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Assessment of the strategies of organic fruit production and fruit drying in Uganda

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Abstract

Organic agriculture in Uganda is developing at a fast pace and despite this trend Uganda is still unable to produce enough fresh and dry organic fruits mainly pineapple to meet the exporters demand. This current research investigated the strategies of farmers at production level by assessing the pros and cons of fruit growing, organic agriculture and fruit drying in order to understand the underlying causal factor for the low production of organic dry fruits in a major fruit producing district of Uganda.

The study was carried out in two separate and distinctive areas; one which only produces and export fresh organic pineapple and the other which exports dried fruits (mainly pineapple and papaya). About 10 % of the farmers in the two study areas were surveyed using questionnaires which were further followed by semi-structured interviews and participatory rural appraisals activities with various types of farmers in order to understand the different decisions and strategies of farmers.

82 % and 74 % of farmers in the two study areas grew fruits as it gave better economic returns and for 77 % and 90 % respectively in the two study areas, the reasons for growing fruit was the ease of selling compared to other crops. All the farmers were relying on coffee husk for growing organic pineapples. However, 50 % of the farmers want to grow pineapples (either organic or conventional) but couldn't afford to buy coffee husk. Fruit drying was mainly a strategy to utilize cheap fruits during harvesting seasons for value addition. 71 % and 42 % of farmers in the two study areas wanted to dry fruits but it was beyond their economic capacity to buy the driers.

Decision of the farmers whether to grow fruits or cereals, organic or conventional agriculture and selling the fruits as fresh or dry were dependent mainly on the economic, knowledge and resource availability of each type of practices. It is concluded that the main barrier for an increase in the production of organic dried fruits is at the processing level, and the limited capacity for investments in drying facilities.

Keywords: conventional agriculture, decision, dried fruits, export, household, organic agriculture, coffee husk

1 Introduction

Organic agriculture is developing at a fast pace in Uganda and more investors and exporters are coming on board (Dinah, 2007). Organic production is rarely certified as most of the farmers have not undergone a formal certification process. The major growth factor for organic farming in Uganda is the demand of organic food in industrialized countries and the growing concern among the farmers on maintaining fertility and prevention of degrading land (Yussefi & Willer, 2003).

Opolot *et al.* (2007) described that there is low investment, limited research and inadequate extension services in organic agriculture sector. Other serious hindrances for producing organic fruits are the lacking existence of a formalized land tenure system, high costs for international certification, inadequate documentation, lack of organized smallholder groups for supplying the market demand consistently, poor marketing infrastructure and the inexistence of an explicit organic agriculture policy (Hine & Pretty, 2006).

It was reported by Agona *et al.* (2002) that the total dry fruit output was 90 mt per year and it is believed that only 10-20 % of market demand was met and there is a huge room for growth. Uganda currently exports only 30 mt of dried organic fruits annually (mainly

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apple banana, mango, papaya and pineapple) while the total world demand for dried organic fruit is estimated at 164,000 mt (Tumushabe *et al.*, 2007).

Despite the enormous potential, there is a gap between the production of organic/dry fruits in Uganda and the demand from the market of organic dry fruits. The problem led to the rise of several questions on the imperfections of production systems, farming strategies and value chains which would address this gap.

This paper concentrates on describing the strategies of farmers for producing organic fresh and dry fruits in the Kayunga district of Uganda. To understand the strategies, the following sub-questions need to be answered:

- *Why are farmers in this region interested in fruit production rather than non-fruit production?*
- *Why are farmers practicing organic agriculture (both by default and certified) and not the conventional agriculture?*
- *Why some farmers are drying the fruit while some do not and what are the strategies they used?*

2 Study area

The present study was carried out in Nsotoka and Mataba village under Kayunga Sub County and Kigayaza village and Kangulumira town under Kangulumira sub county of Kayunga district (Fig 1). The first two villages Nsotoka and Mataba were chosen as there were substantial numbers of pineapple (*Ananas comosus*) growers (both certified organic and conventional type) but no fruit driers. Certified organic pineapple farmers (contract farmers for the exporting companies) sell fresh fruits to exporting companies. There were about 400 households in these two villages.

The other village, Kigayaza under Kangulumira Sub County had several organic fruit producers and also fruit driers (processors) in this region. In this sub county alone, there were about 100 registered fruit driers making it the sub county with most fruit driers in Uganda. There were about 420 households in this study area. None of the organic fruit farmers in this sub county sell pineapples or papaya as fresh to exporting companies. Hence the two study areas which were separated by only 22 km; one exporting fresh fruit and the other exporting dry fruits were chosen to identify the strategies of fruit growing and drying in this region of Uganda.

3 Methods

To specifically analyse the strategies of organic fruit farmers and driers, understanding of the perspectives

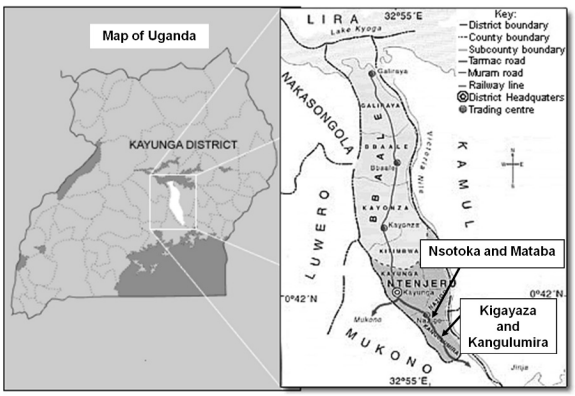

Fig. 1: *Map of Uganda showing the two study areas*

from non fruit farmers and non fruit driers were needed. The strategies of farmers is likely to be related either/or both to the constraints and the advantages of each type of practice. Data needed for analyzing these strategies were collected using questionnaires surveys, in-depth semi-structured interviews, participatory rural appraisals (PRA) techniques and literature reviews. Information gathered from the different methods was triangulated.

