

COMMITTEE ON COMMODITY PROBLEMS

**INTERGOVERNMENTAL GROUP ON BANANAS AND
TROPICAL FRUITS**

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**ECONOMIC SIGNIFICANCE OF BANANA VARIETIES OTHER THAN
CAVENDISH – UGANDA CASE STUDY¹**

¹ Paper prepared by Bioversity International, in collaboration with the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and the International Institute of Tropical Agriculture (IITA).

Case study

Economic significance of banana varieties other than Cavendish in Uganda

Part 1: Country report

Part 2: Banana production in Uganda: Area information from BOAP and statistics from FAO, CIRAD and UBOS

Part 3: Country factsheet

Part 1. Report on economic significance of banana varieties other than Cavendish in Uganda

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Background

The East African plateau is home to a unique banana subgroup (*Musa*-AAA) known as Lugira-Mutika (Simmonds 1966²) or the East African highland bananas (EAHB) (Karamura et al. 1999). The subgroup is grown in a number of countries to the north and west of Lake Victoria, including Uganda, Kenya, Tanzania, Rwanda, Burundi and the Democratic Republic of Congo. The region is recognized as a secondary centre of diversity for the crop (the presumed primary centre being the Indo-Malaysian region in Asia) and is one of the largest producers and consumers of bananas in the world, with Uganda producing about 60% of the region's banana annual output. Depending on the cultivar, these bananas are consumed as a staple food (locally known as Matooke), as a beverage (banana beer, juice or banana gin), as a diversity of confectionaries (cakes, crisps, bread, solar dried figs, chips, etc) and may be roasted or fried and consumed as snack meals. Different cultivars of the subgroup are used to prepare different products. The EAHB are cooked when still green and should not be confused with the ABB cooking bananas which are cooked when ripe.

Other bananas grown in Uganda include bananas which have been introduced from other regions of the world and a number of recently bred hybrids developed by breeders at FHIA in Honduras, IITA in Nigeria and NARO in Uganda. These "exotic" bananas include beer and dessert bananas of AB genome (Ney Poovan subgroup), AAB genome (Kamaramasenge, Silk, Mysore and Prata subgroups), ABB genome (Pisang Awak, Bluggoe and Monthan subgroups) and AAA genome (Gros Michel, Green Red, Red, Ibota and Cavendish subgroups), the roasting bananas of AAB genome (plantain subgroup) as well

² See CRS document, Annex 2 for detailed list of references

as some tetraploids (AAAA, AABB and AAAB). Table 1 summarises the general classification of bananas, genome groups and their uses in Uganda, while Table 2 and 3 provide the most widely cultivated and used genotypes in the country.

A number of factors can be attributed to the importance of these listed cultivars which may include their use as food, cash crops in local and export markets, medicinal and cultural attachments as well as many other socio-cultural values. In the following text, the economic importance of the EAHB (with no special reference to any cultivar), Sukali Ndiizi, Bogoya (Gros Michel) and plantains (also with no special reference to any particular cultivar) are discussed.

Table 1. Classification of bananas and their uses in Uganda (after Edmeades et al. 2006b).

Genome group	Type	Use
AAA	EAHB - Matooke	Cooking
	EAHB - Mbidde	Beer
	Introduced varieties	Dessert
AAB	Plantain	Roasting
ABB, AB	Introduced varieties	Beer
AABB, AAAA, AAAB	Hybrids	Multipurpose

Table 2. Most widely grown banana cultivars in Uganda, by percentage of households (Edmeades et al. 2006b).

Cultivar name	Genome	Use group	Percent of households
Sukali Ndiizi	AAB	Dessert	60.74
Nakitembe	AAA-EA	Cooking	57.83
Nakabululu	AAA-EA	Cooking	43.52
Bogoya	AAA	Dessert	41.01
Mbwazirume	AAA-EA	Cooking	37.33
Musakala	AAA-EA	Cooking	32.88
Kibuzi	AAA-EA	Cooking	32.50
Kisubi	AB	Beer	28.43
Ndyabalangira	AAA-EA	Cooking	25.73
Nabusa	AAA-EA	Cooking	22.63

Table 3. Most widely grown banana cultivars in Uganda, by percentage of mats (Edmeades et al. 2006b).

Cultivar name	Genome	Use group	Percent of mats
Nakitembe	AAA-EA	Cooking	9.18
Sukali Ndiizi	AAB	Dessert	6.71
Nakabululu	AAA-EA	Cooking	6.39
Kibuzi	AAA-EA	Cooking	6.38
Nabusa	AAA-EA	Cooking	6.04
Mbwazirume	AAA-EA	Cooking	4.92
Mbidde	AAA-EA	Beer	4.79
Musakala	AAA-EA	Cooking	4.30
Musa	ABB	Beer	4.07
Kayinja	ABB	Beer	4.04

The East African highland bananas (AAA-EA)

Economic and food security role

In Uganda, the EAHB are the most extensively grown subgroup and most important in terms of food security, annual production, employment prospects and environmental conservation. They occupy more than 1.8 million hectares, equivalent to 38% of Uganda's arable land. Annual production is currently estimated at 10 million tonnes, accounting for about 15% of total world banana/plantain production output (NARO 2006). The crop is grown by about 75% of the farmers and is a staple to an estimated 10 million Ugandans, with 66% of the country's urban population depending on it. Within the economy, bananas are considered a key component of sustainable agricultural development in densely populated high rainfall zones, where they reduce soil erosion and act as an important source of mulch for maintaining and improving soil fertility. The crop ensures income to the farmer throughout the year, provides feeds for animals and plays a key role as a food import substitution. The mature fruits of the cooking types are harvested when green, peeled, boiled or steamed and can be mashed before eating. A number of genotypes are widely grown and sold to markets (Tables 2 and 3). The brewing bananas (Mbidde) are EAHB which have mutated to contain more tannin in their fruits than the green-cooking types and hence cannot be used for cooking because they have a bitter taste. The beer banana fruit is harvested when mature, ripened and squeezed to produce juice that is fermented (with sorghum) to make beer. Other beer-producing bananas, that are not EAHB, are the small-fruited types of the AB genome group (Ney Poovan subgroup), commonly called Kisubi or Gisubi in the region and the ABB Pisang Awak subgroup (Kayinja and Musa).

Key production constraints

Soil fertility

Bananas remove large amounts of soil nutrients with the harvest of the fruit bunch. Lack of nutrient replenishment can lead to a non-sustainable situation reducing yields and productive life. Studies exploring the shifts in Ugandan production found Magnesium as a key constraint with Nitrogen and Potassium deficient on most farms in central Uganda. A similar trend is developing in southwest Uganda (Gold et al. 1999).

Pests and diseases

Weevils are commonly seen as the most devastating pests of bananas and are considered the most economically important pest in the EAHB plantations. Other banana types (Cavendish, beer and Bogoya) appear less susceptible to weevil attack. Reduced levels of Magnesium and Potassium may have weakened resistance to banana weevil (Spilsbury et al. 2002)

Nematodes are an important banana production constraint worldwide. The pest is less easily recognized than the weevil, which is sometimes incorrectly blamed by farmers for nematode damage. This factor may lead to an underestimation of yield loss caused by nematodes.

Black leaf streak/black Sigatoka, an air borne fungal disease, was first reported in Uganda in 1989 when it made an economically important impact by causing incomplete fruit filling. Black leaf streak is considered a key constraint to banana production worldwide and is sensitive to altitude and temperature. Diagnostic survey results show black leaf streak to be absent at elevations above 1450 masl and where mean minimum temperatures lower than 15°C (Tushemereirwe et al. 1993, Mourichon 1997).

In Uganda, Fusarium wilt is prevalent on introduced banana cultivars that are used primarily as dessert bananas (Bogoya, Sukali Ndiizi) and for brewing, e.g. Kayinja (Kangire and Rutherford 2001). Symptoms similar to those of Fusarium wilt have also been observed on EAHB, which have previously been considered to be resistant to the disease (Kangire et al. 2000). Wilt of highland cultivars was only observed in western Uganda at altitudes greater than 1300 masl and mainly within 30 m of homesteads, animal kraals and garbage dumps (Kangire et al. 2000).

Chemicals to manage these pests and diseases are unaffordable to small-scale producers and availability of chemicals is limited in many rural areas. Banana production in Uganda is largely organic with export opportunities seen to exist in this market niche.

Key marketing constraints

Bulkiness and perishability

Bananas have a relatively low value compared to their volume/weight, which influences transportation costs making commodities with higher value but lower volume and/or weight more attractive. Bananas are a perishable crop with limited time between harvest

and the onset of deterioration. This perishability and bulkiness have led to efforts to reduce bulk and improve storage through drying and alcohol production.

Poor infrastructure

Embrecht et al. (1996) ranked poor infrastructure as the number one constraint limiting market development in the majority of rural areas in Uganda. Uganda currently has some main roads in relatively good condition leading to the southwest and central regions. But the declining yields of plots close to main roads and planting of new areas with poorer transport access will increase the importance of feeder roads that often become impassable in rainy periods.

Security

Traders and brokers entering rural areas are recognised targets for thieves as they carry large amounts of money. A regularly mentioned deterrent to traders is risk of thuggery. Improvements in banking services and associated money transfers are needed to address security problems.

Legal requirements and access to credit

Traders, wholesalers and retailers of bananas and banana products require a trading license from the Kampala City Council (K.C.C.) and a permit from the area local council from where the bananas, waragi or tonto (beer) is purchased. The initial capital required to enter many of the trading roles in the supply chain represents a barrier to entry to those with insufficient funds to make initial investments.

In addition to the above constraints, the following apply to exports.

Air freight cost to European markets

Before the economic crisis, airfreight charges for Entebbe to London were US\$1.50-1.70/kg making Ugandan bananas uncompetitive with other bananas supplying the European market. Sea freight would be cheaper, but research by Merck and Icemark – Africa Ltd suggest transport by sea from Kampala to Felixstowe takes approximately 35 days, which is too long to allow sale in Europe before fruit deterioration begins.

