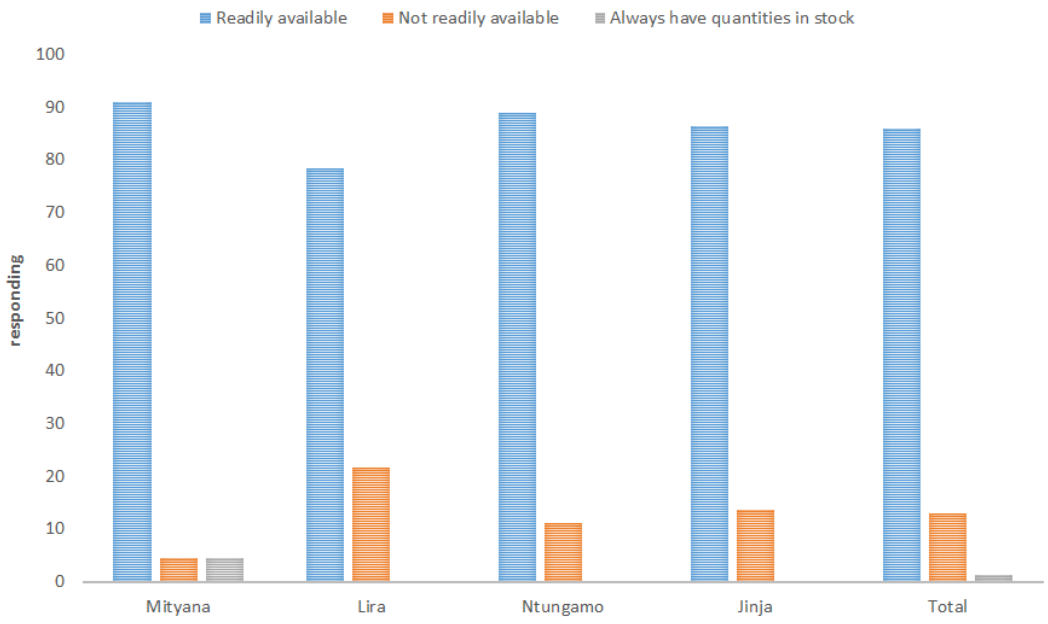


Figure 11: Rating quality of inputs

3.9.5 Rating availability of inputs

Availability of inputs has a bearing on use of the inputs if other conditions are equally considered. Results from this study showed that over 80% of the sampled farmers in the four Districts reported that inputs are available. Availability was more pronounced in Mityana, Ntungamo and Jinja Districts respectively. Lira had the highest proportion of farmers reporting to have less availability of inputs. A chi-square test (ρ=0.001)) showed a significant relation between availability of inputs and use.



3.9.6 Farmer's opinion on improved seed varieties

Table 18 Percentage responses on farmers' opinion on improved seed varieties

Farmers' opinions	District (%)			
	Lira	Ntungamo	Jinja	Total
Faster maturity/ plant growth/ crop vigor	10.0	23.1	23.8	18.5
Good/ high quality	5.0	38.5	14.3	16.7
Expensive/ costly	5.0			1.9
Improved/ increased/ high yields	60.0	15.4	19.0	33.3
Poor quality		7.7	4.8	3.7
Favourable input prices		7.7		1.9
Bigger grain size	5.0		14.3	7.4
Crops are pests and diseases resistant			4.8	1.9
Poor/ low yields	5.0		4.8	3.7
Crops are not resistant to extreme weather conditions	5.0		4.8	3.7
Fake seeds on market		7.7		1.9
Poor plant growth/ germination			4.8	1.9
Small grain size	5.0		4.8	3.7

Source: Adoption Study, 2016

The study set to find out farmers' perception/ opinion of improved seed varieties. Farmers revealed that use improved maize seed varieties leads to higher yield (33%). Improved maize

seed varieties increase crop vigor (18.5) and lead to high quality yield (17%). It is important to note that despite the benefits arising from using improved maize crop varieties, some farmers expressed that some improved maize seed varieties are not resistant to the harsh weather conditions. Some farmers expressed that the market is flooded with fake seeds and this has discouraged use of improved seeds (see table 18 above). This implies that there is more work to be done to increase awareness of improved crop varieties across the intervention areas.

