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Sweetpotato in the Farming and Food Systems of Uganda: A Farm Survey Report

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SWEETPOTATO IN THE FARMING AND FOOD SYSTEMS OF UGANDA: A FARM SURVEY REPORT

Introduction

Uganda is the largest producer of sweetpotato in Africa. Sweetpotato is an important crop that fits well in the country's farming and food systems. In cultivated area, sweetpotato ranks third after bananas and cassava. It stores well in the soil as a famine reserve crop, withstands extreme weather conditions, and performs well in marginal soils. Because sweetpotato is grown in virtually all areas of the country, it plays an important role in providing household food security. In some households, sweetpotato generates cash income in addition to being a food source.

A typical household owns a sweetpotato plot of less than one acre and cultivates more than five varieties, each identified by a name in the local language. Most varieties have different maturation periods, indicative of farmers' desires for a year-round supply of sweetpotato.

Despite the demonstrated importance of sweetpotato, its production still faces several biological, physical, and socioeconomic constraints. Of major importance are the absence of high-yielding and disease-resistant planting materials, poor agronomic practices, lack of markets, unavailability of farm inputs, the high cost of existing inputs, poor storage facilities, limited use opportunities, and infestations of insect and vertebrate pests. Yields on farms remain as low as 4 t/ha (MAAIF, 1992). Although yields are substantially below their potential, experimental yields of more than 25 t/ha have been obtained with the use of fertilizers.

Whereas production for the period 1970-1984 experienced a negative annual growth rate of 0.2%, between 1985 and 1989 production increased annually at a rate of 0.7% (Vanegas and Bashaasha, 1991). After 1989, production continued to expand.

Since its introduction, sweetpotato has received little policy and research attention. This relative neglect is partly because of sweetpotato's status as a subsistence crop and because of historical research and policy bias toward cash crops.

In the 1980s, research on sweetpotato in Uganda was conducted in collaboration with the International Development Research Centre (IDRC) of Canada, the International Institute of Tropical Agriculture (IITA), and the International Board for Plant Genetic Resources (IBPGR), within the framework of the National Root Crops Programme (Mwanga et al., 1991). This research was largely biological, with little or no socioeconomic content.

A commodity-specific sweetpotato research team was put together in 1989 when collaboration with the International Potato Center (CIP) started. CIP has helped the programme to obtain additional funds from GTZ (Germany), FICAH (Food Industry

Crusade Against Hunger), and USAID to complement government research funding. In 1989, baseline diagnostic surveys were begun in major sweetpotato-producing regions of Uganda.

Objectives and Main Findings of the Farm Survey

The overall goal of the sweetpotato programme is to increase and sustain sweetpotato yield and promote consumption in the context of food security, income generation, and system stability. The specific survey objectives were to:

1. Document the role of sweetpotato in the farming and food systems of Uganda.
2. Identify production constraints and opportunities.
3. Identify use constraints and enhance understanding of the current patterns of sweetpotato marketing, preservation, and consumption.
4. Generate information to guide on-farm research.
5. Establish general ex ante information (baseline data) for future impact assessment.

Salient findings of this study are:

- Sweetpotato is grown by rural households for food and cash, and women play a major role in cultivating the crop.
- Sweetpotato is cultivated on small plots, mainly in upland areas, during the rainy season.
- Valley bottoms are used for "vine storage" during prolonged droughts.
- Most farmers provide their own planting materials or obtain vines free from neighbours; during extreme weather conditions, vines are bought and sold.
- Although vines are usually planted on mounds, ridges are used in highland areas in lieu of mounds as a way to control soil erosion.
- Mounds vary in size, and number of vines per mound is a function of mound size.
- Sweetpotato is planted and harvested throughout the year, with peak periods for both planting and harvesting in March-April and June-August.
- In most areas, sweetpotato comes either first or last in the rotation, and weeding is done once or twice depending on weather conditions.
- Though high in vitamins, sweetpotato leaves are not consumed by people in most areas, but are used as green manure, burned, or fed to livestock.

- Sweetpotato is commonly sole-cropped, although it is occasionally intercropped with beans, maize, and other crops.
- Piecemeal harvesting (partial harvesting over an extended period of time) is common except when larger quantities are harvested for sale.
- Farmers rarely use purchased inputs in production.
- During the harvest period, people consume sweetpotatoes every day and sometimes every meal. Even in times of scarcity, they eat sweetpotatoes at least twice a week.
- Peeling and boiling or steaming is the most common method of preparation.
- Farmers perceive high labour and transport costs as the most important factors constraining productivity.
- Sweetpotato weevils and sweetpotato butterflies are viewed as potentially serious pests.
- Farmers believe that drought is the most important abiotic stress.

Selection of the Study Areas, Farmers, and the Pilot Survey

The study aimed to cover Uganda's four agroecological zones. Because a sample frame could not be obtained, we used non-random sampling techniques. Even if a sample frame had been available, the task of "hunting out" randomly selected farmers would have been tedious and costly.

We based the selection of district and village (parish) subdivisions on annual production figures. We used secondary production data from the planning division of the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) to select nine major sweetpotato-producing districts: Apac, Mbale, Kabale, Gulu, Iganga, Mpigi, Luwero, Kabarole, and Arua (Figure 1).