Continuity of supply (market organization)

For export produce targeting retail or supermarket outlets via air freight, there is a need for a regular and reliable flow of produce to meet defined buyer and air carriers' timetable requirements. A need exists for producers to plan ahead to ensure they supply what the market wants in terms of quality and quantity when it is required. For small-scale producers to meet these market requirements, marketing group/co-operative formation is one way of combining and coordinating selling of required volumes. Farmers involved in this planned coordinated marketing will require appropriate capacities that some key informants felt are largely currently absent. Cooperative marketing arrangements have had a poor past record as incentives exist for individuals to sell independently especially at times of high prices. Another alternative would be exporters developing contractual arrangements with large farmers. These people are seen to possess the resources necessary

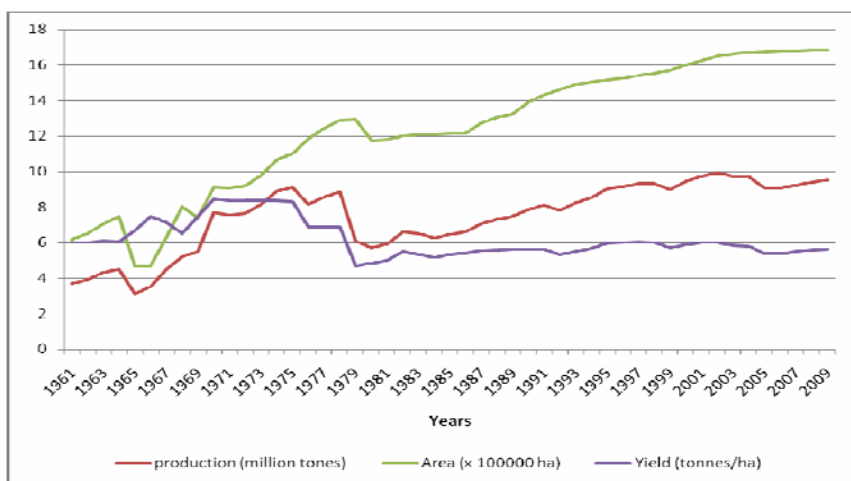
to produce sufficient volumes, the management skills for contractual negotiation and production planning and have incentives to maintain long-term contractual relationships.

Certification for organic produce

To sell organic produce in Europe a certificate of authentication is required. This has a high cost (\$US5000 per farm) and is controlled by European institutions. The process of attaining a certificate can take 1-5 years. The National Organic Agricultural Movement of Uganda (NOGAMU) is currently active in drawing up a Ugandan national standard with local group accreditation to reduce certification costs. A number of exporters currently cover or subsidize farmer's organic certification costs. Depending on which European institution is involved, inspectors may have to visit each farm so that costs rise with the number of farmers.

Growth potential of the EAHB

Population growth rates of 3% for Uganda suggests significant increases in future demand for these bananas (Figure 1).



Source: 'Plantain' data in FAOSTAT 2010, available from URL <http://faostat.fao.org>

Figure 1. Production, area and yield trends of Matooke (EAHB)

Growth in urban demand for bananas has been the driving factor for the expanding market. Increasing potential is also seen for Ugandan exports of Matooke to Rwanda. Data gathered at Katuna border point from January to September 1999 shows 2433 tonnes of Matooke exports crossing to Rwanda. Spilsbury et al. (2002) report volumes of bananas demanded in three main Kampala markets: Kalerwe, Balikudembe (Owino) and Nakawa (Table 4). Main sources of supply to these markets for dessert banana are Mbarara and Mukono districts.

Table 4. Changes in production of Matooke, Bogoya and Ndiizi for the three major markets in Kampala.

Type of bananas	2002		2010	
	Total number of bunches	Total weight (tonnes)	Total number of bunches	Total weight (tonnes)
Matooke	75 282	1 882	99 247	2 481
Bogoya	5 657	141	7 458	186
Sukali Ndiizi	5 384	67	7 098	89
Total	86 323	2 091	113 803	2 756

Source: Spillsbury et al. 2002. Predicted annual volume figure calculations for market turnovers in 2010 are based on 2002 volumes, annual population growth of 3% and an increase in urbanization from 16% to 22% of the population.

Addressing the soil fertility, as well as pests and diseases are essential to ensure long-term production. The first priority should be to guarantee sustainable banana production systems and increase the efficiency of the banana marketing chain from rural production areas to urban consumption zones. The second priority is to capture regional market opportunities that currently appear in Rwanda and Kenya and finally international market opportunities should be addressed. International efforts should be seen as part of general initiative to increase exports of fresh and dried fruit and vegetables particularly to Europe.

Dessert banana - Sukali Ndiizi and Bogoya

Economic and food security role

Sukali Ndiizi (AAB, Kamaramasenge) often called Apple banana in the region, and Bogoya (AAA, Gros Michel) represent the main dessert and commercial bananas in Uganda. They are both widely grown in all banana growing areas of Uganda although on a small scale. While Bogoya is grown within the EAHB systems, Sukali Ndiizi is grown on the fringes of banana gardens as they multiply faster than the local endemic types.

They are also known to stay unripe for a maximum of 21 days from harvest with adequate postharvest management. Sukali Ndiizi represents one of the few cultivars in Kamaramasenge subgroup where most of the clones are small fruited types but have differences in size, compactness of bunch, taste, and probably time of flowering (Onyango 2007). The identification of clones among the Kamaramasenges is therefore very crucial in the developing industry. Both Sukali Ndiizi and Bogoya are mainly for local consumption as dessert fruits in Uganda and East Africa as a whole and they do make a major contribution to the region's economy. Production is by small-scale farmers who benefit from year round income as a result of the year round production. The demand keeps increasing both locally and for export outside East Africa for Sukali Ndiizi and outside Uganda for Bogoya. Small quantities of Sukali Ndiizi are exported to Switzerland, Italy and United Kingdom. Current estimates of Sukali Ndiizi being imported to Europe indicate to

be more than 50 tonnes per week. Kenya exported 16 tonnes of Sukali Ndiizi in 2007 worth US\$54 300 or Kshs 3.8 million (2007 HCDA report). Uganda exported 120 tonnes in 2003 to UK and Holland at a value of 300 000 US\$. The supply of Sukali Ndiizi is still irregular, mainly due to a lack of standardization of the product.

Key production and marketing constraints

Sukali Ndiizi is included in the imports of bananas; however their share of the market is still small mostly due to irregular supply and higher prices which do not encourage importers to invest extensively in promoting these products. A gradual rise of prices occurs during the winter months; otherwise the demand for Sukali Ndiizi is price elastic: if the retail prices would decrease, the demand would increase significantly.

Cost reductions are necessary for exporting countries if they are to remain competitive. Exports of Sukali Ndiizi to Europe is currently facing three main barriers related to inconsistent and poor quality fruit supplied to wholesale markets: (1) Difficulty in controlling and predicting the ripening of Sukali Ndiizi, (2) Poor, rough and untrained handling from growers and transporters which causes damage to fruits that are particularly susceptible to blemish, (3) Current Ugandan varieties have the characteristic of forming unattractive skin blotches as opposed to giving a speckled appearance on ripening.

Investment in research to control ripening and methods to improve skin colouration characteristics could overcome two of these barriers. Increased farmer / trader training in handling requirements will assist people to receive higher prices for their products.

Fusarium and bacterial wilt are major threats to Sukali Ndiizi and Bogoya production and hence a deterrent to investment in these dessert bananas.

Growth potential

The small fruited Sukali Ndiizi is grown more in volume in Uganda than any other country in the region. The fruit has become attractive to an increasing number of consumers. Market surveys have also shown that European consumers would prefer to buy smaller bananas if they were readily available. In theory, this would provide a realistic opportunity for growers, but the sales are currently limited by the high freight costs, which makes Ndiizi three to four times more expensive than Cavendish. Lack of organized production and packing facilities are also major obstacles to obtaining sales contracts for Ndiizi in Europe. For Uganda, the closest and most accessible markets are Europe, the Middle East and South Africa. Bogoya is only exported to Kenya. Table 4 above indicates the increase in volume of both Bogoya and Sukali Ndiizi being absorbed and sold in the three major Kampala markets from 2002 to 2010.

The plantains (AAB)

The plantains constitute a subgroup of bananas within the AAB genome group (Simmonds 1966). They are commonly referred to as roasting bananas in Uganda. The name plantain has often been applied to all cooked bananas. However, these are considered the true plantains since they require cooking before being consumed and are often unpalatable when raw (Swennen and Vuylsteke 1987, Karamura 1999).

Economic and food security role

The plantain provides an important source of food in the region and since their introduction to Africa, they have multiplied and got new names forming a secondary centre which extends from low land areas of Congo towards central and West Africa. Plantains have a characteristic orange yellow colour of the fruit and are known to contain carotenoids ranging from 0.71 to 99.03 nmol/gdw depending on the cultivar (Bioversity 2009). Plantain fruits have wider uses both in the raw and ripe stages. Before ripening, the starchy pulp can be sliced, sun dried and processed into flour that is said to be very digestible by weaning babies in western Democratic Republic of Congo. Ripe fruits can be steamed unpeeled or peeled and roasted, the latter being the most commercial practice. Ripened pulp can also be sliced and dip-fried. Unlike the EAHB that lose value at ripening, plantains can still be roasted, steamed or used for juice production at the over-ripe stage. The beer brewed from plantain juice and known as “Amarwa” in the central region of Uganda is a delicacy that used to be drunk only by Kings. In reference to post-harvest qualities, plantains have a thicker peel that provides an effective protection to the pulp. This minimizes post-harvest losses during transportation. The high starch content gives the fruits a longer shelf life too. Due to these post-harvest qualities and the diversified utilization, farmers have found plantain growing more profitable. Apart from the fruit, several plant parts have medicinal value. Roots are roasted and chewed by expectant mothers to speed up baby delivery. A small piece of fibre can be tied around the neck to treat a stiff neck. Powder scraped from raw roasted pulp is used for sealing umbilical cords of newly born babies.

