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TECHNOLOGY ADOPTION BY SUNFLOWER FARMERS IN NORTHERN UGANDA

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Abstract

This study is on technology adoption by sunflower farmers in northern Uganda. The overall objective of the study was to assess the factors that affect adoption of sunflower technologies. Specifically, the study examined the factors that affect adoption of sunflower technologies, and secondly, it examined the adoption level of sunflower farming technologies. The study used cross sectional design where 95 sunflower farmers in Kitgum and Apac districts in Northern Uganda were covered. Quantitative and qualitative techniques were used to analyse the data. The results showed that male dominates the sunflower production and are found quick to adopt than female farmers. Factors found to influence technology adoption included gender, access to credit, access to inputs market, access to agro-processing facilities and cash savings. Based on these findings, it is recommended that policy makers should emphasize more on making credit available at minimal terms and training to farmers on the existing technologies. Moreover farm organizations should provide other services instead of concentrating on farming training.

Key words: Technology adoption, farmers, farming technologies

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1. INTRODUCTION

1.1 Background

Sunflower is among the major oil seed crops grown in the world which accounts for 7.3 percent of oilseed production. In Uganda, the oil seed sub-sector directly influences livelihoods of over 12 million Ugandans mainly in North-Eastern Uganda and accounts for over 70 percent of vegetable oil production in the country. In Uganda, sunflower is grown mainly in the North, North-West and North-East of the country. This is because these areas have the best agro-ecology for production of sunflower due to the vast land, cheap labour and agro-ecological conditions where the dry period immediately after harvesting allows for drying. The crop grows well in soils ranging in texture and it does not require high level of fertility in order to produce satisfactory yields. However, despite the growing production area for sunflower, year after year yields have remained relatively low over the same period (Mwesige, 2008).

Sunflower has many uses and according to Ugen (2009), the oil extracted from sunflower is used in both bakery and for other industrial products (industrial

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manufacture of soap); and the by-products used for making animal feeds. There are two different methods of extracting oil from the oilseeds, the production of crude oil and production of oil cakes from hexane. There is about 40 – 50 percent of oil and 40 percent of oilcake from the sunflower seed (Department of agriculture, 2011). In Uganda, the sunflower oil market is dominated by Mukwano which is involved in providing seed, working with farmers and buying their produce. However, new entrants like small scale and cottage oil producers are emerging. The current demand for raw sunflower from the local oil processors exceeds local supply by 60-65 percent (SNV, 2009).

The Uganda Government has prioritized several programmes in a continued effort to strengthen the oilseed production including sunflower. These include the creation of an enabling environment and the provision of proactive support to private operators, farmer's organizations and NGOs. It has also tried to formulate policies to strengthen the agriculture sector including Uganda National Agriculture Policy of 2011. Other Government agriculture supporting programmes include National Agricultural Advisory Services (NAADS), National Agriculture Policy Secretariat (NAPS), National Agricultural Research Organization (NARO) and National Agricultural Research System (NARS). Other initiatives include projects established to support farmers among which are the Agribusiness Initiative Trust (aBi Trust). The aBi supports the private sector to enhance its contribution to the agricultural sector by increasing land and labour productivity. Through cooperation with partners in the operational areas the trust promotes the hybrid sunflower seeds, training of extension officers and training farmers in better technologies to promote sun flower production.

Various sunflower technologies are available ranging from improved varieties, fertilizer, spacing, irrigation, pesticide control, harvest and post-harvest techniques. For instance, high yielding varieties for sunflower in Uganda are available to farmers even from local markets. These varieties are hybrid and open pollinated variety (OPVs) which are produced in Uganda (Mwesige 2008). However, the technological transfer is weak. Sunflower technology adoption has the potential to improve farmers' welfare given the high demand for cholesterol free seed oil; for local consumption and commercialization (Bandiera *et al*., 2006). Its by-products can also be used for animal feeds.

Farmers can not adopt improved technology unless they have heard it and or having access to detailed and accurate information. Such information can reach farmers from various sources such as extension agents, public research, demonstration plots, external agencies and an increase in the number of policies supporting agriculture (Moris *et al.,* 1999; Uaiene, 2011). Government can enable technology to reach many farmers if it has a good system and other supporting organizations in place.

However, given all these efforts by various stakeholders, technology adoption has never been easy due to different factors including technology complexity and profitability, the nature of prevailing cropping systems while others are farmer related such as ethnicity and culture, level of income, level of education and gender (Morris *et al.*, 1999).

1.2 Statement of the Problem

The demand for sunflower has increased because of oil producers' requirement and generally studies agree that the quantity of sunflower seed from local production cannot meet the demand by the local processors (Meyer, 2007 and Farm Concern International, 2009). According to Meyer, 2007, the study strongly recommended need to resolve several production and processing problems. There is a need for increasing its production. The increased productivity can be a tool for reducing poverty through increased income, reducing food prices and thereby, enhancing increments in consumption (Adekambi *et al.,* 2009). The problem of low sunflower production can be attributed to low and or non-adoption of sunflower technologies. Little has been done to understand the adoption of better technologies by sunflower farmers and problems encountered in the adoption. There is a need to fill this gap by assessing the adoption behaviour of sunflower farmers to help improve production. Therefore this study focuses on assessing the factors that affect adoption of sunflower technologies in Northern Uganda.

1.3: Objectives of the Study

1.3.1 Main Objective

The major objective of the study is to assess the factors that affect adoption of sunflower technologies in Northern Uganda. Specific objectives are:

1.3.2 Specific Objectives

The specific objectives of this study were:

(i) To examine factors that affect adoption of sunflower technologies in Northern Uganda; and

(ii) To examine adoption level of sunflower farming technologies in Northern Uganda.