3.9.7 Farmer's onion on fertility management

Table 19 Percentage responses on farmers' opinion on soil fertility management

Farmers' opinions	District (%)			Total
	Lira	Ntungamo	Jinja	
Faster maturity/ plant growth/ crop vigor	30.8	14.3	14.3	18.8
Good/ high quality	15.4	21.4		10.4
Expensive/ costly	7.7			2.1
Improved/ increased/ high yields	46.2	35.7	42.9	41.7
Not readily available/ accessible		7.1	4.8	4.2
Favourable input prices		7.1		2.1
Crops are pests and diseases resistant			4.8	2.1
Improves and maintains good soil moisture and fertility			28.6	12.5
Discontinuing use causes soil exhaustion and barrenness		14.3		4.2
Crops are resistant to extreme weather conditions			4.8	2.1

Source: Adoption Study, 2016

The study set to find out farmers' opinion on soil fertility technologies promoted. Farmers revealed that use of fertilizers give high performance in terms of volume and quality of yield (41%) and faster maturity/crop vigor (19%) as well as crops are resistant to extreme weather conditions. However some farmers revealed that fertilizers are expensive and not readily available. The high cost of inputs and fertilizers not being available has greatly hindered the use and adoption of fertilizers.

4 CONCLUSIONS AND RECOMMENDATIONS

This study aimed at providing evidence of use of particularly improved seed varieties of maize and fertilizer technologies, and to identify factors that favour use of such technologies by target farming communities. This section summarizes conclusions made and recommendations proposed.

4.1 Conclusions

Data collected from randomly selected farmers in the intervention areas of Lira, Ntungamo, Jinja and Mityana districts revealed 60% of the sample size expressed awareness and having knowledge on improved maize crop varieties mainly through trainings by SG2000-U. Overall, 87% of the sample was using improved seed while 78% were using fertilizer although at different intensities. It is important to note that 100% of farmers selected in Jinja reported using fertilizers and these were followed by Ntungamo (95%), Mityana (75%) and only 46% from Lira. In addition, highest percentage responses on use of improved seed were recorded in Ntungamo (88%), followed by Mityana (82%) and then Jinja (79%) and Lira (58%). It is evidenced that Lira District from Northern Uganda recorded the least response on use of both improved seed and fertilizer. The main reasons cited by those not using the technologies were cost related. The most popular maize varieties were longe10 (43%) and longe5 (38%) while the most commonly used fertilizer was DAP (86%).

Data also revealed that some farmers from Lira and Mityana had dis-adopted some improved maize seed varieties). This was due to costs; and for only Mityana, poor performance in terms of yield which indicated issues of fake inputs in the communities.

Expectedly, findings revealed that all farmers selected for this study were affiliated to village savings and loans association (VSLA) from which 95% affirmed to accessing credit. They further reported that such credit was used for mainly farm operations or activities (mainly hiring in labor) for farmers in Mityana (62%), Ntungamo (57%) and Lira (54%) while for Jinja it was mainly for trading in crop produce (71%). However, low percentage responses were recorded on input purchasing as evidenced in Mityana (43%), Ntungamo (21%), Lira (13%) and Jinja (6%). Gender disaggregated data revealed that males (26%) and females (22 percent) of the sample size acquire credit to purchase improved crop varieties and fertilizers.

4.2 Recommendations and Implications for future interventions

Although majority of the farmers across the study districts reported awareness of the promoted crop varieties in the intervention areas, Lira district recorded the least percentages on use of the improved

crop technologies. It is therefore recommended from this study that more efforts are placed on sensitizing the farmers on the benefits of the technologies. In addition, access to these technologies should be supported and facilitated (for instance by linking farmers to agro-input dealers).

Furthermore, cost and lack of funds (capital) come up as hindering factors for those not using the promoted technologies. On the other hand, it is observed that the VSLA component in the farmer groups is very active and credit is being accessed. However, little priority is given to input purchasing when accessing the loans. It is recommended that during saving periods, priority should also be given to inputs. For instance, one of the "bags", for periodic saving should be for input purchasing such that by the time of planting, farmers can acquire a loan from that particular slot.

The issue of fake inputs was very pronounced in Mityana district among farmers who had dis-adopted the improved seed varieties. It is recommended that linkages to credible agro-input dealers be made by Public Private Partnerships and market access (PPP&MA). The theme should strengthen efforts to identify genuine agro input dealers and link them to smallholder farmers in rural areas. Furthermore, PPP&MA can intervene by increasing trainings among farmers on product identification. This will help farmers distinguish genuine products from fake products on the market.