Key production and marketing constraints

Plantains are generally low-land plants (0-600 masl); they grow very slowly above 1000 masl (De Langhe 1986). In Uganda, plantains are grown on a small scale and account for only 11% of the banana production in the region (Frison and Sharrock 1999). Plantains are more important in the Democratic Republic of Congo, coastal lowlands as well as in the low plains of Tanzania and Malawi. The proportion of plantain in the farmers' banana fields are estimated at 10% in Burundi, Rwanda and Democratic Republic of Congo (Sebasigari 1990) and 2% in Uganda (Gold et al. 1999). Other factors which account for the low acreage of plantain in the region include the crop's very strong susceptibility to weevils, its low leaf production rate (Karamura et al. 1999), poor root system and high mat.

All these attributes collectively shorten the life span of the mats. Other factors may be cultural.

Growth potential

In the banana growing parts of Uganda and Tanzania, plantains are generally given a second consideration where one to two mats are planted at the periphery of every banana plantation. The low supply of plantain fruits has made the fruits a delicacy forcing the prices to triple that of the widely grown EAHB cultivars.

Regional trade flows for non-Cavendish bananas for East Africa

Production challenges of bananas are very similar across the region where there is inability to meet demand quality and quantity due to diseases especially *Xanthomonas* wilt. There is also limited access to clean seed for target products, farmer bargaining power and limited transboundary exchange of information and technologies. Other related constraints are fruit quality (harvesting/handling/transportation/packaging/grading), perishability (long distance hauling/limited facilitation at borders) and poor infrastructure within and across borders. However, there are big variations between and within different countries with regard to banana genetic resources, probably depending on the status/importance of the crop or selected genotypes. The latter will influence the public and private sector investment to conserve/preserve banana genetic resources in the respective countries. Increasingly however banana is becoming more and more prioritized as an important and viable crop for investment both at the national and regional levels. The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) has prioritized banana as an income and food security crop (ASARECA 2007).

Cross-border trade between all the countries has gone on for many decades but the volumes traded have remained low. A number of reasons can explain why the situation has remained like this. There has been lack of harmonized cross-border policies and limited cross-border exchange of information and technologies, lack of appropriate infra-structure at the border, limited cross-border collective action for learning and exploiting synergies in solving common problems remain key challenges to regional banana supply chains. Table 5 shows the main banana trade products across borders in the region.

Uganda's per capita Gross Domestic Product (GDP) measured in constant prices has risen by an average of 3.2% per annum from 1990 to 2000. The country's population of 32 million people is growing at approximately 3% per annum.

Table 5. Major banana trade products across borders in East Africa.

Matooke (green-cooking/beer AAA bananas)	Uganda exports to Rwanda (20 000 t), to Kenya (1200 t)
Dessert banana (AAA-Gros Michel; AAB Sukali Ndiizi)	Highly susceptible to FoC and BXW; high and increasing demand in major urban centres; Uganda exports to Kenya (5000 t).
Plantain (AAB)	DR Congo is the main supplier for Rwanda, Uganda and Burundi. Largely consumed as chips; roasted and sold as roadside snack meals; demand high and increasing.
Banana beverage (juice, beer/wine, gins)	Bottled products in Uganda largely for local markets but improved quality may lead to regional trade.
Fibre products	All banana types can be used though certain varieties may be preferred for specific products; mainly handicrafts, house decorations and paper; for niche markets like the tourist industry

Source: Karamura et al. 2008.

Therefore it is suggested that food demand will continue to rise through both a population and income effect. Levels of urbanization were recorded at only 16% in 2000 but forecast to reach 22% by 2010. National food consumption patterns are expected to change as an increasingly large number of people live in urban areas. The banana sector also has other segments in the fibre and beverage markets. The product can be defined with local, regional and export markets as shown in Table 6.

Table 6. Banana products and market segments in Uganda.

Fresh bananas	Beverages	Fibre products
Cooking bananas (Matooke)	Juice	Baskets
Brewing bananas (Mbidde)	Beer (Tonto)	Decorations
Roasting bananas	Waragi	Paper
Sweet (Dessert) bananas		
Domestic	Regional	Export
All types of fresh banana	Matooke	Matooke
Beverage products	Dessert bananas (Bogoya)	Dessert banana (Ndiizi)
Fibre products		

Source: F Bagamba 2010.

Regional demand chains for Ugandan bananas

Most countries have targeted overseas markets but volumes are still very small due to transportation costs, competition from other suppliers, changing regulatory environment in consumer countries and others. Regional markets are very promising but largely unsearched, especially transboundary demand chains. New opportunities for regional collective action have been put in place and these will further boost the flow of trade (EAC, ASARECA, CAADP, COMESA).

Tables 7-9 emphasize the increase in banana exports and imports in the region (E Karamura et al. 2008).

Table 7. Imports of banana into Rwanda from its neighbours (t).

Country	1999 (second crop)	2001 (first crop)
Burundi	6	-
DRC	2 436	1 848
Tanzania	-	5
Uganda	1 351	11 261
Grand total	3 793	13 114

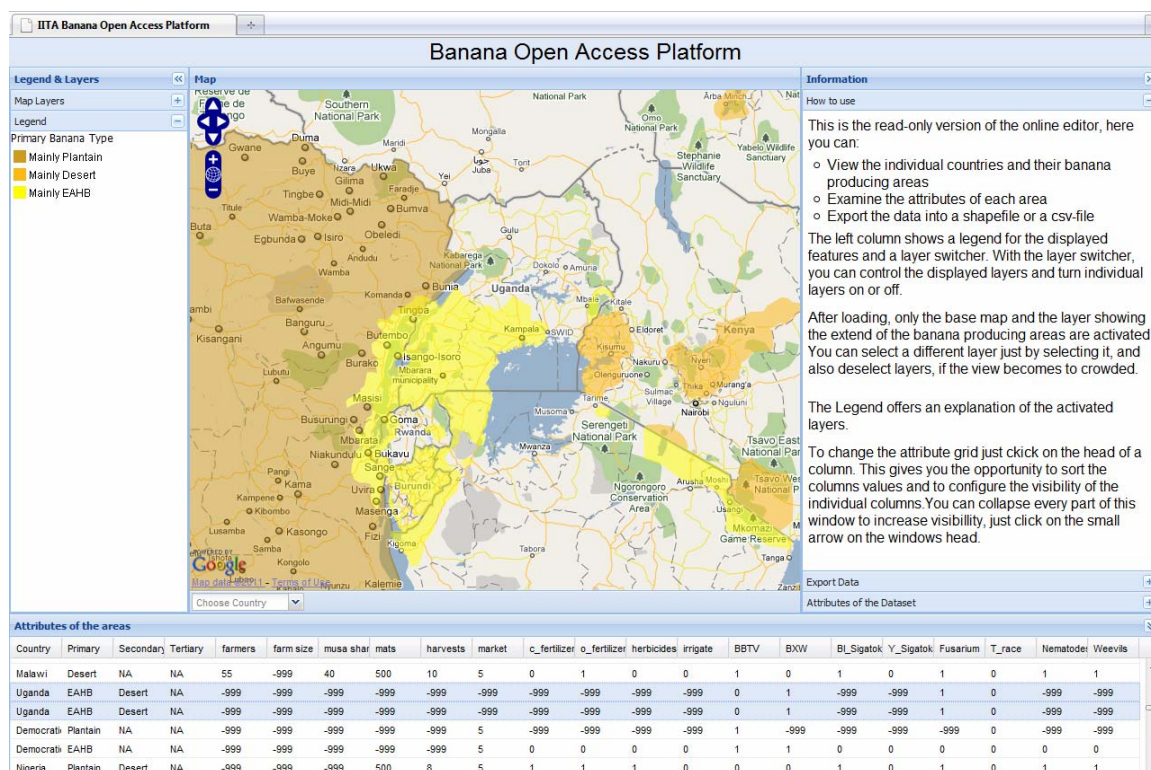
Table 8. Estimated banana demand growth for dessert banana for rural and urban from Uganda (t).

Year	Urban demand	Rural demand	Total demand
2000	6 924	5 255	12 179
2005	10 833	6 028	16 861
2010	16 949	6 824	23 772
2015	26 517	7 575	34 092
2020	41 487	8 165	49 653

Table 9. Estimated demand growth for green-cooking banana in rural, urban and total (t) – Rwanda from Uganda.

Year	Urban demand	Rural demand	Total demand
2000	32 117	39 041	71 157
2005	50 248	44 783	95 031
2010	78 617	50 690	129 306
2015	123 000	56 272	179 272
2020	192 441	60 656	253 097

Part 2: Banana production in Uganda: Area information from BOAP and statistics from FAO, CIRAD and UBOS



Comparison of production statistics for 'bananas' in Uganda - 2005 data (3 sources)

Name (wording by source)	FAO (1)	CIRAD (2)	UBOS (3)
<i>Dessert types</i>			
Bananas	615 000		
Cavendish (AAA)		440 000	
Gros Michel + other dessert bananas		175 000	
Bananas (Sweet)			131 505
Subtotal dessert types	615 000	615 000	131 505
<i>Cooking types</i>			
Plantains	9 054 000		
Plantains (AAB)		120 000	
Highland bananas + ABB + other cooking bananas		9 780 000	
Bananas (Food)			4 175 817
Bananas (Beer)			1 048 147
Subtotal cooking types	9 054 000	9 900 000	5 223 964
Grand Total	9 669 000	10 515 000	5 355 469

(1) Source: FAOSTAT; (2) Source: FruiTrop, Dec. 2006. No. 140; (3) Source: Uganda Bureau of Statistics, Uganda National Household Survey 2005/2006.