1.4 Research questions

- What factors affect adoption of sunflower technologies?
- How do farmers adopt sunflower farming skills and practices?

1.5 Justification

This study aimed at assessing the factors that affect adoption of sunflower farming technologies in the study area. By identifying the factors that influence sunflower farming technology adoption, this study will provide useful knowledge to farm organizations, policy makers and other stakeholders. The added knowledge will help them make decisions on how to encourage farming technology adoption. This will help to increase sunflower production; hence, poverty reduction.

Furthermore, this study will enable aBi Trust to understand the effectiveness of its support in improving sunflower production. Moreover, the findings will help aBi to identify forces and constraints that enhance farmers to adopt farming technologies and make an informed decision.

2. Literature Review

2.1 Theoretical models used in adoption studies

The different theoretical models of adoption show that observed diffusion patterns depend critically on complicated (and sometimes un-observable) relationships between different elements such as the risks associated with various technologies, the nature of farmers attitudes to risks, the existence of fixed adoption costs (either actual or imputed) and the availability of cash resources. Similar innovations may therefore experience different adoption patterns in different areas and by different groups of farmers. Specifically, the relationship between farm size and adoption can take different shapes due to a host of factors.

Clustered adoption theory assumes that decision makers are willing to collect more information over time and utilize all available information efficiently before making a technology adoption decision. So firms of any size can adopt the technology whenever they feel the technology is worth adopting, i.e., whenever they think the benefits would outweigh the costs. Furthermore, firms of all size categories can be found in each region. If large and small firms tend to cluster by region, then it will be difficult to expect that they will also cluster by size. It suggests that a positive economic condition eases and accelerates technology adoption decision making **(**Au *et al.,* 2006).

It is necessary to treat adoption as a process involving acquisition of information and learning. Adoption innovation shows two distinct approaches to modelling this process. The first is to model the adoption decision of individuals over time by the inter-temporal changes in certain explanatory variables. For innovations that are "divisible" (e.g. a new crop) and can be adopted in a stepwise manner, the adoption decision also involves a decision regarding the intensity of adoption at any given time period along the adoption time path (Marra *et al.,* 2001).

Measures of adoption may indicate both the timing and extent of new technology utilization by individuals. Adoption behaviour may be depicted by more than one variable. It may be depicted by a discrete choice, whether or not to utilize an innovation, or by a continuous variable that indicates to what extent a divisible innovation is used. For example, one measure of the adoption of a high-yield seed variety by a farmer is a discrete variable denoting if this variety is being used by a farmer at a certain time; another measure is what percent of the farmer's land is planted with this variety (Sunding and Zilberman, 2000)

Adoption of agriculture technologies plays a greater role in economic development. However, adoption of technology cannot take place at once but it needs time. The duration of technology vary among economic units regions and attributes of the technology itself, (Abera, 2008)

According to Feder *et al.,* (1985) individual (farm level) adoption and aggregate adoption should be separated. Adoption at the individual farmer's level was defined as the degree of use of a new technology in long-run equilibrium when the farmer has full information about the new technology and its potential. The aggregate adoption was defined as the process of spread of a new technology within a region. This is measured by the aggregate level of use of a specific new technology within a given geographical area or within a given population.

However, distinction needs to be drawn between new technologies which are divisible (e.g. High yield varieties and fertilizers) and non-divisible (e.g. harvesters and tractors). Divisible technology adoption intensity can be measured at the individual farm level in a given time period by the amount or share of farm area utilizing the technology or by the per hectare quantity of input used where applicable. Analogous measures may apply at the aggregate level for a region. Non divisible technology adoption intensity in a given period is necessarily dichotomous (use or no use); but, in the aggregate, the measure becomes continuous. This can be measured by calculating percentage of farmers using a particular technology (Feder *et al.,* 1985).

In most cases, agricultural technologies are introduced in packages that include several components, for example, high-yielding varieties (HYV), fertilizers, and corresponding land preparation practices. Farmers' level of education, land, land tenure, income, credit, source of information, participation in extension activities, extension office visits, and membership in farmers organization are factors relating to farmers adoption of practices, (Mendis and Udomsade, 2005; Uaiene, 2011). This is also affected by high cost of fertilizers and agro chemicals, high prices and lack of quality seeds, irrigation and drainage problems, shortage of labour and high rates of labour, cultivation problems, lack of suitable varieties and credit.

2.2 Factors which affect adoption of new agricultural technologies

According to (Kaliba *et al.,* 2000; Degu *et al.,* 2000; Uaiene, 2011) access to credit appears to be one of the major constraints to adopting farming technology. Few farmers who obtained credit did so through the informal sector and used the money mainly to purchase farm inputs such as fertilizer and pesticides. Farmers' inability to obtain credit from the formal sector is attributed to lack of knowledge about the formal credit system and the bureaucratic process for obtaining loans.

Farmers adopts innovations like application of inorganic fertilizer, use of improved seeds, use of double strand and recommended spacing in sunflower farming. Factors such as farming experience, frequency of contacting extension officer, family size, availability of sunflower market, and respondent's education level significantly influenced the adoption of sunflower farming innovations, (Liberio, 2012). Furthermore, Egge *et al.,* (2012) contends that younger, educated farmers are more likely to adopt a new technology as they are more optimistic and are greater risk takers than older farmers. Younger household heads are more flexible and hence likely to adopt new technologies.