3.1 Questionnaire survey

The aim of the questionnaire survey was to obtain a general understanding of the different household characteristics and agricultural activities. The information expected was the size of the household, if it was male- or female headed, the distribution of persons into age-groups and the number of people involved in agricultural activities. Furthermore, it was also to gain information on the incomes and expenditures of the household, the agricultural inputs, the major crops cultivated and the usage of the crops.

To get a description of a representative selection of the village and the agricultural situation, 42 households in Nsotoka and Mataba and 36 households in Kigayaza and Kangulumira were surveyed. The aim was to make sure that all categories of households were represented. The first 30 households in Nsotoka and Mataba were randomly selected by visiting every 10th house. There were very few organic fruit farmers in the sample and therefore, the next 12 households were selected purposively by guidance from the interpreter, to make sure that more households practising organic agriculture were included.

The same sampling procedure was applied to the other study area.

The questionnaire surveys were done by using a premade questionnaire. It was tested with the interpreters and adjusted during the survey process. Every household were marked in the village map to locate the exact

placement in the village and to ensure the possibility of returning to the household for further interviews.

3.2 Semi structured interviews

The interviews were structured by a list of keywords and questions, and the aim was to get a dialogue going to gain as much information as possible. The interviews were carried out in order to get more detailed information from the answers in the questionnaire survey.

On the basis of the questionnaire survey, a total of 39 households in the two study areas were selected (15 and 14 households in the two study area respectively) for semi structured interviews. Most of these represented households growing fresh fruits/vegetables and either practising organic or conventional agriculture.

Additionally, several key informants such as the village chair persons, elder people and extension officer were interviewed to obtain information from community residents who were in a position to know the community as a whole, or give alternative perspectives on agriculture.

3.3 Participatory techniques

Two different participatory activities were carried out with different selected farmers from the village. The participating farmers consisted of both men and women who were selected from the questionnaire survey.

3.4 Matrix ranking of the assets and constraints for organic fruit growing and drying

The aim of this activity was to gain information on the different assets and constraints associated with organic agriculture and fruit drying. The villagers were asked to identify the major advantages and constraints and to rank them individually. Afterwards the ranking of constraints were drawn on a flipchart, a summarized ranking was made and discussed in the group.

3.5 Follow up group discussion

This activity was mainly a group discussion to follow up on the previous activities and get answers to some of the questions that had been raised during the fieldwork. The participants were confronted with several questions, which were then discussed among them.

The data collected were compiled into the MS excel sheet and analysed using simple mathematical calculations. The results were interpreted in the form of graphs and tables.

4 Results and Discussions

4.1 Description of ways of production and strategies in the two study areas

The majority of farmers in the study areas are not specialized farmers and practice multiple-cropping (intercropping) on a small plot of land. The average land holding area of the two study areas are 1.8 hectares (ha) and 1.0 ha respectively. The average land holding area is higher in Nsotoka and Mataba village as there are few large scale farmers who inherited the land from their ancestors who were the native people of the village. While most of the villagers in the other study area, Kigayaza and Kangulumira are immigrants and new settlers in the area; hence no large land holder.

Table 1: *List of the activities carried out in the two study areas.*

	Nsotoka and Mataba	*Kigayaza and Kangulumira*
Total number of households	400	420
No of questionnaires carried out	42	36
No. of interviews carried out	15	14
PRA constraints and assets of fruit growing, organic production and drying of fruits	Yes	Yes

In a typical 0.8 ha of plot with fruits, a farmer would grow 0.4 ha of pineapple (9000-10,000 plants/0.4 ha) intercropped with plantain. On the 0.4 ha, he grows cereals and vegetables for household consumption. Maize is the major cereal along with beans which can be stored for future consumption while tuber crops like cassava, sweet potatoes and yam are grown mainly for direct consumption. On the boundaries or sides of the plot, there are usually some papaya or mango trees. A schematic diagram of the farm strategy of pineapple farmers is shown in Fig 2. Less than 5 % of the farmers grow passion fruit which is intercropped with sweet potatoes or beans. Coffee trees are grown by most farmers in between the cereals or tuber crops. It provides shade to the crops and also cash to the farmer.

Plantain used to be one of the major food crops in this region but has declined over the last 10 years because of banana wilt. According to the farmers, this strategy of growing different crops the small plot of plat is to provide food and cash for the household. Milestad & Darnhofer (2002) even goes further describing that the combination of two or more crops in a plot reduces the impact of crop failure and strengthens ecological resilience.

The reasons and constraints for practicing specific types of farming; fruit or non fruits, organic or conventional agriculture and producing dry or fresh fruits, obtained during the study is described in the following sections.

4.2 Farmers' strategy for growing fruits or vegetables/cereals

Farmers' strategy for growing fruits instead of vegetables/cereals and vice-versa was related to the merits and demerits associated with the growing of fruits and