Part 3: Draft country factsheet for Uganda



Uganda



Quick country facts

People¹

Total population: 30.7 millions
Population 0-15 year: 50%
Working population: 11 millions
Rural working population: 81%

Proportion of undernourished: 15%
Child malnutrition, underweight: 20%
Child mortality rate: 14%

Land²

Land area: 241 000 km²
Arable land: 21.57%
Permanent crops 8.92%

Banana cultivated land: 18 150 km² with a production of almost 10 million tonnes in 2008 (15% of global production)

Economics¹

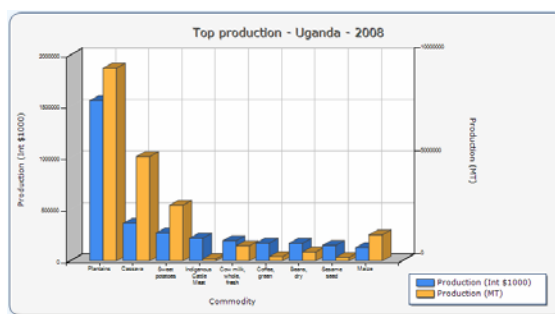
Agriculture as % of GDP: 33%
Share of agricultural exports (% of total exports): 40.53%
Share of agricultural imports (% of total imports): 13.94%

Banana exports 2005³: 2196 t
(0.1% of total exports)

Banana imports 2005: 0 t



Agricultural production⁴



Source: FAOStat

Bananas in Uganda¹⁵

Banana is a staple to an estimated 10 million Ugandans, with 66% of the country's urban population depending on it. Bananas play a major role in Western Uganda with diet shares between 54% (Mbarara) and 69% (Bushenyi) and with an overall average for Uganda of 20% of the caloric intake⁵. Ugandans consume at least 191 kg of banana and plantain per year, more than 0.5 kg a day.

Main cultivars grown in the country

Three main types of bananas exist in the country:

- the Banana "Food" type includes East African Highland Bananas (EAHB) locally known as 'Matooke', as well as "Plantains" and some introduced hybrids;
- the Banana "Beer" type belongs mainly to the EAHB locally known as 'Mbidde' and
- the Banana "Sweet" type is mainly composed of Bogoya (Gros Michel) and Cavendish cultivars.

EAHB is the most extensively grown subgroup and the most important in terms of food security, annual production and employment.

Average yield^{Error! Bookmark not defined.}: 'Bananas': 4.55 t/ha, 'Plantains': 5.65 t/ha

Following FAO classification and statistics 2008, 'Plantains' (\approx "Food" and "Beer" types) rank first and 'Bananas' ("Sweet" type) 12th in the Ugandan agricultural commodities production with respectively 9 371 000 t and 615 000 t, representing a total of 9 986 000 t.

CIRAD statistics⁶ published in April 2010 (2008 data) indicate: "Food" and "Beer" types (Cooking bananas): 9 591 000 t; "Sweet" type (Dessert bananas): 405 000 t representing a total of 9 996 000 t.

Average plot size¹³:

'Matooke': 0.18 ha
'Beer': 0.15 ha
Dessert: 0.07 ha

Areas of major banana production by types



Matooke
Beer
Dessert

Source map: Spilsbury et al. 2002²³

Production systems

The crop is grown by about 75% of the farmers and is considered a key component of sustainable agricultural development in densely populated high rainfall zones, where they reduce soil erosion and act as essential mulch for maintaining and improving soil fertility. The crop ensures income to the farmer throughout the year, provides feeds for animals and plays a key role as a food import substitution⁷.

Banana backyard garden systems are usually found in peri-urban zones. Size ranges from few mats to 0.25ha; crop management practices are poor, the purpose being to supplement other food sources. Sometimes, peri-urban dwellers keep backyards gardens for non-food use, e.g. to provide to market green leaves for wrapping and cooking Matooke⁸

Banana subsistence systems are the most common means of growing bananas. They are perennial, low input and small size and complex in terms of cultivars grown (average of 12 cultivars per farm), soils, pest and diseases communities, management skills and crop uses. The main purpose is food security but commercial interests (local markets) are increasing.

Key production constraints¹⁹

Soil fertility

Low soil fertility is among the important factors limiting banana yields. The cultivation of bananas removes large amounts of nutrients from the soil. Lack of nutrient replenishment can lead to a non-sustainable situation reducing yields and productive life. Magnesium as well as Nitrogen and Potassium deficiencies are key constraints on most farms in central Uganda and are developing in southwest Uganda. Low adoption of fertilizer use by farmers has been attributed to their high prices, poor availability and lack of knowledge on their use

Pests

Together with soil fertility, pests are one of the major constraints in Uganda.

Weevils are commonly seen as the most devastating pests of bananas, especially in EAHB plantations. Other banana types (Cavendish, Beer and Bogoya) appear less susceptible to weevil attack.

Being microscopic, nematodes are not as readily mentioned as a problem. Much of the damage attributed to weevils, could in fact be due to nematodes.

Diseases

Black leaf streak, better known as black Sigatoka, was first reported in Uganda in 1989. The disease, caused by an air-borne fungus, has an economic impact as it interferes with fruit filling. It is considered a key constraint to banana production worldwide but being sensitive to altitude and temperature, it is absent at elevations above 1450 masl and where mean minimum temperatures are lower than 15°C.

Fusarium wilt, caused by a soil-borne fungus, is prevalent on dessert and beer bananas. Similar symptoms have also been observed on EAHB cultivars, previously considered to be resistant to the disease, in western Uganda at altitudes greater than 1300 masl.

Banana Xanthomonas Wilt (BXW) attacks almost all varieties of bananas, especially cooking bananas, destroying the fruits and devastating the crop. It was first identified in Ethiopia in

the 1970s, but spread to Uganda in 2001. In 2004, 33% of the total banana mats were infected, resulting in a total yield loss estimated at 30-52%; a communication campaign against the disease had substantial impact in reducing disease incidence⁹.

Chemical control of banana pest and diseases

Banana production in Uganda is largely organic. The availability of chemicals is limited in many rural areas and they are largely unaffordable to small-scale producers.

With the shift in production zones in Uganda to higher altitude fertile soils, less susceptible to pests and diseases the use of inorganic inputs is questioned.

Key marketing constraints¹⁹

Bulkiness and perishability

Bananas have a relatively low value compared to their volume/weight and are a perishable crop with limited time between harvest and the onset of deterioration. These constraints have led to efforts to reduce bulk and improve storage through drying and alcohol production.

Poor infrastructure

Poor infrastructure is number one constraint limiting market development in the majority of rural areas. The main roads to the southwest and central regions are in relatively good condition, but with declining yields in plots close to the main roads, the importance of improving secondary roads increases.

Marketing system¹⁰

The banana marketing system in Uganda is very complex with long value chains of actors from farmers to consumers (farmers, bicycle traders, village brokers, transporters, wholesalers, urban market brokers, retailers, consumers). In central and western Uganda, only 19% of the farmers are organized into collective marketing groups. They are able to raise large volumes (420 to 620 bunches/month) and attract bulk buyers with higher prices.

Processing and uses¹¹

Banana products and market segments

Fresh bananas	Beverages	Fibre products
Cooking bananas (Matooke)	Juice	Baskets
Brewing bananas (Mbidde)	Beer (Tonto)	Decorations
Roasting bananas	Waragi	Paper
Sweet (Dessert) bananas		
Domestic	Regional	Export
All types of fresh banana	Matooke	Matooke
Beverage products	Dessert bananas (Bogoya)	Dessert banana (Ndiizi)
Fibre products		

Source: Bagamba 2010¹²

Beverages

The only pronounced form of banana processing is beverage production. These beverages are “Waragi” a distilled spirit (local and factory processed) and “Tonto” a banana beer.

Factory produced “Waragi” can use banana based raw alcohol. Alternatives include sugar or molasses based material.

“Tonto” is made from the juice of beer bananas. Rural households in banana growing regions traditionally brew this beer which can be stored for approximately seven days before it becomes bitter. However, it can be distilled to “Waragi” when its shelf life is past. Because of its mode of preparation, “Tonto” is largely considered to be an inferior drink. Rural households in banana growing regions traditionally brew this beer, which may be consumed at home, during different traditional ceremonies or sold.

A beer is also brewed from plantain juice and is known as “Amarwa” in the central region of Uganda; it is a delicacy that used to be drunk only by Kings.

It is estimated that approximately 2 million litres of local “Waragi” and 1.4 million litres of “Tonto” are annually traded in Kampala.

Fibre products

Banana paper made from banana fibres. Large banana producing countries are seen to have a competitive advantage on international markets but locally a relatively small market is seen selling to tourists, expatriates and wealthy Ugandans. Future growth in Ugandan incomes and tourism are seen to influence market potential for these product types.

Export market²³

Regional export opportunities appear for Matooke in Rwanda and for dessert varieties (Bogoya) in Kenya.

International banana market is increasingly competitive, especially in European Union. Within this context market potential for Ugandan bananas is seen in markets segments including organic or health focused fruit and ‘naturally’ solar dried dessert bananas. Sales of Matooke to Europe have increased, but whereas the small fruited Sukali Ndiizi has become attractive to a growing number of consumers, exports to Europe have declined due to quality issues. If quality requirements can be achieved European market prices appear as attractive.

It seems that most potential exists also for fresh and naturally dried Sukali Ndiizi (solar dried or semi-dried chips) within organic / health market segment, especially in Switzerland, Germany and UK.

Case study

Economic significance of banana varieties other than Cavendish in Uganda

Part 1: Country report

Part 2: Banana production in Uganda: Area information from BOAP and statistics from FAO, CIRAD and UBOS

Part 3: Country factsheet

Part 1. Report on economic significance of banana varieties other than Cavendish in Uganda

by Deborah Karamura (Bioversity International, Uganda Office)

Background

The East African plateau is home to a unique banana subgroup (*Musa-AAA*) known as Lugira-Mutika (Simmonds 1966³) or the East African highland bananas (EAHB) (Karamura et al. 1999). The subgroup is grown in a number of countries to the north and west of Lake Victoria, including Uganda, Kenya, Tanzania, Rwanda, Burundi and the Democratic Republic of Congo. The region is recognized as a secondary centre of diversity for the crop (the presumed primary centre being the Indo-Malaysian region in Asia) and is one of the largest producers and consumers of bananas in the world, with Uganda producing about 60% of the region's banana annual output. Depending on the cultivar, these bananas are consumed as a staple food (locally known as Matooke), as a beverage (banana beer, juice or banana gin), as a diversity of confectionaries (cakes, crisps, bread, solar dried figs, chips, etc) and may be roasted or fried and consumed as snack meals. Different cultivars of the subgroup are used to prepare different products. The EAHB are cooked when still green and should not be confused with the ABB cooking bananas which are cooked when ripe.