More educated farmers are typically assumed to be better able to process information and search for appropriate technologies to alleviate their production constraints. The belief is that education gives farmers the ability to perceive, interpret and respond to new information much faster than their counterparts without education, (Uaiene, 2011). Paxton *et al.,* (2010) found that number of precision agriculture technologies employed by producers is positively correlated with the educational level of the producer. Better educated producers adopt a larger number of precision agriculture technologies. Furthermore farmers possessing a high level of knowledge adopted the package technologies more than farmers with medium and low level of knowledge (Win *et al*, 2009). Extension activities such as individual farm and home visits and group contact methods are effective in helping farmers to adopt the technologies.

Adoption of improved fertilizer is positively associated with land endowments, ethnic affiliations and consultative norms, the adoption of improved seeds, the availability of credit and extension services, (Ishamu, 2000). Furthermore Asfaw *et al.,* (2011) argued that knowledge of existing varieties, perception about the attributes of improved varieties, household wealth (livestock and land) and availability of active labour-force are major determinants for adoption of improved technologies.

According to (Liberio, 2012; Egge *et al.,* 2012) availability of sunflower market of sunflower market facilitates dissemination of agricultural technologies information hence adoption of sunflower farming innovations. Distance to market is plays an important role in technology adoption. Input and output markets are also known to influence the adoption of improved agricultural technologies, (Uaiene, 2011). Sunflower farmers who are near to the market or have access to the market are likely to adopt new technologies. Information can be disseminated through radio, TV and extension officers.

Men are most likely to adopt new technologies, particularly chemical inputs and animal traction than female (Uaiene 2011). Farming activities including planting, fertilizer application, weeding, insecticide application, harvesting, and processing are mainly carried out by men (Degu *et al.,* 2000). Men spent more time doing farming activities while women are involved in few post-harvest activities such as drying and storing.

3. Methodology

3.1 Research Design

The research design for this study was cross-sectional where data was collected at a single point in time. This design also made it possible to examine relationship between variables

3.2 Description of Study Area

The study was conducted in Kitgum and Apac districts in Northern Uganda. Kitgum district is located between longitude 32^0E, and 34^0E, latitude 03^0N and 04^0 N in Northern Uganda bordered by South Sudan to the north, Kaabong district to the east, Kotodo district to the southeast, Agago district to the south, Pader district to the southwest and Lamwo district to the northwest. According to the Ugandan national census of 2002, Kitgum district had a population of 167,030 with annual population growth rate estimated at 4.1 percent. Kitgum District has dry and rainy seasons. The district receives average annual rainfall of 1330mm. Agriculture is the main economic activity including sunflower which is favoured by the climatic condition.

Apac district lies between longitudes 32° E and 34° E and latitudes 2° N and 3° N in Northern Uganda bordered by Kole and Oyam districts to the north, Lira district to the northeast, Dokolo district to the east, Amolatar district to the south, Nakasongola district to the southwest and Kiryandongo district to the west. According to the national census of 2002 population of the district was 249,656 with a population growth rate of 3.5 percent. Agriculture is the main economic activity. The soil of Apac is a reddish-brown layer of clay loam which covers almost all cultivable land and is very suitable for rain-fed agriculture.

These districts were selected because they are one of the important sun flower producing district in Uganda. Farmers in these districts also get support from aBi to support sunflower production. aBi supports the farmers in these districts through Kitgum District Farmers Association (KDFA) in Kitgum, and Apac District Farmers Association (ADFA) in Apac .

3.3 Sampling Techniques and Sample Size

Purposive sampling was done to select two aBi support partners from both Kitgum and Apac. The selected partners were Kitgum District Farmers Association from Kitgum and Apac District Farmers Association from Apac. From each of the selected aBi partner a list of beneficiaries who grow sunflower was provided and farmers were selected, but care was taken to include both male and female respondents. Forty-three sunflower farmers were selected from Kitgum and 52 from Apac which made a total of 95 sunflower farmers included in this study. In addition of the 95 sunflower farmers, 8 key informants were purposively selected for this study. They included 2 technical staff from partner organisations, 2 extension officers and 4 lead farmers. Therefore, in this study, the main respondents were sunflower farmers, extension officers and the technical staff in the partner organisations.

3.4 Data Collection Techniques

For this study, both secondary and primary data were collected. Qualitative and quantitative data were collected using different tools to meet the study objectives. The study involved interviews, discussions and field observations. Face-to-face interviews with the 95 sampled sunflower farmers were held. The interviews were guided by a structured questionnaire administered by the researcher and enumerators who were trained to carry out the data collection exercise. Discussions were held with key informants of the supported partners. A checklist was used as the data collection tool especially in the discussions with the technical staff. Field observations were important in verifying some of the farmers' responses and whatever the farmers could have not reported in the structured questionnaire was recorded.

3.5 Data Analysis Techniques

To address the study objectives, both regression analysis and descriptive statistics were used in the data analysis. The Tobit model was run to estimate the factors which affect the adoption of technologies promoted among the sunflower farmers. The dependent variable in this model was summation of the technologies which were adopted by a particular farmer, each technology being assigned a value of 1 for those who adopted and a value of zero for the non-adopters of a particular technology. The technologies considered were the use of improved varieties, spacing, disease and pest control, soil and water conservation, weed control, watering, fertilizer use, manure use, harvesting and post-harvest handling. The independent variables which were used in the model and their hypothesized effects are presented in Table 1 below.