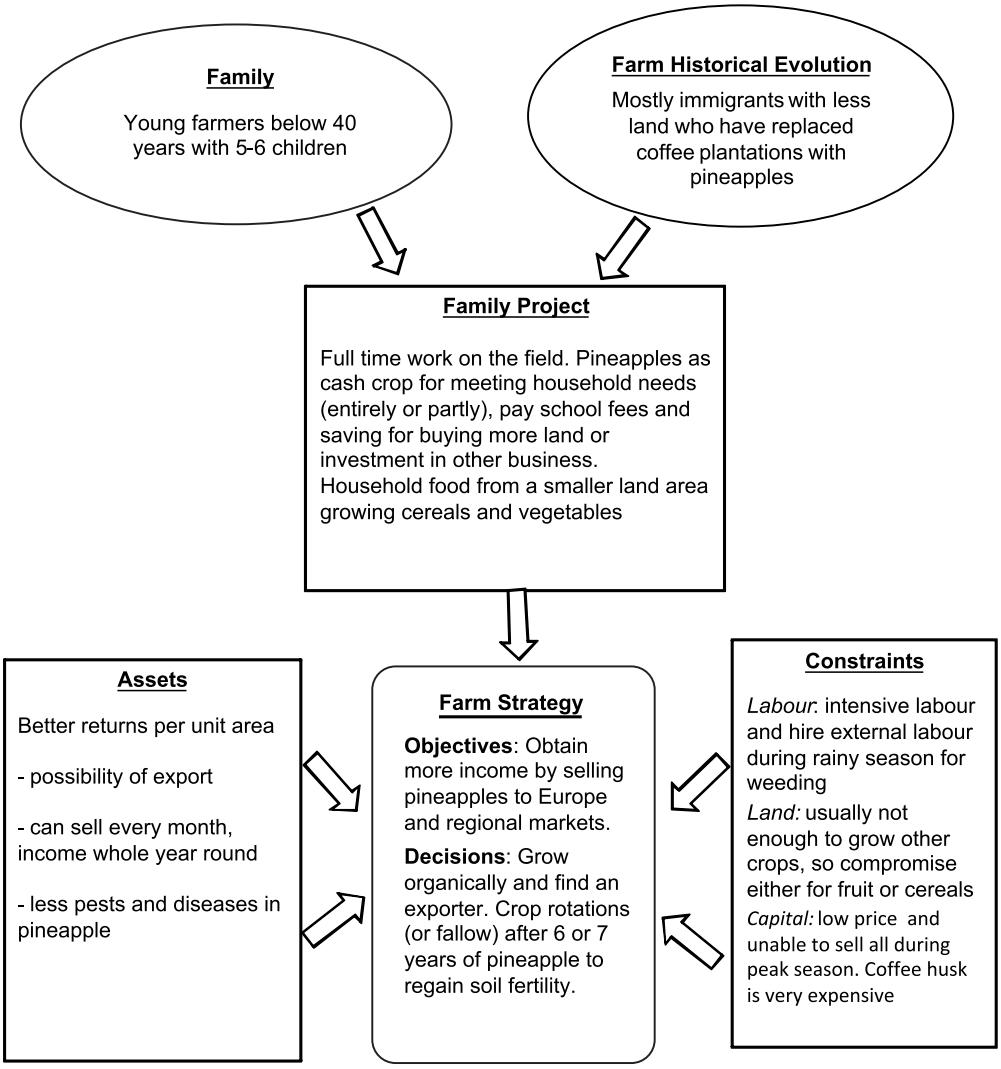

Fig. 2: *General description of farmers growing pineapple and other diversified crops*

non-fruit crops. The reasons for the farmers to pursue either to produce fruits or vegetables are described in the following sub-sections:

4.2.1 Strategies for growing fruits

Jackfruits, mangoes, papayas, passion fruits and pineapples are the major fruits found in the study region. The soil and environmental conditions in the study areas are reported to be favorable for the cultivation of papaya, passion fruit and pineapple. Fruits are grown by 50 % and 72 % of the farmers in the two study areas. Pineapple is the most important fruit followed by papaya and passion fruits in terms of economic value. Jackfruits and mangoes have lesser economical value. About 20 % of farmers in Nstoka are growing organically and export fresh pineapples to Europe while 40 % of farmers in Kigayaza are drying organic pineapples and export to Europe through companies (see Fig 3).

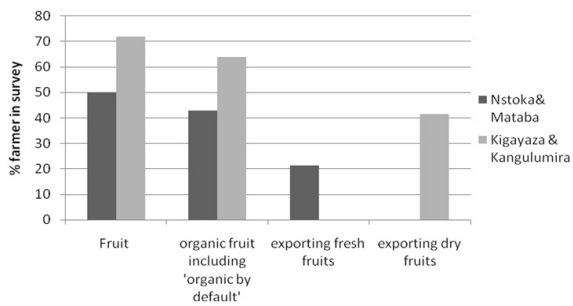

Fig. 3: *Farmers involved in fruit growing and exporting business in the two study areas*

As many as 82 % farmers in Nsotoka grow fruit because it gives better return than other crops while 90 % of farmers in Kigayaza grow fruits mainly because fruits are easier to sell (see Fig 4 A and B).

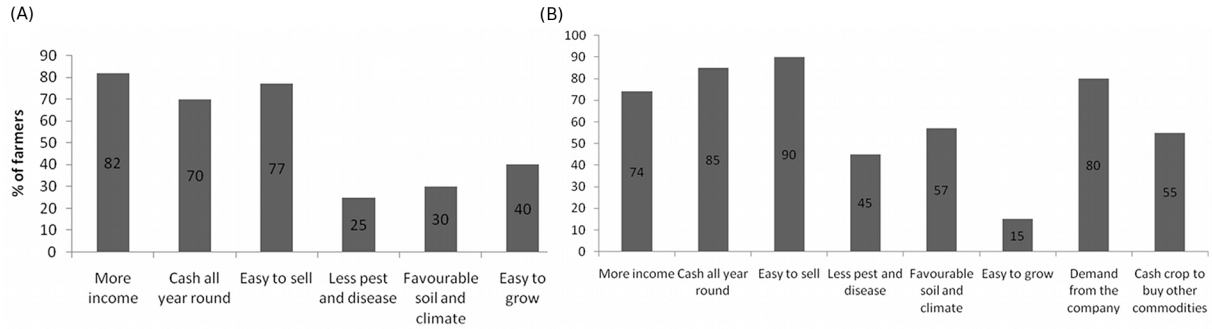

Fig. 4: *The major reasons for growing fruits in the two study areas. (A) Nsotoka and Mataba, (B) Kigayaza and Kangulumira*

The presence of an exporting company close to the region is also an important reason for farmers to grow fruits in Kigayaza and Kangulumira. 80 % of the farmers are growing fruit because there is a stable demand for dry fruits from the company, Fruits of the Nile (FON).