Other bananas grown in Uganda include bananas which have been introduced from other regions of the world and a number of recently bred hybrids developed by breeders at FHIA in Honduras, IITA in Nigeria and NARO in Uganda. These "exotic" bananas include beer and dessert bananas of AB genome (Ney Poovan subgroup), AAB genome (Kamaramasenge, Silk, Mysore and Prata subgroups), ABB genome (Pisang Awak, Bluggoe and Monthan subgroups) and AAA genome (Gros Michel, Green Red, Red, Ibota and

³ See CRS document, Annex 2 for detailed list of references

Cavendish subgroups), the roasting bananas of AAB genome (plantain subgroup) as well as some tetraploids (AAAA, AABB and AAAB). Table 1 summarises the general classification of bananas, genome groups and their uses in Uganda, while Table 2 and 3 provide the most widely cultivated and used genotypes in the country.

A number of factors can be attributed to the importance of these listed cultivars which may include their use as food, cash crops in local and export markets, medicinal and cultural attachments as well as many other socio-cultural values. In the following text, the economic importance of the EAHB (with no special reference to any cultivar), Sukali Ndiizi, Bogoya (Gros Michel) and plantains (also with no special reference to any particular cultivar) are discussed.

Table 1. Classification of bananas and their uses in Uganda (after Edmeades et al. 2006b).

Genome group	Type	Use
AAA	EAHB - Matooke	Cooking
	EAHB - Mbidde	Beer
	Introduced varieties	Dessert
AAB	Plantain	Roasting
ABB, AB	Introduced varieties	Beer
AABB, AAAA, AAAB	Hybrids	Multipurpose

Table 2. Most widely grown banana cultivars in Uganda, by percentage of households (Edmeades et al. 2006b).

Cultivar name	Genome	Use group	Percent of households
Sukali Ndiizi	AAB	Dessert	60.74
Nakitembe	AAA-EA	Cooking	57.83
Nakabululu	AAA-EA	Cooking	43.52
Bogoya	AAA	Dessert	41.01
Mbwazirume	AAA-EA	Cooking	37.33
Musakala	AAA-EA	Cooking	32.88
Kibuzi	AAA-EA	Cooking	32.50
Kisubi	AB	Beer	28.43
Ndyabalangira	AAA-EA	Cooking	25.73
Nabusa	AAA-EA	Cooking	22.63

Table 3. Most widely grown banana cultivars in Uganda, by percentage of mats (Edmeades et al. 2006b).

Cultivar name	Genome	Use group	Percent of mats
Nakitembe	AAA-EA	Cooking	9.18
Sukali Ndiizi	AAB	Dessert	6.71
Nakabululu	AAA-EA	Cooking	6.39
Kibuzi	AAA-EA	Cooking	6.38
Nabusa	AAA-EA	Cooking	6.04
Mbwazirume	AAA-EA	Cooking	4.92
Mbidde	AAA-EA	Beer	4.79
Musakala	AAA-EA	Cooking	4.30
Musa	ABB	Beer	4.07
Kayinja	ABB	Beer	4.04

The East African highland bananas (AAA-EA)

Economic and food security role

In Uganda, the EAHB are the most extensively grown subgroup and most important in terms of food security, annual production, employment prospects and environmental conservation. They occupy more than 1.8 million hectares, equivalent to 38% of Uganda's arable land. Annual production is currently estimated at 10 million tonnes, accounting for about 15% of total world banana/plantain production output (NARO 2006). The crop is grown by about 75% of the farmers and is a staple to an estimated 10 million Ugandans, with 66% of the country's urban population depending on it. Within the economy, bananas are considered a key component of sustainable agricultural development in densely populated high rainfall zones, where they reduce soil erosion and act as an important source of mulch for maintaining and improving soil fertility. The crop ensures income to the farmer throughout the year, provides feeds for animals and plays a key role as a food import substitution. The mature fruits of the cooking types are harvested when green, peeled, boiled or steamed and can be mashed before eating. A number of genotypes are widely grown and sold to markets (Tables 2 and 3). The brewing bananas (Mbidde) are EAHB which have mutated to contain more tannin in their fruits than the green-cooking types and hence cannot be used for cooking because they have a bitter taste. The beer banana fruit is harvested when mature, ripened and squeezed to produce juice that is fermented (with sorghum) to make beer. Other beer-producing bananas, that are not EAHB, are the small-fruited types of the AB genome group (Ney Poovan subgroup), commonly called Kisubi or Gisubi in the region and the ABB Pisang Awak subgroup (Kayinja and Musa).

Key production constraints

Soil fertility

Bananas remove large amounts of soil nutrients with the harvest of the fruit bunch. Lack of nutrient replenishment can lead to a non-sustainable situation reducing yields and productive life. Studies exploring the shifts in Ugandan production found Magnesium as a key constraint with Nitrogen and Potassium deficient on most farms in central Uganda. A similar trend is developing in southwest Uganda (Gold et al. 1999).

Pests and diseases

Weevils are commonly seen as the most devastating pests of bananas and are considered the most economically important pest in the EAHB plantations. Other banana types (Cavendish, beer and Bogoya) appear less susceptible to weevil attack. Reduced levels of Magnesium and Potassium may have weakened resistance to banana weevil (Spilsbury et al. 2002)

Nematodes are an important banana production constraint worldwide. The pest is less easily recognized than the weevil, which is sometimes incorrectly blamed by farmers for nematode damage. This factor may lead to an underestimation of yield loss caused by nematodes.

Black leaf streak/black Sigatoka, an air borne fungal disease, was first reported in Uganda in 1989 when it made an economically important impact by causing incomplete fruit filling. Black leaf streak is considered a key constraint to banana production worldwide and is sensitive to altitude and temperature. Diagnostic survey results show black leaf streak to be absent at elevations above 1450 masl and where mean minimum temperatures lower than 15°C (Tushemereirwe et al. 1993, Mourichon 1997).

In Uganda, Fusarium wilt is prevalent on introduced banana cultivars that are used primarily as dessert bananas (Bogoya, Sukali Ndiizi) and for brewing, e.g. Kayinja (Kangire and Rutherford 2001). Symptoms similar to those of Fusarium wilt have also been observed on EAHB, which have previously been considered to be resistant to the disease (Kangire et al. 2000). Wilt of highland cultivars was only observed in western Uganda at altitudes greater than 1300 masl and mainly within 30 m of homesteads, animal kraals and garbage dumps (Kangire et al. 2000).

Chemicals to manage these pests and diseases are unaffordable to small-scale producers and availability of chemicals is limited in many rural areas. Banana production in Uganda is largely organic with export opportunities seen to exist in this market niche.

Key marketing constraints

Bulkiness and perishability

Bananas have a relatively low value compared to their volume/weight, which influences transportation costs making commodities with higher value but lower volume and/or weight more attractive. Bananas are a perishable crop with limited time between harvest

and the onset of deterioration. This perishability and bulkiness have led to efforts to reduce bulk and improve storage through drying and alcohol production.

Poor infrastructure

Embrecht et al. (1996) ranked poor infrastructure as the number one constraint limiting market development in the majority of rural areas in Uganda. Uganda currently has some main roads in relatively good condition leading to the southwest and central regions. But the declining yields of plots close to main roads and planting of new areas with poorer transport access will increase the importance of feeder roads that often become impassable in rainy periods.

Security

Traders and brokers entering rural areas are recognised targets for thieves as they carry large amounts of money. A regularly mentioned deterrent to traders is risk of thuggery. Improvements in banking services and associated money transfers are needed to address security problems.

Legal requirements and access to credit

Traders, wholesalers and retailers of bananas and banana products require a trading license from the Kampala City Council (K.C.C.) and a permit from the area local council from where the bananas, waragi or tonto (beer) is purchased. The initial capital required to enter many of the trading roles in the supply chain represents a barrier to entry to those with insufficient funds to make initial investments.

In addition to the above constraints, the following apply to exports.

Air freight cost to European markets

Before the economic crisis, airfreight charges for Entebbe to London were US\$1.50-1.70/kg making Ugandan bananas uncompetitive with other bananas supplying the European market. Sea freight would be cheaper, but research by Merck and Icemark – Africa Ltd suggest transport by sea from Kampala to Felixstowe takes approximately 35 days, which is too long to allow sale in Europe before fruit deterioration begins.

Continuity of supply (market organization)

For export produce targeting retail or supermarket outlets via air freight, there is a need for a regular and reliable flow of produce to meet defined buyer and air carriers' timetable requirements. A need exists for producers to plan ahead to ensure they supply what the market wants in terms of quality and quantity when it is required. For small-scale producers to meet these market requirements, marketing group/co-operative formation is one way of combining and coordinating selling of required volumes. Farmers involved in this planned coordinated marketing will require appropriate capacities that some key informants felt are largely currently absent. Cooperative marketing arrangements have had a poor past record as incentives exist for individuals to sell independently especially at times of high prices. Another alternative would be exporters developing contractual arrangements with large farmers. These people are seen to possess the resources necessary

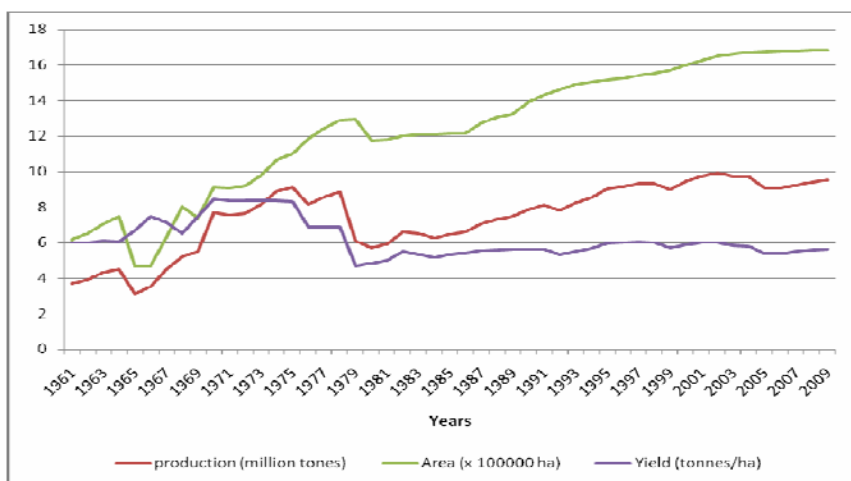
to produce sufficient volumes, the management skills for contractual negotiation and production planning and have incentives to maintain long-term contractual relationships.