Table 1: Independent variables in the Tobit model and their hypothesized effects

Independent variable	**Measure**	**Hypothesized effects**
Gender of the farmer	1=male; 0=Female	+
Land allocated to sunflower	Acres	+
Access to credit	1=access; 0=no access	+
Value of equipment	Only farm equipment, measured in UGX	+

Monthly cash savings	Savings from all income sources, measured in UGX	+
Access to the main road	1= access; 0=no access	+
Access to input sources	1= access; 0=no access	+
Access to market information	1= access; 0=no access	+
Access to agro processing facility	1= access; 0=no access	+

Descriptive statistics were used to describe the socio-economic characteristics of the respondents. Descriptive statistics were also used to address objective two, the level of adoption of sunflower technologies in the districts.

4. Findings and Discussion

4.1 Characteristics of the Sunflower Farmers

Data was collected from both males and females in the study area. Males accounted for 53.7 percent and female 46.3 percent of the sample (Table 2). Responses were thus obtained from all gender, which gives balanced responses. This finding implies that both men and women in Apac and Kitgum are involved in Sun flower production. This however, indicates that men dominated sunflower farming in the study area. The mean farm size holding of the farmers in the two districts was small (6.7 acres). Of the 6.7 acres, only 1.6 acres were allocated to sunflower, a percentage of approximately 24 percent. This depicts that the farm allocated for sunflower is small compared to the total land size and would imply that farmers have other alternative crops where they may focus their attention on the expense of adopting the sunflower technologies.

Findings from the study indicate that 56.8 percent of the farmers have heard of aBi and received support from its partners. Furthermore all farmers who were aware of aBi got the knowledge through farm organizations. Organizations which operate in these districts are the Kitgum District Farmers Association and Apac District Farmers Association. This indicates that aBi through their partners provides support services to the farmers although they are yet to reach all farmers. The finding that aBi has reached to more than 50 percent of the respondents, yet it has been operational in the study area for one year is an indicator of the potential aBi has in promoting sunflower production in the area. However it was revealed that most of the farmers (63 percent) who have heard of aBi their sunflower farms are between 0.5 to 1 acre.

Table 2: Characteristics of Sunflower Farmers in Kitgum and Apac Districts

Farmer characteristics	Detail	Percentage
Gender	Male	53.7
	Female	46.3
Size of land the farmer owns (Acres)	6.75 (8.61)	
Size of land the farmer has put under sun flower (acres)	1.63 (1.10)	
Whether the farmer has heard about aBi	Yes	56.8
Where the farmer heard about aBi	Farmer organization	100

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Access to resources, their availability and use among the farmers was very varied, with some resources well accessed but lacking in some other resources. 93 percent of the farmers (Figure 1) had access to improved seed varieties but only 60 percent of these farmers used the varieties while 40 percent are still using the local seeds. The reasons for not using improved seeds were mainly lack of capital while the seeds are costly. It was also observed that the farmer organizations were important in providing the seed to the farmers. The use of fertilizers, pesticides and herbicides was very limited in the study area, that only less than 5 percent of the respondents used the resources. Their availability was also very low, with less than 10 percent of the farmers having access to any of the fertilizers, herbicides or pesticides. In all cases, lack of capital was mentioned as the main limiting factor in the use of these resources. Therefore, providing farmers with capital can improve on the use of these important agronomic practices. Other reasons that limit the use are that the fertilizers, pesticides and herbicides are costly, they require a lot of labour and that the farmers did not have sufficient knowledge on the use of the technologies (Figure 1).