4.2.2 Constraints to fruit growing

Jack fruit, mango and papaya are commonly grown in this region and are difficult to sell in the local market. Only 5 % of the farmers grow passion fruits which are intercropped with cereals. The price of passion fruits varies greatly during different times of the year. During the rainy season (peak season of passion fruits), a sac of about 60 kg would fetch only 1.8 Euros. The fruits cannot not be stored and to sell later during the off season. During off season even though there is demand and high price for passion fruits, the fruit plant bears few fruits. Norman (2003) also pointed out that the lack of adequate processing facilities was limiting the use of non-export grade fruits which may be suitable for processing.

Pineapple is the important cash fruit crop grown by the farmers. However, it is difficult to grow pineapples without inputs specially coffee husk for fertilization, which is very expensive. As indicated by farmers in the interviews, at least 3 Lorries of coffee husk is required for 0.4 ha of pineapple plantation and each lorry cost between 91 – 127 Euros. In a study carried out by Bekunda & Woomer (1996) it was reported that cattle manures and surface mulching with banana trunks and leaves were an important source of organic manure in a banana based cropping system. However, the result of the present study shows that the amount of cattle manure and surface mulching applied is very negligible and always inadequate for a pineapple plantation. All organic pineapple plantations with plantains are fertilized with coffee husk. Mulching materials when applied to the banana or plantain fields gives a better yield and coffee husk significantly improves the yield of fruit crops (Zake *et al.*, 2000).

Pineapple plantations require more labour for weeding or herbicides compared to traditional crops in order to get a good yield. Old age farmers and women find it difficult to manage pineapple plantations without hiring external labour which eventually leads to lesser profit. The price of the pineapple is very low during peak harvesting season (May-June and November) and sometimes even difficult to sell. Pineapples have a short shelf life and cannot be stored without curing.

The farmers also identified that growing pineapple needs good knowledge on the selection of good variety, proper planting and maintenance of the plantation. The thorns from the pineapple plant also made it difficult to work in pineapple plantations. The numbers of professional horticulturists are few in the area and farmers rarely have the opportunity to undergo courses on horticulture which is the reason why horticulture is not well developed in Africa (Norman, 2003).

4.2.3 Strategies for growing vegetables and other crops, especially coffee

Food crops like beans, cassava, maize, sweet potatoes etc. are grown by every household for household consumption in the study areas. These crops can also be exchanged with different vegetables or crops amongst the villagers. Women and old age people are more actively involved in growing these crops. These crops are relatively easier to grow as they have been growing for ages and farmers have a good knowledge about the crop and the cropping system. As economically important horticultural crops such as pineapple are new in the study area, it needs extra expertise and knowledge of specific culture techniques. The present study supports the finding of Norman (2003) that most small scale growers were not conversant with the proper cultural techniques for the production of horticultural crops in Africa.

Food crops require less input and can be grown with less money. Coffee is a cash crop that used to be grown by every farmer in this region. It is still cultivated by many farmers as a cash crop in his/her plot along with other cereals and vegetables. Old people with less energy and women headed household depend more on coffee cultivation as it does not require more physical labour and inputs. Despite the decline in coffee prices and production due to coffee wilt, it continues to provide income to many households. Raw coffee beans

can be sold easily to middleman in the village who buys cheaply at 0.40 Euro/kg.

4.2.4 *Constraints for growing cereals and vegetables*

Cereals, vegetables and cash crops like coffee contribute immensely to the household food and income security. However, there are also certain constraints in growing these crops and this is this reason why many farmers look for other crops or sources of income like fruit growing or drying. For a landless or small holder farmer, it is difficult to obtain higher income by growing cereals like beans, cassava, maize or cash crops like cabbages, coffee or sugarcane. In order for these crops to provide enough income for the family, it needs more land area because the economic and labour productivity per unit area is lesser compared to growing pineapples or other high value crops. Farmers need to buy seeds for many vegetable crops and also chemicals against pests and diseases. These expenditures are expensive for the farmers in the study areas. Prices of these crops in the local market also fluctuate quite often, making farmers feel insecure while growing these crops. In addition, absence of the opportunity for these crops to export (which would give farmers a better price) is also a big constraint for growing cereals and vegetables. Yussefi & Willer (2003) pointed out that traditional crops and forms of production were coming under stress because of increasing size of population. Higher literacy among farmers and more economically profitable crops are needed in Africa.

4.3 *The reasons for practicing organic farming*

The reasons for practicing organic farming (both as certified and default) are also determined by the advantages of organic agriculture over the conventional agriculture. However, majority of the farmers are practicing conventional agriculture and there are also reasons for these farmers to not adopt organic agriculture. This strategy of practicing either organic or conventional agriculture practices is best described while looking into the pros and cons of organic agriculture (in the following sub-sections).