Certification for organic produce

To sell organic produce in Europe a certificate of authentication is required. This has a high cost (\$US5000 per farm) and is controlled by European institutions. The process of attaining a certificate can take 1-5 years. The National Organic Agricultural Movement of Uganda (NOGAMU) is currently active in drawing up a Ugandan national standard with local group accreditation to reduce certification costs. A number of exporters currently cover or subsidize farmer's organic certification costs. Depending on which European institution is involved, inspectors may have to visit each farm so that costs rise with the number of farmers.

Growth potential of the EAHB

Population growth rates of 3% for Uganda suggests significant increases in future demand for these bananas (Figure 1).



Source: 'Plantain' data in FAOSTAT 2010, available from URL <http://faostat.fao.org>

Figure 1. Production, area and yield trends of Matooke (EAHB)

Growth in urban demand for bananas has been the driving factor for the expanding market. Increasing potential is also seen for Ugandan exports of Matooke to Rwanda. Data gathered at Katuna border point from January to September 1999 shows 2433 tonnes of Matooke exports crossing to Rwanda. Spilsbury et al. (2002) report volumes of bananas demanded in three main Kampala markets: Kalerwe, Balikudembe (Owino) and Nakawa (Table 4). Main sources of supply to these markets for dessert banana are Mbarara and Mukono districts.

Table 4. Changes in production of Matooke, Bogoya and Ndiizi for the three major markets in Kampala.

Type of bananas	2002		2010	
	Total number of bunches	Total weight (tonnes)	Total number of bunches	Total weight (tonnes)
Matooke	75 282	1 882	99 247	2 481
Bogoya	5 657	141	7 458	186
Sukali Ndiizi	5 384	67	7 098	89
Total	86 323	2 091	113 803	2 756

Source: Spillsbury et al. 2002. Predicted annual volume figure calculations for market turnovers in 2010 are based on 2002 volumes, annual population growth of 3% and an increase in urbanization from 16% to 22% of the population.

Addressing the soil fertility, as well as pests and diseases are essential to ensure long-term production. The first priority should be to guarantee sustainable banana production systems and increase the efficiency of the banana marketing chain from rural production areas to urban consumption zones. The second priority is to capture regional market opportunities that currently appear in Rwanda and Kenya and finally international market opportunities should be addressed. International efforts should be seen as part of general initiative to increase exports of fresh and dried fruit and vegetables particularly to Europe.

Dessert banana - Sukali Ndiizi and Bogoya

Economic and food security role

Sukali Ndiizi (AAB, Kamaramasenge) often called Apple banana in the region, and Bogoya (AAA, Gros Michel) represent the main dessert and commercial bananas in Uganda. They are both widely grown in all banana growing areas of Uganda although on a small scale. While Bogoya is grown within the EAHB systems, Sukali Ndiizi is grown on the fringes of banana gardens as they multiply faster than the local endemic types.

They are also known to stay unripe for a maximum of 21 days from harvest with adequate postharvest management. Sukali Ndiizi represents one of the few cultivars in Kamaramasenge subgroup where most of the clones are small fruited types but have differences in size, compactness of bunch, taste, and probably time of flowering (Onyango 2007). The identification of clones among the Kamaramasenges is therefore very crucial in the developing industry. Both Sukali Ndiizi and Bogoya are mainly for local consumption as dessert fruits in Uganda and East Africa as a whole and they do make a major contribution to the region's economy. Production is by small-scale farmers who benefit from year round income as a result of the year round production. The demand keeps increasing both locally and for export outside East Africa for Sukali Ndiizi and outside Uganda for Bogoya. Small quantities of Sukali Ndiizi are exported to Switzerland, Italy and United Kingdom. Current estimates of Sukali Ndiizi being imported to Europe indicate to

be more than 50 tonnes per week. Kenya exported 16 tonnes of Sukali Ndiizi in 2007 worth US\$54 300 or Kshs 3.8 million (2007 HCDA report). Uganda exported 120 tonnes in 2003 to UK and Holland at a value of 300 000 US\$. The supply of Sukali Ndiizi is still irregular, mainly due to a lack of standardization of the product.

Key production and marketing constraints

Sukali Ndiizi is included in the imports of bananas; however their share of the market is still small mostly due to irregular supply and higher prices which do not encourage importers to invest extensively in promoting these products. A gradual rise of prices occurs during the winter months; otherwise the demand for Sukali Ndiizi is price elastic: if the retail prices would decrease, the demand would increase significantly.

Cost reductions are necessary for exporting countries if they are to remain competitive. Exports of Sukali Ndiizi to Europe is currently facing three main barriers related to inconsistent and poor quality fruit supplied to wholesale markets: (1) Difficulty in controlling and predicting the ripening of Sukali Ndiizi, (2) Poor, rough and untrained handling from growers and transporters which causes damage to fruits that are particularly susceptible to blemish, (3) Current Ugandan varieties have the characteristic of forming unattractive skin blotches as opposed to giving a speckled appearance on ripening.

Investment in research to control ripening and methods to improve skin colouration characteristics could overcome two of these barriers. Increased farmer / trader training in handling requirements will assist people to receive higher prices for their products.

Fusarium and bacterial wilt are major threats to Sukali Ndiizi and Bogoya production and hence a deterrent to investment in these dessert bananas.

Growth potential

The small fruited Sukali Ndiizi is grown more in volume in Uganda than any other country in the region. The fruit has become attractive to an increasing number of consumers. Market surveys have also shown that European consumers would prefer to buy smaller bananas if they were readily available. In theory, this would provide a realistic opportunity for growers, but the sales are currently limited by the high freight costs, which makes Ndiizi three to four times more expensive than Cavendish. Lack of organized production and packing facilities are also major obstacles to obtaining sales contracts for Ndiizi in Europe. For Uganda, the closest and most accessible markets are Europe, the Middle East and South Africa. Bogoya is only exported to Kenya. Table 4 above indicates the increase in volume of both Bogoya and Sukali Ndiizi being absorbed and sold in the three major Kampala markets from 2002 to 2010.

The plantains (AAB)

The plantains constitute a subgroup of bananas within the AAB genome group (Simmonds 1966). They are commonly referred to as roasting bananas in Uganda. The name plantain has often been applied to all cooked bananas. However, these are considered the true plantains since they require cooking before being consumed and are often unpalatable when raw (Swennen and Vuylsteke 1987, Karamura 1999).

Economic and food security role

The plantain provides an important source of food in the region and since their introduction to Africa, they have multiplied and got new names forming a secondary centre which extends from low land areas of Congo towards central and West Africa. Plantains have a characteristic orange yellow colour of the fruit and are known to contain carotenoids ranging from 0.71 to 99.03 nmol/gdw depending on the cultivar (Bioversity 2009). Plantain fruits have wider uses both in the raw and ripe stages. Before ripening, the starchy pulp can be sliced, sun dried and processed into flour that is said to be very digestible by weaning babies in western Democratic Republic of Congo. Ripe fruits can be steamed unpeeled or peeled and roasted, the latter being the most commercial practice. Ripened pulp can also be sliced and dip-fried. Unlike the EAHB that lose value at ripening, plantains can still be roasted, steamed or used for juice production at the over-ripe stage. The beer brewed from plantain juice and known as “Amarwa” in the central region of Uganda is a delicacy that used to be drunk only by Kings. In reference to post-harvest qualities, plantains have a thicker peel that provides an effective protection to the pulp. This minimizes post-harvest losses during transportation. The high starch content gives the fruits a longer shelf life too. Due to these post-harvest qualities and the diversified utilization, farmers have found plantain growing more profitable. Apart from the fruit, several plant parts have medicinal value. Roots are roasted and chewed by expectant mothers to speed up baby delivery. A small piece of fibre can be tied around the neck to treat a stiff neck. Powder scraped from raw roasted pulp is used for sealing umbilical cords of newly born babies.

Key production and marketing constraints

Plantains are generally low-land plants (0-600 masl); they grow very slowly above 1000 masl (De Langhe 1986). In Uganda, plantains are grown on a small scale and account for only 11% of the banana production in the region (Frison and Sharrock 1999). Plantains are more important in the Democratic Republic of Congo, coastal lowlands as well as in the low plains of Tanzania and Malawi. The proportion of plantain in the farmers' banana fields are estimated at 10% in Burundi, Rwanda and Democratic Republic of Congo (Sebasigari 1990) and 2% in Uganda (Gold et al. 1999). Other factors which account for the low acreage of plantain in the region include the crop's very strong susceptibility to weevils, its low leaf production rate (Karamura et al. 1999), poor root system and high mat.

All these attributes collectively shorten the life span of the mats. Other factors may be cultural.

Growth potential

In the banana growing parts of Uganda and Tanzania, plantains are generally given a second consideration where one to two mats are planted at the periphery of every banana plantation. The low supply of plantain fruits has made the fruits a delicacy forcing the prices to triple that of the widely grown EAHB cultivars.

Regional trade flows for non-Cavendish bananas for East Africa

Production challenges of bananas are very similar across the region where there is inability to meet demand quality and quantity due to diseases especially *Xanthomonas* wilt. There is also limited access to clean seed for target products, farmer bargaining power and limited transboundary exchange of information and technologies. Other related constraints are fruit quality (harvesting/handling/transportation/packaging/grading), perishability (long distance hauling/limited facilitation at borders) and poor infrastructure within and across borders. However, there are big variations between and within different countries with regard to banana genetic resources, probably depending on the status/importance of the crop or selected genotypes. The latter will influence the public and private sector investment to conserve/preserve banana genetic resources in the respective countries. Increasingly however banana is becoming more and more prioritized as an important and viable crop for investment both at the national and regional levels. The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) has prioritized banana as an income and food security crop (ASARECA 2007).