Figure 1: Farmers with Access to Resources

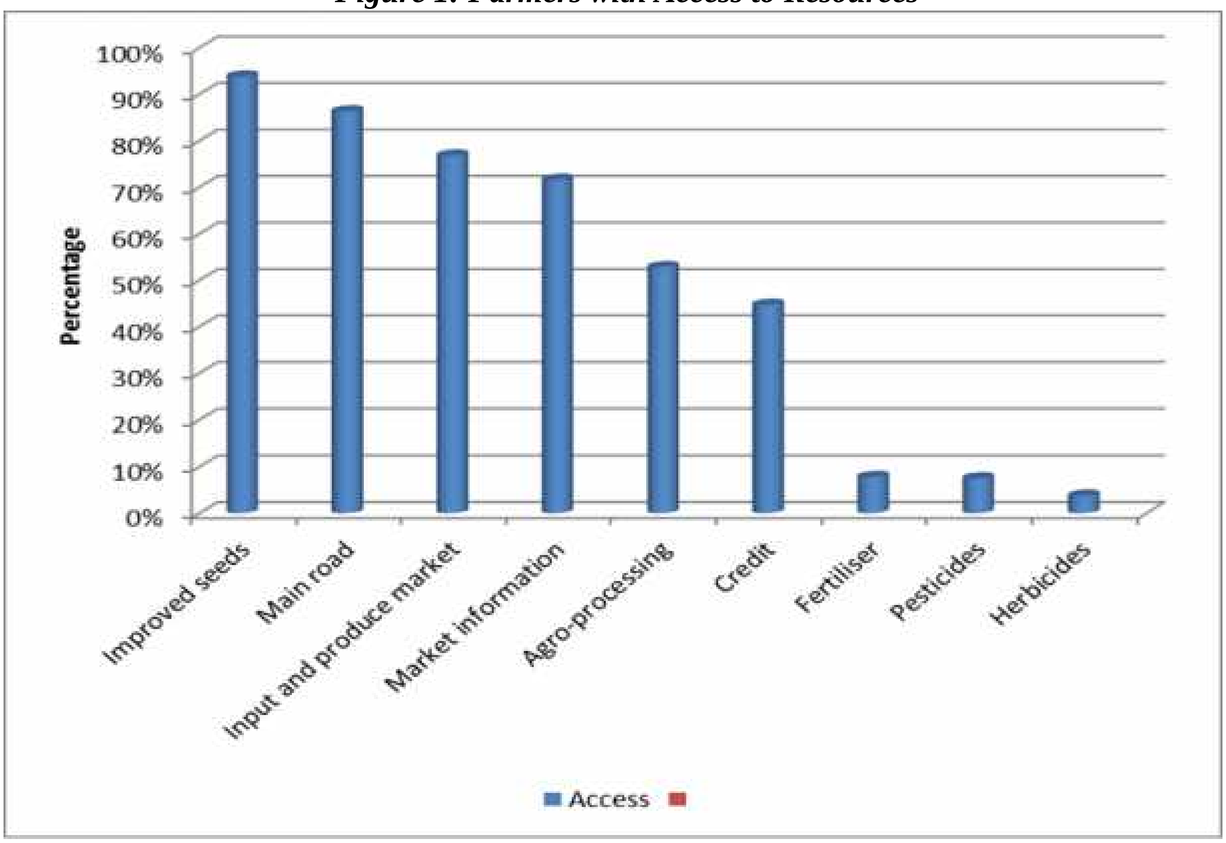
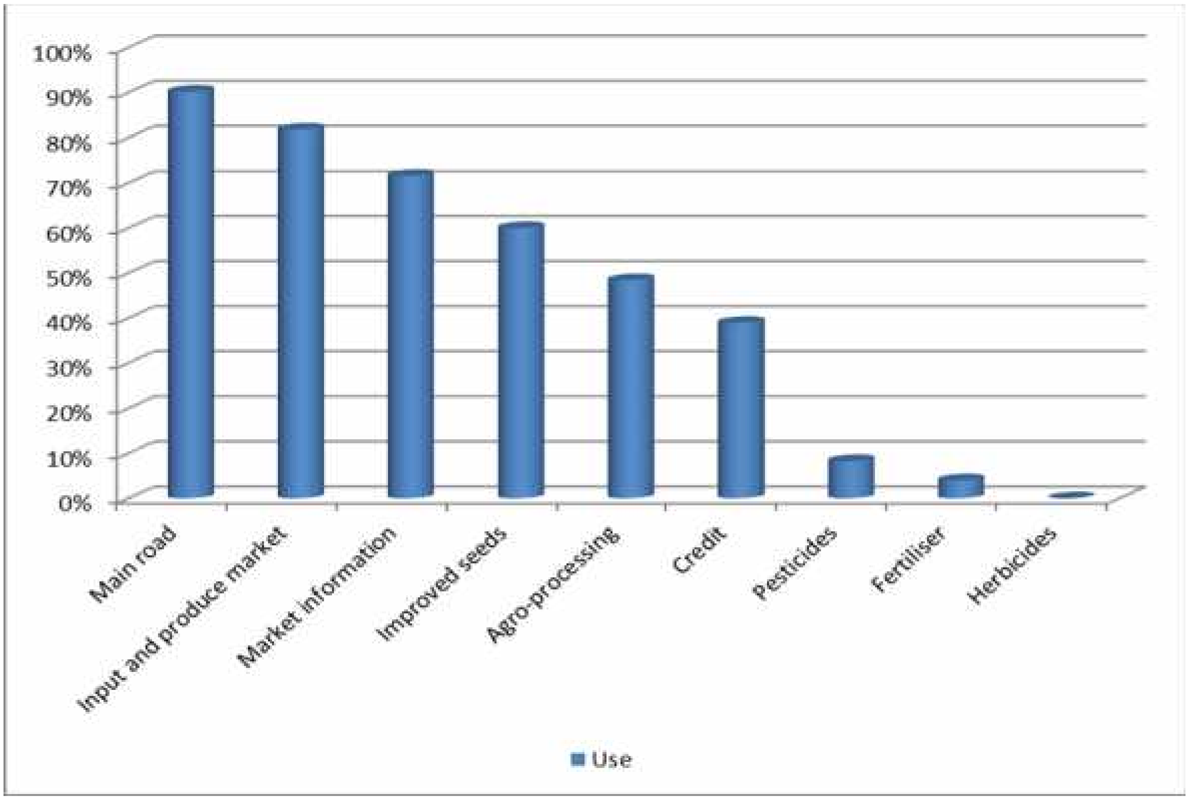