4.3.1 *Strategies for organic farming*

Certified organic farming in this region is usually a contract type of farming operated by organic exporting firms. Agriculture in Uganda has often been described as 'Organic by default' (Kidd *et al.*, 2001). This notion is based on the concept that external input such as agro chemicals are out of reach for the majority of small holders in Uganda. In the two study areas, agricultural chemicals and synthetic fertilizers were introduced quite recently. From the survey, it is recorded that 42 % and 63 % of the farmers in the two study areas are 'organic by default' and have never used any chemicals in the field. Out of this, only 21 % and 33 % respectively are certified organic farmers. The priorities and reasons for being organic are totally different between certified organic farmers and 'organic by default' farmers. According to certified organic farmers, the two most important reasons for growing organically are the premium price they get for organic fruits (~180 %) when selling to export companies and secondly the instructions from the companies to grow organically in order to sell to them. These two reasons are purely for business and economic purpose. An important economic objective which the organic farming has brought about is the increase in income which enables the farmers to save for further investment. Increased saving and buying of land by organic farmers could also potentially affect the existing land renting and tenure system in the village. UNCTAD (2008) in a case study carried out in Uganda also reported that organic price premiums contributed to higher revenues, but their effect was reduced by the fact that a proportion of the organic produce was sold at conventional prices. The augmented cash incomes from organic fruits have enabled households to increase the amount and quality of food purchased in the market.

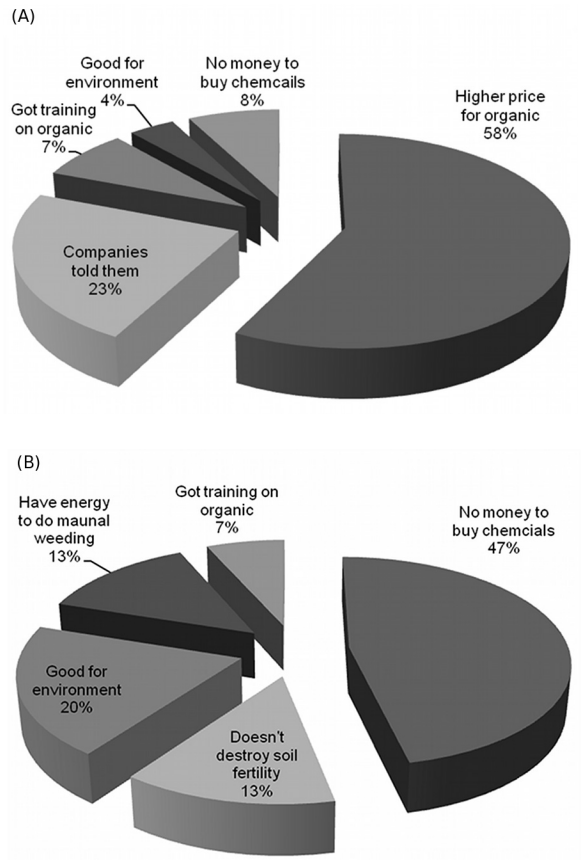

Fig. 5: *The major reasons for practicing organic agriculture by (A) 'organic certified' and (B) 'default organic' farmers*

For 'Organic by default' farmers the main reasons for not using chemicals are: they have no money to buy chemical fertilizers, organic is good for environment and they are young and have energy to do manual weeding. Fig 5 A and B shows the main priorities of these two types of organic farmers. Walaga & Hauser (2005) reported that certified organic agriculture was clearly market orientated while 'organic by default' farmers were lacking access to international organic markets. 'Organic by default' farmers derive food security through subsistence food production by intensifying agriculture whereas certified farmers tend to attain food security by purchasing (economic specialization).

In both the study areas, organic agriculture creates more cohesion among villagers who are in the group of the exporting company. Farmers within a group particularly in the village know each other very well and help each other during times of economic and financial needs. Other farmers also seek advice and suggestions from organic farmers as most of the organic farmers are more literate and knowledgeable. This interaction brings more unity among farmers in the region which is one of the most important social objectives of the farmers. Crucefix (1998) also described social cohesiveness as one of the potential benefits of organic agriculture in developing countries.

In spite of the differences in the main reasons for growing organically between these farmers, almost all the farmers (even the non organic farmers) are of the opinion that organic agriculture is good for environment, it does not destroy soil fertility, good for health, chemicals are expensive and partly also because of some NGOs who are promoting organic agriculture in the village. Hine & Pretty (2006) also reported that organic farming led to improvement of natural environment, increased soil water retention, reduced soil erosion, improved water table, increased soil organic matter and increased agro biodiversity. The international market for organic crops with premium price was an opportunity to increase income. The environmental movement has raised the awareness of organic farming and also to fight soil degradation and erosion (Yussefi & Willer, 2003).

Gibbon & Bolwig (2007) also reported that farmers that were engaged in certified organic farming were earning significantly higher profits than the conventional farmers in Uganda. There were only few organic farmers who were doing contract farming for exporting companies. All the villagers knew that organic pineapple brings more income but because of unaffordability of hiring labour and buying coffee husk, unsuitability of swampy areas for growing pineapples, more labour and skills requirement to meet the company's regulations and limited number of contract farmers were the reasons for many farmers to practice conventional agriculture.

4.3.2 Constraints for organic agriculture

The Participatory Rural Appraisals (PRA) exercise on the ranking of constraints for growing organic fruits in the Nsotoka village indicates that buying coffee husk for growing pineapple is the most important constraint. Coffee husk is considered to be an essential requirement for growing pineapple. It is very expensive and not many farmers can afford to buy it. 50 % of non fruit farmers wanted to grow pineapple but do not have money to buy coffee husk and hence still growing other crops and cereals. Preißel & Reckling (2009) also found out that the organic production in Uganda requires capital for labour and inputs while the income could be expected after one to five years. For the initial resource constraint farmers, this is the main hurdle for the adoption of organic agriculture.