Cross-border trade between all the countries has gone on for many decades but the volumes traded have remained low. A number of reasons can explain why the situation has remained like this. There has been lack of harmonized cross-border policies and limited cross-border exchange of information and technologies, lack of appropriate infra-structure at the border, limited cross-border collective action for learning and exploiting synergies in solving common problems remain key challenges to regional banana supply chains. Table 5 shows the main banana trade products across borders in the region.

Uganda's per capita Gross Domestic Product (GDP) measured in constant prices has risen by an average of 3.2% per annum from 1990 to 2000. The country's population of 32 million people is growing at approximately 3% per annum.

Table 5. Major banana trade products across borders in East Africa.

Matooke (green-cooking/beer AAA bananas)	Uganda exports to Rwanda (20 000 t), to Kenya (1200 t)
Dessert banana (AAA-Gros Michel; AAB Sukali Ndiizi)	Highly susceptible to FoC and BXW; high and increasing demand in major urban centres; Uganda exports to Kenya (5000 t).
Plantain (AAB)	DR Congo is the main supplier for Rwanda, Uganda and Burundi. Largely consumed as chips; roasted and sold as roadside snack meals; demand high and increasing.
Banana beverage (juice, beer/wine, gins)	Bottled products in Uganda largely for local markets but improved quality may lead to regional trade.
Fibre products	All banana types can be used though certain varieties may be preferred for specific products; mainly handicrafts, house decorations and paper; for niche markets like the tourist industry

Source: Karamura et al. 2008.

Therefore it is suggested that food demand will continue to rise through both a population and income effect. Levels of urbanization were recorded at only 16% in 2000 but forecast to reach 22% by 2010. National food consumption patterns are expected to change as an increasingly large number of people live in urban areas. The banana sector also has other segments in the fibre and beverage markets. The product can be defined with local, regional and export markets as shown in Table 6.

Table 6. Banana products and market segments in Uganda.

Fresh bananas	Beverages	Fibre products
Cooking bananas (Matooke)	Juice	Baskets
Brewing bananas (Mbidde)	Beer (Tonto)	Decorations
Roasting bananas	Waragi	Paper
Sweet (Dessert) bananas		
Domestic	Regional	Export
All types of fresh banana	Matooke	Matooke
Beverage products	Dessert bananas (Bogoya)	Dessert banana (Ndiizi)
Fibre products		

Source: F Bagamba 2010.

Regional demand chains for Ugandan bananas

Most countries have targeted overseas markets but volumes are still very small due to transportation costs, competition from other suppliers, changing regulatory environment in consumer countries and others. Regional markets are very promising but largely unsearched, especially transboundary demand chains. New opportunities for regional collective action have been put in place and these will further boost the flow of trade (EAC, ASARECA, CAADP, COMESA).

Tables 7-9 emphasize the increase in banana exports and imports in the region (E Karamura et al. 2008).

Table 7. Imports of banana into Rwanda from its neighbours (t).

Country	1999 (second crop)	2001 (first crop)
Burundi	6	-
DRC	2 436	1 848
Tanzania	-	5
Uganda	1 351	11 261
Grand total	3 793	13 114

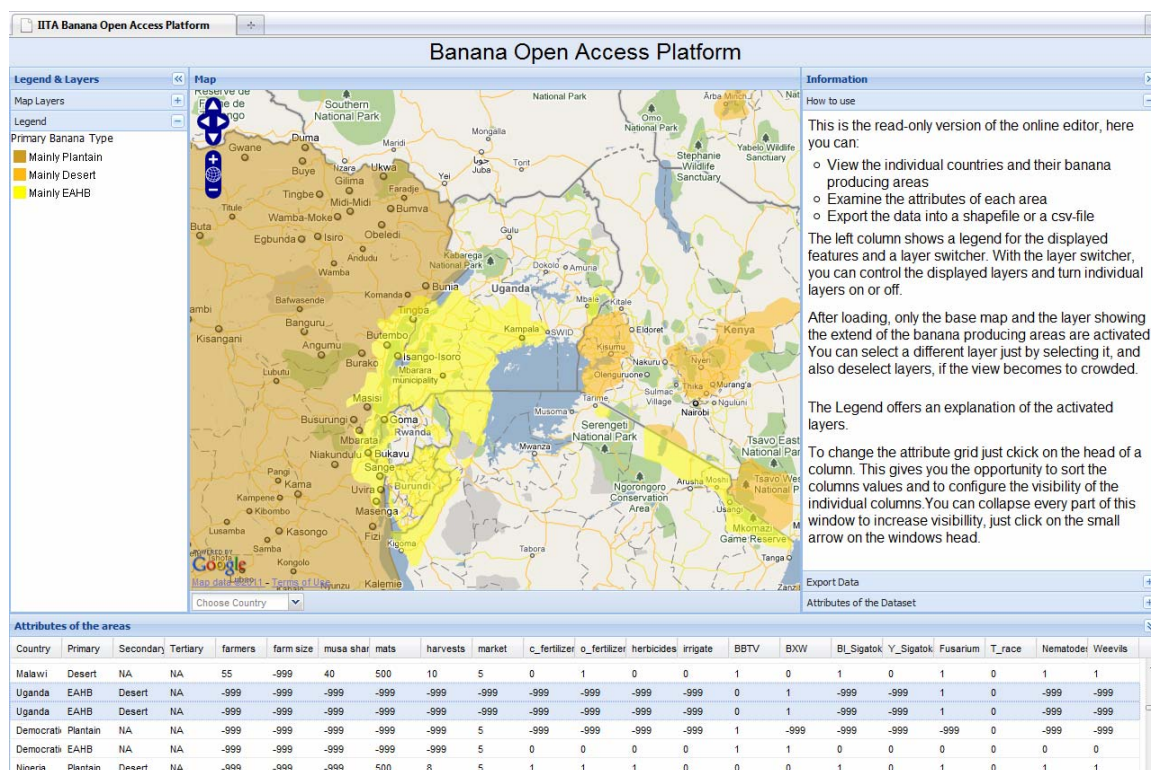
Table 8. Estimated banana demand growth for dessert banana for rural and urban from Uganda (t).

Year	Urban demand	Rural demand	Total demand
2000	6 924	5 255	12 179
2005	10 833	6 028	16 861
2010	16 949	6 824	23 772
2015	26 517	7 575	34 092
2020	41 487	8 165	49 653

Table 9. Estimated demand growth for green-cooking banana in rural, urban and total (t) – Rwanda from Uganda.

Year	Urban demand	Rural demand	Total demand
2000	32 117	39 041	71 157
2005	50 248	44 783	95 031
2010	78 617	50 690	129 306
2015	123 000	56 272	179 272
2020	192 441	60 656	253 097

Part 2: Banana production in Uganda: Area information from BOAP and statistics from FAO, CIRAD and UBOS



Comparison of production statistics for 'bananas' in Uganda - 2005 data (3 sources)

Name (wording by source)	FAO (1)	CIRAD (2)	UBOS (3)
<i>Dessert types</i>			
Bananas	615 000		
Cavendish (AAA)		440 000	
Gros Michel + other dessert bananas		175 000	
Bananas (Sweet)			131 505
Subtotal dessert types	615 000	615 000	131 505
<i>Cooking types</i>			
Plantains	9 054 000		
Plantains (AAB)		120 000	
Highland bananas + ABB + other cooking bananas		9 780 000	
Bananas (Food)			4 175 817
Bananas (Beer)			1 048 147
Subtotal cooking types	9 054 000	9 900 000	5 223 964
Grand Total	9 669 000	10 515 000	5 355 469

(1) Source: FAOSTAT; (2) Source: FruiTrop, Dec. 2006. No. 140; (3) Source: Uganda Bureau of Statistics, Uganda National Household Survey 2005/2006.

Part 3: Draft country factsheet for Uganda



Uganda



Quick country facts

People¹³

Total population: 30.7 millions
Population 0-15 year: 50%
Working population: 11 millions
Rural working population: 81%

Proportion of undernourished: 15%
Child malnutrition, underweight: 20%
Child mortality rate: 14%

Land¹⁴

Land area: 241 000 km²
Arable land: 21.57%
Permanent crops 8.92%

Banana cultivated land: 18 150 km² with a production of almost 10 million tonnes in 2008 (15% of global production)

Economics¹

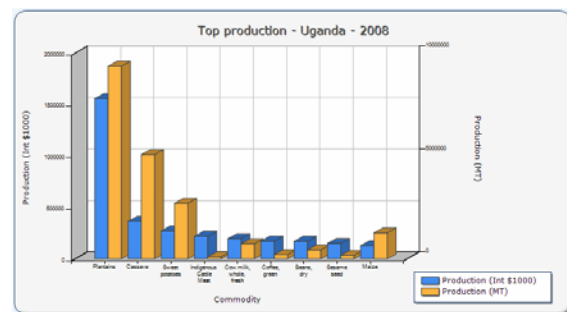
Agriculture as % of GDP: 33%
Share of agricultural exports (% of total exports): 40.53%
Share of agricultural imports (% of total imports): 13.94%

Banana exports 2005¹⁵: 2196 t
(0.1% of total exports)

Banana imports 2005: 0 t



Agricultural production¹⁶



Source: FAOStat

Bananas in Uganda¹⁵

Banana is a staple to an estimated 10 million Ugandans, with 66% of the country's urban population depending on it. Bananas play a major role in Western Uganda with diet shares between 54% (Mbarara) and 69% (Bushenyi) and with an overall average for Uganda of 20% of the caloric intake¹⁷. Ugandans consume at least 191 kg of banana and plantain per year, more than 0.5 kg a day.