Figure 2: Farmers using the Resources



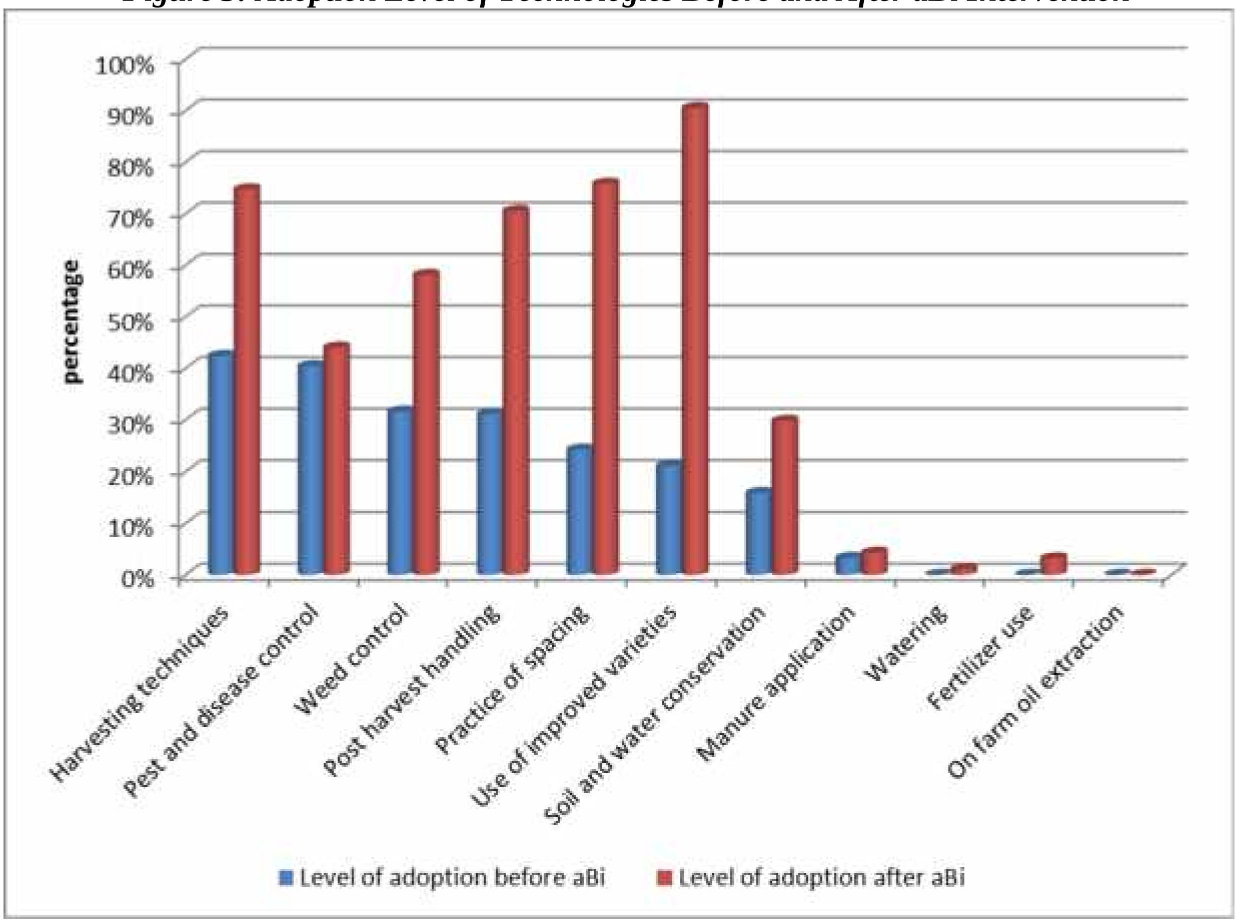
The study established that 44.7 percent of the farmers have access to credit service and only 38 percent of the farmers had used the facility (Figure 2). This shows that the bigger percentage of farmers have not had access to credit in the study area. This credit was mainly used to fund farming activities. The main source was from Savings and Credit Cooperative Societies (SACCOS). Limited access to credit was attributed to various reasons including: non-accessibility of the facility, lack of the knowledge to use the service, discouraged to use it due to the previous experience and lack of collateral (Figure 2).

Agro-processing facilities were available in the study area, as mentioned by 50 percent of the farmers and approximately half of the farmers used this resource. The result shows that sunflower oil can be processed in the area and thus value added to it. Over 80 percent of the farmers had access to the road and input supplies and almost all the farmers who had access to these resources exploited them. Market information was accessible by 68 percent of farmers. Radios remain the most important source of market information, ahead of other sources such as farmer organizations, input traders, television etc. Market information is important for the sun flower farmers because it enables farmers to find the market for their produce and this is more critical for the large processors. Farmers were assured of the market for their produce however the price was low.