The second biggest constraint is the problem of weeds. In a pineapple farm, removal of unwanted grasses and weeds are necessary so as to get a good harvest. Weeds compete with pineapple for soil nutrients and space which results in smaller sizes pineapples. Some farmers use herbicides to kill the weeds and this method is relatively easier. Farmers apply only two rounds of herbicides in a year and the field is clear of weeds. Spraying herbicides is reported save time as well as money. Organic farmers are facing the problem of excessive weeds. They do manual weeding and this not only takes more time (Hillocks, 2002) but also have to spend more money on hiring labour for weeding. Weeding has to be done every month otherwise the weeds affects the yield of pineapples. These results however contradicts the findings of Hine & Pretty (2006) that organic agriculture methods and technologies were ideally suited for many poor, marginalized small holder farmers in Uganda as it require minimal or no external inputs. The possible explanation by the farmers is that in a pineapple plantation, there is no locally available cheaper substitute for coffee husk and herbicides in order to grow organically. Another problem which farmers encounter in organic agriculture is that the thorns of pineapple plant pricks the worker and many farmers/labourers do not like to do weeding. This prolongs the weeding time and requires hiring specialized labour which needs to be paid more.

The third biggest constraint described by farmers is the absence of niche market and premium price for organic fruits in the local and regional markets. Local consumers prefer larger and cheaper pineapples and are not concerned whether the fruit was organic or not. Organic fruits have the tendency to be smaller compared to the conventional ones (as many farmers could not afford to weed and fertilize) which in turn lead not only to lesser price for organic but also difficulty in selling. Conventional bigger size pineapples out-compete smaller organic pineapples in the local and regional market. Lack of premium price for organic product, mar-

ket demand, accessibility and penetration are the constraints that need to be overcome for the development of organic agriculture Uganda (Naluwairo, 2005). Walaga & Hauser (2005) reported that organic markets was unlikely to grow as fast as it would be necessary to pull large shares of small holders in Uganda into certified export oriented organic production. There was very little consumer awareness in ACP (African, Caribbean and Pacific) countries about the benefits of organic agriculture which constrains the development of viable local organic markets. It implied that, although more farmers were adopting organic agriculture practices, their focus was on exporting to countries in the North (Walaga, 2005).

Only 21.4 % of the fruit growers in Nsotoka and Mataba in the study sample are certified organic and sell fresh pineapple to two exporting companies; *Amfri farms* and *Biofresh*. The companies do not come to buy pineapples frequently and also buy only a small percentage of the pineapples (only small and baby size). Majority of the pineapples are sold in the local market. Although the farm has to be kept organic for these companies, the farmers are selling most of their produce as conventional. There are many willing farmers who would like to grow organically but because of uncertain market and buyers, they are hesitating.

Some of the current organic farmers are even rethinking of switching to conventional farming as the exporting companies are not reliable buyers. There have been instances where these certified organic farmers were caught red handed while using unallowed chemicals by the company and expelled from the company's buyer list. According to his farmers the companies come only once in a year to buy 200 pineapples and he cannot keep the whole farm organic just to sell 200 organic pineapples. This prompted him to cheat the organic requirements and spray chemicals taking into consideration his potential to sell 20,000 pineapples in a year. The same reason was reported by Aigelsperger *et al.* (2007), that a majority of the organic crops in Uganda were sold without a premium to conventional buyers and constant monitoring of farmers was necessary to ensure quality of produce. Additionally, the exporting companies are also not expanding their out growers which make it difficult for many willing farmers to convert to organic. In addition to these constraints, Altieri (2002) pointed out that one of the greatest constraints faced by farmers in organic agriculture was the lack of knowledge, information sources and technical support. Greater government investment in appropriate research and extension service could help overcome these bottlenecks.

Results of the questionnaires survey in Kigayaza and Kangulumira show that there are more farmers involved in organic fruit growing and drying (41 %). Some of the constraints are quite different from the other study area. The reasons being that in Kigayaza there is always a market for the dried organic fruits. FON is willing to buy whatever the farmers produce. It is the farmers who do not want to dry fruits whole year round as selling fresh fruits is more profitable during off season. The organic farmers also want premium price for organic dried fruits as it involves extra labour and time. Price is the biggest constraint in this study area with 68 % of the farmers reporting it as the biggest constraint (see Fig 6). Farmers are willing to grow and dry pineapples in all seasons if the company offers them a favorable price.

(A)

Constraints	*Rank*
Hiring labour for weeding	2
Buying Coffee husk is expensive	1
More time needed for weeding than using herbicides	5
No organic niche market	4
Pineapple thorns pricking while weeding	8
No premium price for organic fruits in local market	3
Pest and disease problem	9
Cannot substitute cereals/other crops for family consumption	6
Companies do not often come to buy organic	7

(B)

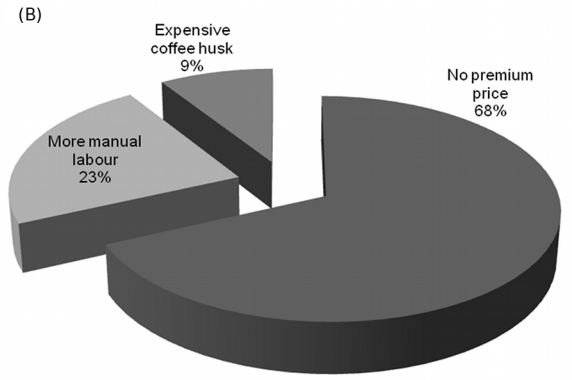

Fig. 6: *Constraints for organic fruit growing in the two study areas.*
(A) Results of the PRA exercise in Nsotoka village (copied from the chart paper) on the constraints of organic fruit growing carried out by 6 farmers (4 men and 2 women) growing organic/conventional crops and fruits. Farmers were asked to identify the constraints and to rank them according to the severity of the constraints.
(B) Constraints for growing organic pineapples in Kigayaza village (from Questionnaire survey)

Many of the farmers have stopped drying since FON imposed organic regulations to the fruit grower and driers. The answer from these farmers is that FON is not increasing the price for converting their farms to organic and it is not economically viable to grow and dry fruits organically at 1.8 Euros/kg which has been the same for the past 5 years. The farmers want the price to double in order to grow and dry the fruits organically.