Main cultivars grown in the country

Three main types of bananas exist in the country:

- the Banana "Food" type includes East African Highland Bananas (EAHB) locally known as 'Matooke', as well as "Plantains" and some introduced hybrids;
- the Banana "Beer" type belongs mainly to the EAHB locally known as 'Mbidde' and
- the Banana "Sweet" type is mainly composed of Bogoya (Gros Michel) and Cavendish cultivars.

EAHB is the most extensively grown subgroup and the most important in terms of food security, annual production and employment.

Average yield^{Error! Bookmark not defined.}: 'Bananas': 4.55 t/ha, 'Plantains': 5.65 t/ha

Following FAO classification and statistics 2008, 'Plantains' (\approx "Food" and "Beer" types) rank first and 'Bananas' ("Sweet" type) 12th in the Ugandan agricultural commodities production with respectively 9 371 000 t and 615 000 t, representing a total of 9 986 000 t.

CIRAD statistics¹⁸ published in April 2010 (2008 data) indicate: "Food" and "Beer" types (Cooking bananas): 9 591 000 t; "Sweet" type (Dessert bananas): 405 000 t representing a total of 9 996 000 t.

Average plot size¹³:

- 'Matooke': 0.18 ha
- 'Beer': 0.15 ha
- Dessert: 0.07 ha

Areas of major banana production by types



Source map: Spilsbury et al. 2002²³

Production systems

The crop is grown by about 75% of the farmers and is considered a key component of sustainable agricultural development in densely populated high rainfall zones, where they reduce soil erosion and act as essential mulch for maintaining and improving soil fertility. The crop ensures income to the farmer throughout the year, provides feeds for animals and plays a key role as a food import substitution¹⁹.

Banana backyard garden systems are usually found in peri-urban zones. Size ranges from few mats to 0.25ha; crop management practices are poor, the purpose being to supplement other food sources. Sometimes, peri-urban dwellers keep backyards gardens for non-food use, e.g. to provide to market green leaves for wrapping and cooking Matooke²⁰

Banana subsistence systems are the most common means of growing bananas. They are perennial, low input and small size and complex in terms of cultivars grown (average of 12 cultivars per farm), soils, pest and diseases communities, management skills and crop uses. The main purpose is food security but commercial interests (local markets) are increasing.

Key production constraints¹⁹

Soil fertility

Low soil fertility is among the important factors limiting banana yields. The cultivation of bananas removes large amounts of nutrients from the soil. Lack of nutrient replenishment can lead to a non-sustainable situation reducing yields and productive life. Magnesium as well as Nitrogen and Potassium deficiencies are key constraints on most farms in central Uganda and are developing in southwest Uganda. Low adoption of fertilizer use by farmers has been attributed to their high prices, poor availability and lack of knowledge on their use

Pests

Together with soil fertility, pests are one of the major constraints in Uganda.

Weevils are commonly seen as the most devastating pests of bananas, especially in EAHB plantations. Other banana types (Cavendish, Beer and Bogoya) appear less susceptible to weevil attack.

Being microscopic, nematodes are not as readily mentioned as a problem. Much of the damage attributed to weevils, could in fact be due to nematodes.

Diseases

Black leaf streak, better known as black Sigatoka, was first reported in Uganda in 1989. The disease, caused by an air-borne fungus, has an economic impact as it interferes with fruit filling. It is considered a key constraint to banana production worldwide but being sensitive to altitude and temperature, it is absent at elevations above 1450 masl and where mean minimum temperatures are lower than 15°C.

Fusarium wilt, caused by a soil-borne fungus, is prevalent on dessert and beer bananas. Similar symptoms have also been observed on EAHB cultivars, previously considered to be resistant to the disease, in western Uganda at altitudes greater than 1300 masl.

Banana Xanthomonas Wilt (BXW) attacks almost all varieties of bananas, especially cooking bananas, destroying the fruits and devastating the crop. It was first identified in Ethiopia in

the 1970s, but spread to Uganda in 2001. In 2004, 33% of the total banana mats were infected, resulting in a total yield loss estimated at 30-52%; a communication campaign against the disease had substantial impact in reducing disease incidence²¹.

Chemical control of banana pest and diseases

Banana production in Uganda is largely organic. The availability of chemicals is limited in many rural areas and they are largely unaffordable to small-scale producers.

With the shift in production zones in Uganda to higher altitude fertile soils, less susceptible to pests and diseases the use of inorganic inputs is questioned.

Key marketing constraints¹⁹

Bulkiness and perishability

Bananas have a relatively low value compared to their volume/weight and are a perishable crop with limited time between harvest and the onset of deterioration. These constraints have led to efforts to reduce bulk and improve storage through drying and alcohol production.

Poor infrastructure

Poor infrastructure is number one constraint limiting market development in the majority of rural areas. The main roads to the southwest and central regions are in relatively good condition, but with declining yields in plots close to the main roads, the importance of improving secondary roads increases.

Marketing system²²

The banana marketing system in Uganda is very complex with long value chains of actors from farmers to consumers (farmers, bicycle traders, village brokers, transporters, wholesalers, urban market brokers, retailers, consumers). In central and western Uganda, only 19% of the farmers are organized into collective marketing groups. They are able to raise large volumes (420 to 620 bunches/month) and attract bulk buyers with higher prices.

Processing and uses²³

Banana products and market segments

Fresh bananas	Beverages	Fibre products
Cooking bananas (Matooke)	Juice	Baskets
Brewing bananas (Mbidde)	Beer (Tonto)	Decorations
Roasting bananas	Waragi	Paper
Sweet (Dessert) bananas		
Domestic	Regional	Export
All types of fresh banana	Matooke	Matooke
Beverage products	Dessert bananas (Bogoya)	Dessert banana (Ndiizi)
Fibre products		

Source: Bagamba 2010²⁴

Beverages

The only pronounced form of banana processing is beverage production. These beverages are “Waragi” a distilled spirit (local and factory processed) and “Tonto” a banana beer.

Factory produced “Waragi” can use banana based raw alcohol. Alternatives include sugar or molasses based material.

“Tonto” is made from the juice of beer bananas. Rural households in banana growing regions traditionally brew this beer which can be stored for approximately seven days before it becomes bitter. However, it can be distilled to “Waragi” when its shelf life is past. Because of its mode of preparation, “Tonto” is largely considered to be an inferior drink. Rural households in banana growing regions traditionally brew this beer, which may be consumed at home, during different traditional ceremonies or sold.

A beer is also brewed from plantain juice and is known as “Amarwa” in the central region of Uganda; it is a delicacy that used to be drunk only by Kings.

It is estimated that approximately 2 million litres of local “Waragi” and 1.4 million litres of “Tonto” are annually traded in Kampala.

Fibre products

Banana paper made from banana fibres. Large banana producing countries are seen to have a competitive advantage on international markets but locally a relatively small market is seen selling to tourists, expatriates and wealthy Ugandans. Future growth in Ugandan incomes and tourism are seen to influence market potential for these product types.

Export market²³

Regional export opportunities appear for Matooke in Rwanda and for dessert varieties (Bogoya) in Kenya.

International banana market is increasingly competitive, especially in European Union. Within this context market potential for Ugandan bananas is seen in markets segments including organic or health focused fruit and ‘naturally’ solar dried dessert bananas. Sales of Matooke to Europe have increased, but whereas the small fruited Sukali Ndiizi has become attractive to a growing number of consumers, exports to Europe have declined due to quality issues. If quality requirements can be achieved European market prices appear as attractive.

It seems that most potential exists also for fresh and naturally dried Sukali Ndiizi (solar dried or semi-dried chips) within organic / health market segment, especially in Switzerland, Germany and UK.

¹ Uganda Bureau of Statistics, Uganda National Household Survey 2009/2010. Available from URL: <http://www.ubos.org/UNHS0910>

² <https://www.cia.gov/library/publications/the-world-factbook/geos/ug.html>

³ <http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/tradebulletin2006.pdf>

⁴ <http://faostat.fao.org/site/339/default.aspx>

⁵ C3P Food security brief No.4, Ibadan, Nigeria. <http://c3project.iita.org>

⁶ *FruiTrop 177* (April 2010), p 50.

⁷ Karamura D. 2010. Report on economic significance of banana varieties other than the Cavendish in Uganda.

⁸ Karamura E. et al. 1999. Banana production systems in eastern and southern Africa. pp 401-412 in *Bananas and food security*. Inibap, France.

⁹ Karamura E. et al. 2010. Assessing the impacts of banana bacterial wilt disease on banana (*Musa* spp.) productivity and livelihoods of Ugandan farm households. *Acta Hort.* (ISHS) 879:749-755. http://www.actahort.org/books/879/879_81.htm

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- 10 Ngambeki D. et al. 2010. The extent and causes of banana (*Musa spp.*) market distortions in Uganda. *Acta Hort. (ISHS)* 879:143-150. http://www.actahort.org/books/879/879_12.htm
- ¹¹ Spilsbury JS, Jagwe JN, Ferris RSB. 2002. Evaluating the marketing opportunities for banana and its products in the principle growing countries of ASARECA. Foodnet, International Institute of Tropical Agriculture.
- ¹² Bagamba F. 2010. Market access and agricultural production: the case of banana production in Uganda. VDM Verlag. 176pp.
- ¹³ Uganda Bureau of Statistics, Uganda National Household Survey 2009/2010. Available from URL: <http://www.ubos.org/UNHS0910>
- ¹⁴ <https://www.cia.gov/library/publications/the-world-factbook/geos/ug.html>
- ¹⁵ <http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/tradebulletin2006.pdf>
- ¹⁶ <http://faostat.fao.org/site/339/default.aspx>
- ¹⁷ C3P Food security brief No.4, Ibadan, Nigeria. <http://c3project.iita.org>
- ¹⁸ *FruiTrop* 177 (April 2010), p 50.
- ¹⁹ Karamura D. 2010. Report on economic significance of banana varieties other than the Cavendish in Uganda.
- ²⁰ Karamura E. et al. 1999. Banana production systems in eastern and southern Africa. pp 401-412 in *Bananas and food security*. Inibap, France.
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