4.2 Level of Adoption of Sunflower Technologies

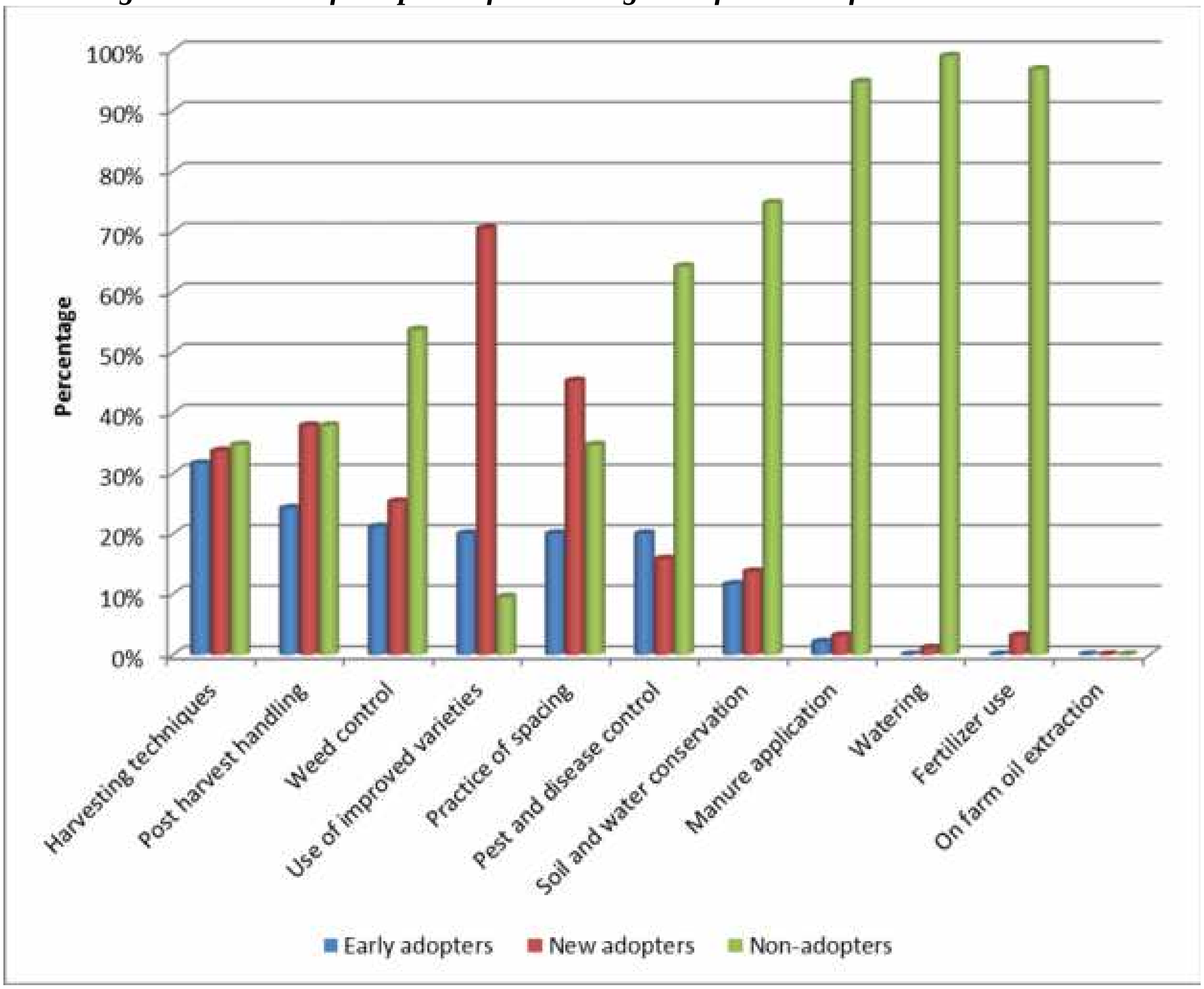
The study done in the two districts of Apac and Kitgum, show that the level of adoption of all technologies before aBi intervention was significantly low compared to the current level of adoption of technologies after aBi intervention. The biggest difference was observed on the use of improved seed varieties, which has led to an increase in the level of adoption from 21.1 percent to 90.5 percent after aBi intervention (Figure 3). A more than 30 percent increase in the level of adoption of technologies after aBi intervention was observed in the practice of spacing, in the harvesting techniques and in the post-harvest handling. For some technologies like watering, manure application, fertilizer use and farm oil extraction, the level of adoption were very low, before and after aBi intervention. Small increments in the level of adoption were observed in the pest and disease control technology, soil and water conservation.

Figure 3: Adoption Level of Technologies Before and After aBi Intervention



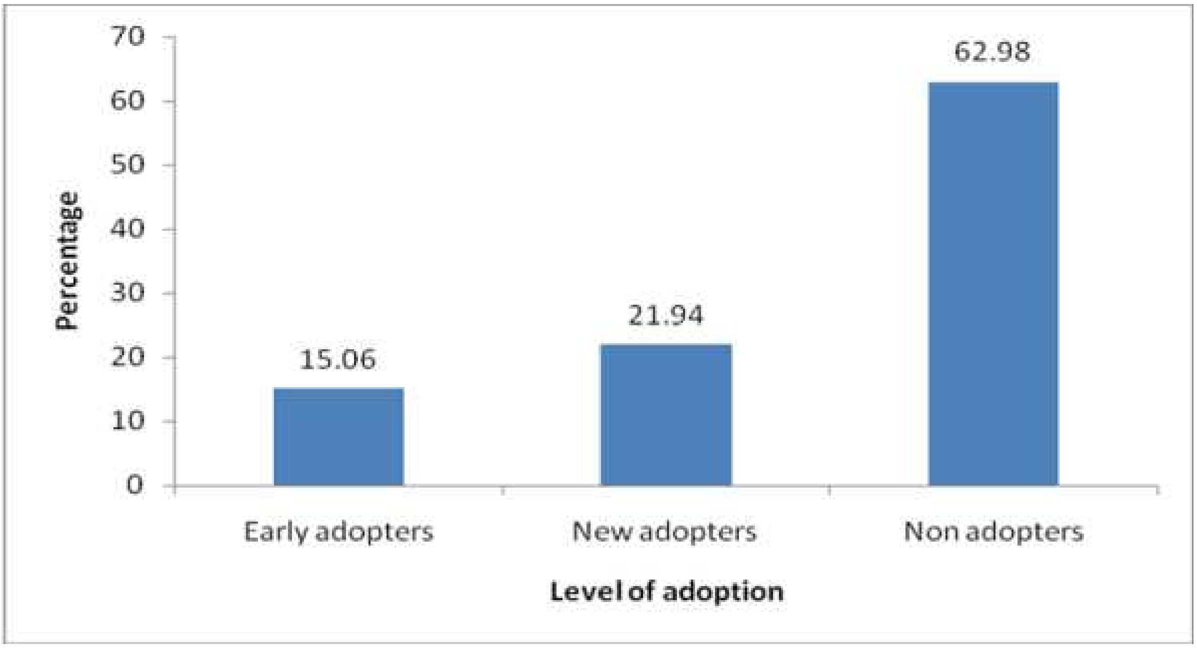
Consequently, new adopters have been observed with the use of improved varieties, in the practice of spacing, harvesting techniques and post-harvest handling (Figure 4). All these techniques do not require very high capital inputs from both the farmers and aBi, although they can bring about significant yield increases. However, technologies like watering, fertilizer use and manure application may require more labour input and capital needs which may be difficult to be met by the farmers or the support organizations, although these technologies may lead to tremendous yield increases.