4.4 Advantages and disadvantages of fruit drying over fresh fruits

Many farmers prefer to sell their fruits as fresh in the local and regional markets while some farmers prefer to dry and sell to exporting companies. This decision of the farmers also relates to the advantages and disadvantages of fruit drying over fresh fruits and vice-versa which is described in the following sub-sections.

4.4.1 Strategies for fruit drying

There are 5 different sizes of pineapple; large, medium, small, baby and egg. Large and medium size pineapple has market in all seasons in regional and local market. However, the price of these fluctuates in different seasons. Baby and egg size pineapples are not preferred by the buyers in local and regional market. These small size pineapples are difficult to sell and especially during pineapple season, they do not have any markets. Many of the driers took this advantage and dry the small, baby and egg size pineapples. Farmers having drier use all the small and egg size pineapples from his field and also buys from other farmers cheaply for drying. Hence, the small and egg size pineapple are used for drying in most part of the year. During peak season when pineapples were plenty and cheap, even the large and medium size pineapples are dried. The pineapples are not only very cheap but sometimes the market for fresh pineapple is saturated and farmers cannot sell the pineapples. Norman (2003) reported that the lack of assured markets affects production of fruits considerably in Africa and when there is a bumper crop; growers find it difficult to sell their produce. However, during off seasons, all the farmers prefer to sell the large and medium size as fresh to regional and local markets as it is more profitable. Fig 7 shows the benefits of drying fruit.

As mentioned earlier, prices and demands for pineapples varies greatly during different seasons, drying of fruit is one of the strategy whereby farmers get a constant and stable price throughout the year. In addition the dried fruit is always sold easily and readily to the company.

For 45 % of farmers, drying is also a value addition and they get more profit than selling as fresh.

Another strategy for fruit drying is that during peak pineapple season, it can be dried in bulk quantities and store for months. During times when they need money for school fees or household needs, the dried fruits can be taken and sell to the company. FON readily buys whenever and whatever amount of dry fruits the farmers brings to them.

Women particularly are very active in fruit drying business while their male counterparts work in the field and grew fruits or cereals. In this study, 53 % of women and 74 % older people (above 40 years) are involved in the drying of fruits. A study carried out by Hine & Pretty (2006), in the Iganga district of Uganda revealed that gender equity was a serious limitation to organic agriculture development in Uganda and affects labour deployment and allocation of resources. That study however did not look into the gender roles in organic agriculture and drying of fruits. The present study shows that drying of fruits is a good example of division of labour in the family where women and older people with lesser strength and energy take up this work during leisure time to earn additional income while staying at home. Some men are of the opinion that cutting and slicing of fruits is a women's work and drying is one of the activity that reduces the dependence of women on men for money. Drying also empowers women economically. The money earned from drying is mostly managed by the women as land is owned by males and income from other agricultural activities goes to the pocket of men.

4.4.2 Constraints for fruit drying

The major constraints identified in the two study areas are the lack of drier, seasonality, low price, unfavourable weather conditions etc. However, while calculating the biggest constraint from fruit growers of the two study areas, 19 % of farmers in Nsotoka and Mataba states that there is no buyer (company) for dried fruits in the village and hence they are not drying fruits. This is not a constraint in the other study area as the company, FON buys the dried fruits. Even with a distance of only 22 km between the two study areas, FON is not reaching Nsotoka to buy dry fruits. For 42 % of the farmers in Kigayaza and Kangulumira and 71 % of farmers in Nsotoka and Mataba village, unaffordability of the drier is the biggest constraint for fruit drying. FON is helping farmers in buying or financing driers in Kigayaza and Kangulumira, which is why lesser percentage (42 %) of farmers thinks that buying drier is the biggest constraint (Figure 8). Walaga (2005) also reported that fruit processing (solar drying) and packaging in Uganda was constrained by the lack of suitable technologies.

Weather conditions are very important for drying fruits using simple solar driers. Cloudy and rainy weather affects fruit drying. Drying technology was one major factor limiting the output of dry fruits (Agona *et al.*, 2002). Another important constraint pointed out by farmers in Kigayaza and Kangulumira is the profitability of fruit drying. The price per kilogram of dried fruits has been the same for the last 5 years while the price of other essential commodities has sky rocketed.