Figure 4: Nature of Adoption of Technologies Before and After aBi Intervention



Whereas, generally , the level of adoption for all technologies is very low, as seen in Figure 4, where about 63 percent are the non-adopters of the technologies, the proportion of non-adopters is thus significantly high in watering, fertilizer use, manure application, soil and water conservation and pest and disease control (Figure 4). The very low levels of adoption of technologies require adequate efforts from both the farmers and aBi to improve on the sunflower production. Much investment of resources is required for the training of farmers in using the technologies like fertilizer/ manure use, soil and water harvesting. This can also apply to all other technologies farmers had tried to adopt to improve the sunflower production in the district.

Figure 5: Level of Adoption of the Sunflower Technologies



4.3 Factors which Affect the Adoption of Technologies in Sunflower Production in Apac and Kitgum Districts

The Tobit Model results to explain the factors which influence the probability to adopt the sunflower technologies are presented in table 3 below. Gender of the farmer, access to credit, monthly cash savings, access to the input sources and access to the agro processing facility were found to be significant in influencing the probability of adopting the sunflower production technologies.

Results indicate that male farmers are more likely to adopt the sunflower technologies than the female farmers. This is consistency with Uaiene (2011) that males are more likely to adopt improved technology than females. This could be because sunflower is mainly produced for the commercial purposes. Studies have always indicated that men tend to adopt technologies of a particular crop if it is more of the cash value to the households than for family consumption.

Findings from this study also agree with previous study findings that access to credit encourages adoption of new technologies. This is because when farmers have access to credit, they can get resources to buy inputs which are important in the adoption of the technologies. This result therefore points to the need to have more agriculture input outlets in the districts so that many farmers adopt the technologies.

The probability to adopt the technologies also significantly increases with the monthly cash savings, which is used as a proxy for wealth. The finding implies that the wealthier the farmers are, the more they can be able to buy equipment and other resources required for the sunflower production. Wealthy farmers are also able to quickly obtain market information and other necessary information because they have the ability to move and attend meetings and other interactions that may be important to adopting superior technologies. Whereas access to market information was not significant, there was a positive relationship between the market access and probability to adopt the improved technologies.

Access to the agro processing facility was also important factor which affect the adoption of technologies. This could be because when the facility is near the farmers, they can easily market their sunflower and incur less marketing costs to market their produce. This encourages production and the adoption of technologies that can enhance production. The result implies that more processing plants should be set up in the area to ease the burden of walking long distances to market the sunflower. Processing facilities may also offer other services such as training farmers on what to do, both at production, harvesting and post-harvest level which encourages the farmers to access the information and hence adopt the technologies.

Whereas other factors, such as size of land allocated to sunflower, access to the main road and access to the market information were not significant, the sign of the coefficient was positive, which show that these variables may be important in the adoption of the technologies, and should therefore not be neglected.

Table 3: Factors which Affect Adoption of Sunflower Production Technologies

Variable	**Coefficient**	**P-value**
Gender of the farmer	0.486	0.006
Land allocated to sun flower (acres)	0.105	0.185
Access to credit	0.399	0.001
Value of equipment	-2.54 e-07	0.117
Monthly cash savings	4.18e-07	0.077
Access to the main road	0.288	0.356
Access to input sources	0.689	0.009
Access to market information	0.222	0.264
Access to agro processing facility	1.064	0.000
	-0.3823	0.230
Log likelihood = -99.428341, Pseudo R2 = 0.2150;	**Prob chi2 = 0.0000**	

5. Conclusion and Recommendations

5.1 Conclusion

This study examined the factors influencing the adoption of farming technologies by sunflower farmers in northern Uganda. The study involved two districts of Kitgum and Apac where sunflower is among the crops grown in the area. Farmers were selected randomly from the farm organizations which are partnering with aBi Trust.

Gender, access to credit, access to inputs market, access to agro-processing facilities and cash savings are factors influencing technology adoption. Male dominates the sunflower production which is a cash crop and are found quick to adopt than female farmers. Constraints in accessing credit was found to hinder farmers from buying inputs such as seed varieties, pesticides and fertilizers which hinder the increase in yields. The access to agro-processing is a constraint to adopt technology as in its absence farmers are forced to sell unprocessed seeds. By processing their produce they can get oil and other by products like cake which is more profitable. The accessibility of agro-inputs can however be facilitated with the availability of credit.

Farmers with cash savings are likely to adopt farming technology because where the credit is not available savings can be used to finance the working capital. If other factors held constant it is expected that the wealthier the farmer the more the savings. These farmers may use the available savings for accessing required resources from the farm preparation stage to the processing stage.

5.2 Recommendations

Policy makers should put emphasize on making credit available at minimal terms to farmers. This can be achieved by emphasizing financial institutions to provide credit on conditions that are suitable and can be met by farmers. Also policy makers should put emphasize on employing more extension officers to train farmers on the existing technologies and their benefits.

Farm organizations should provide other services including credit, supplying of inputs, providing training on record keeping and financial management instead of concentrating on agricultural training.

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