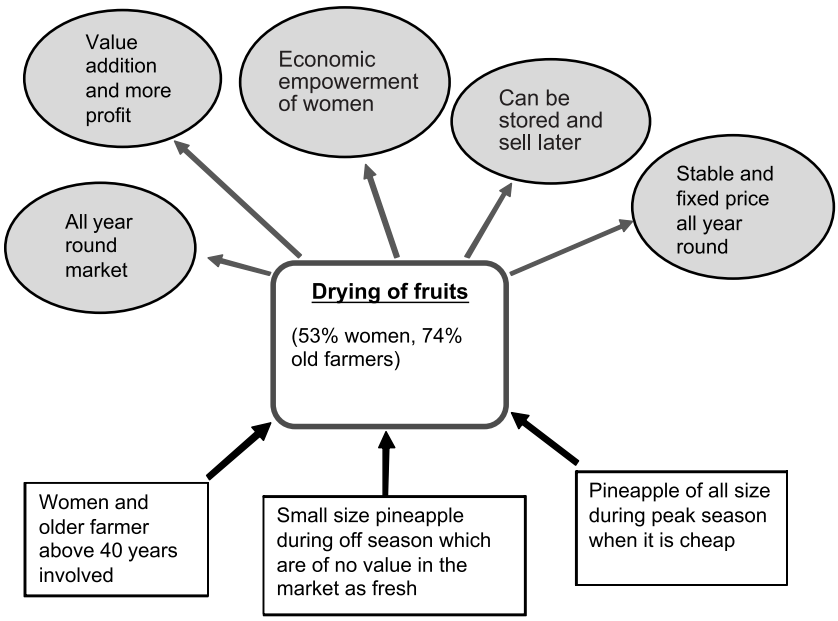

Fig. 7: *Reasons for drying fruits*

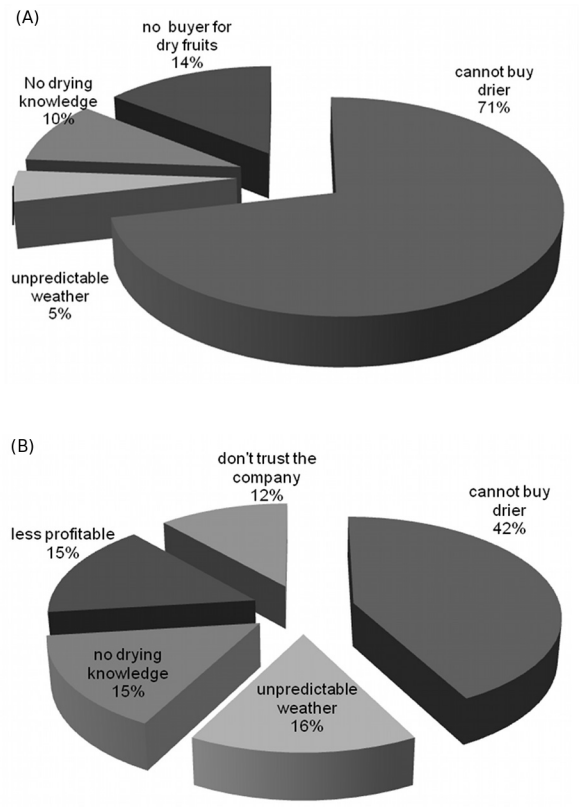

Fig. 8: *The major constraints for fruit drying in the two study areas. (A) Nsotoka and Mataba, (B) Kigayaza and Kangulumira*

At the present price of 1.8 Euros/kg of dried pineapple, 1.2 Euros/kg of papaya and 1.5 Euros/kg of jack fruit, the profit margin is very less. It is not worthy to dry fruits throughout the year as selling fresh during off-season is more profitable. Since the last 2 years, FON instructed that all the dried fruits have to be organic. On the other hand, farmers are complaining that they are not being paid premium for being organic despite more manual labour and money required for weeding instead of using herbicides. UNCTAD (2008) reported that the small holder farmers might not reap the full benefits of premiums paid by the end consumers, since the international trading company, the local exporter or the importer may take most or entire premium.

12 % of fruit farmers and driers in Kigayaza and Kangulumira feel that FON is playing a monopolistic game and exploiting famers by giving low price for the dry fruits. There is no other company to compete with FON in this region and hence the farmers have to accept to what FON offers. Moreover, when FON give the driers to farmers in the form of loans, farmers are not aware of the current price of the driers in the market. FON charges money every time when the farmer brings dried fruits to sell. These are the reasons why they do not trust the company. On several occasions, the company also rejects dry fruits on the ground that it is of poor quality. Agona *et al.* (2002) pointed out that the processors need continuous training on quality assurance and control, business planning and management in order to be competitive and sustainable.

As stated before, the role of women in decision making for the agriculture and family matters among fruit driers has increased but men still play a dominant role in

a family that sells organic and conventional fresh fruits and cereals.

Last but not the least constraint for drying is that drying takes time and there is a high chance of fruits getting spoiled due to bad weather conditions and can even prolong the drying process. Moreover, farmers do not also get money instantly from fruits and they cannot take small amount of dry fruits to the company as the transportation is expensive. Unpredictable weather patterns and high product losses during drying were two important constraints for dried fruits that Agona *et al.* (2002) identified in Uganda.

5 Conclusions and future outlook

Fruits especially pineapple are grown by young farmers having physical energy for weeding while crops such as cassava, coffee, maize and sugarcane are grown by old age farmers. Intercropping of fruits (papaya and pineapple) with other perennial or seasonal food crops is a classic strategy for increasing and diversifying income and food sources. The higher price of fruits and its relatively higher resistance to diseases and pests convinced many farmers to shift from growing coffee to pineapples. Farmers growing organic fruits and drying have developed a variety of strategies which rely mostly upon market and labour availability. Two important reasons for farmers to practice certified organic farming are the premium price for organic fruits and the strict organic rules imposed by the companies. Organic farming and drying of pineapple is well worth the extra effort because of the income benefits for the household and savings for further investment. Organic farming facilitates more social cohesion among farmer groups and also in the village. Hindrances to the organic sector are the unavailability of cheap substitute for coffee husk for fertilisation and excess labour required for clearing weeds. Fruit drying is a key to economic empowerment of women and a strategy for utilising cheap fruits during harvesting season in this region. The major constraint for increasing the production of organic dried fruits is at the processing level, and the limited capacity for investments in drying facilities. The greatest bottleneck for organic producers lies in getting a consistent and reliable buyer for organic fruits with a premium price. Release of these constraints is very likely to significantly improve both the quality and quantity of organic fruits from Uganda. Furthermore, a premium price and opening of outlets for organic products in the local and the regional markets could potentially increase the production of organic fruits.

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