County and subcounty selection was based on production data available at the district agricultural office. We selected parishes and villages based on the knowledge of local leaders, chiefs, resistance councils (RCs), and local agricultural staff, and on accessibility.

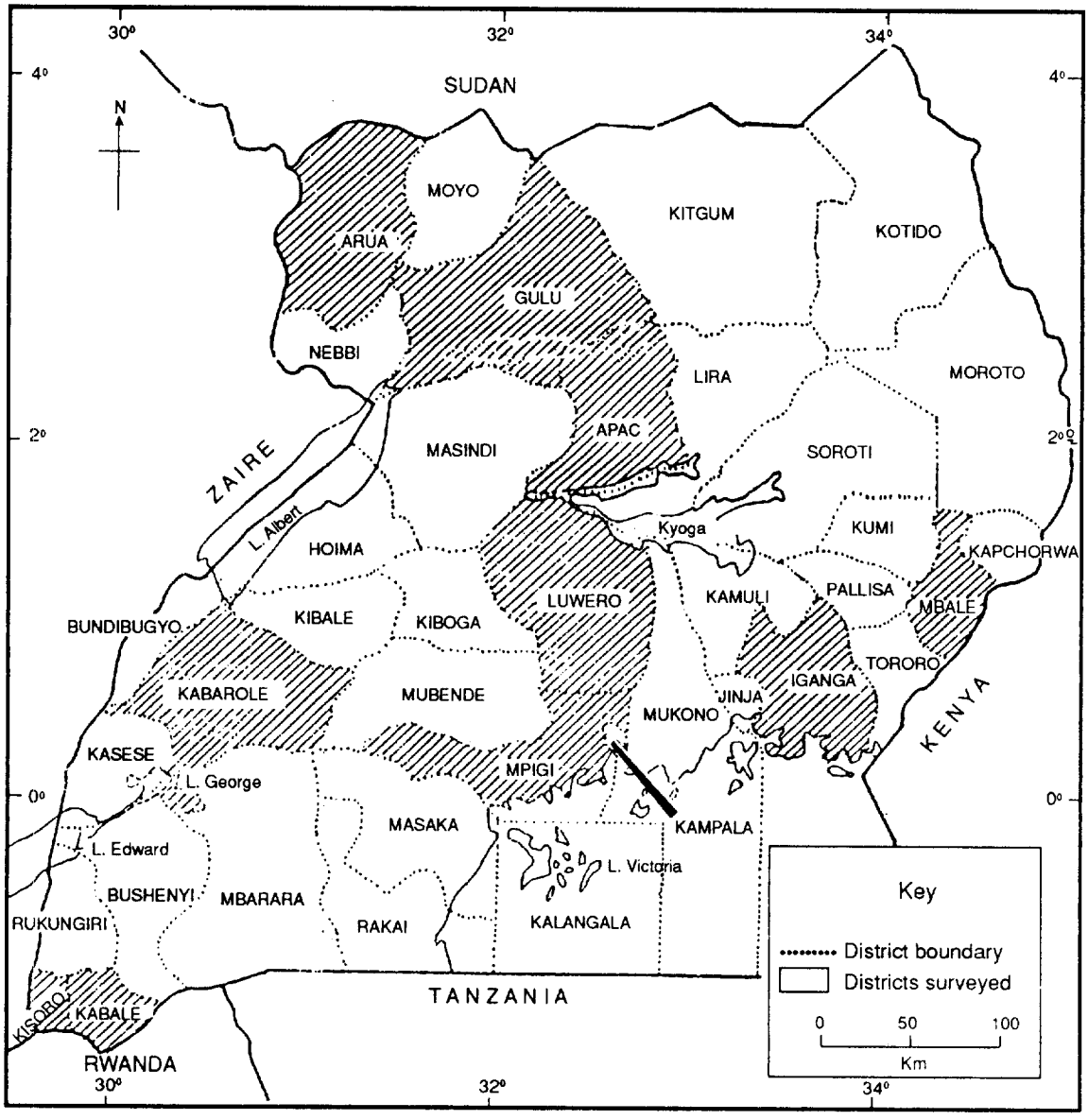


Figure 1. The surveyed districts of Uganda, 1989 - 1992.

Once in the selected village, we interviewed every farmer who met our criterion of having a sweetpotato field. We used structured questionnaires on production and consumption, checklists for key informants, and direct field observations to obtain information. A single-visit survey was canvassed. The target was a minimum of 45 respondents for the production questionnaire and 20 respondents for the consumption questionnaire per district. Information obtained from the district agricultural team and key informants using checklists complemented the questionnaires.

Researchers participated as enumerators and, where necessary, interpreters assisted. Four hundred and nineteen farmers responded to the production questionnaire, and 216 individuals provided information on sweetpotato consumption and use.

Apac and Mbale districts were surveyed in late 1989, and results were reported in 1990 (Ministry of Agriculture, 1990). We surveyed the remaining seven districts between November 1990 and March 1992, and they are the focus of this report, which also includes information from the pilot study, when warranted.

Agroecological and Demographic Contexts

The sites in the nine selected districts cut across the four principal agroecological zones of Uganda (Figures 1 and 2). Mbale to the east and Kabale to the southwest are in the high-altitude zone. These areas have a near-temperate climate and can produce temperate crops.

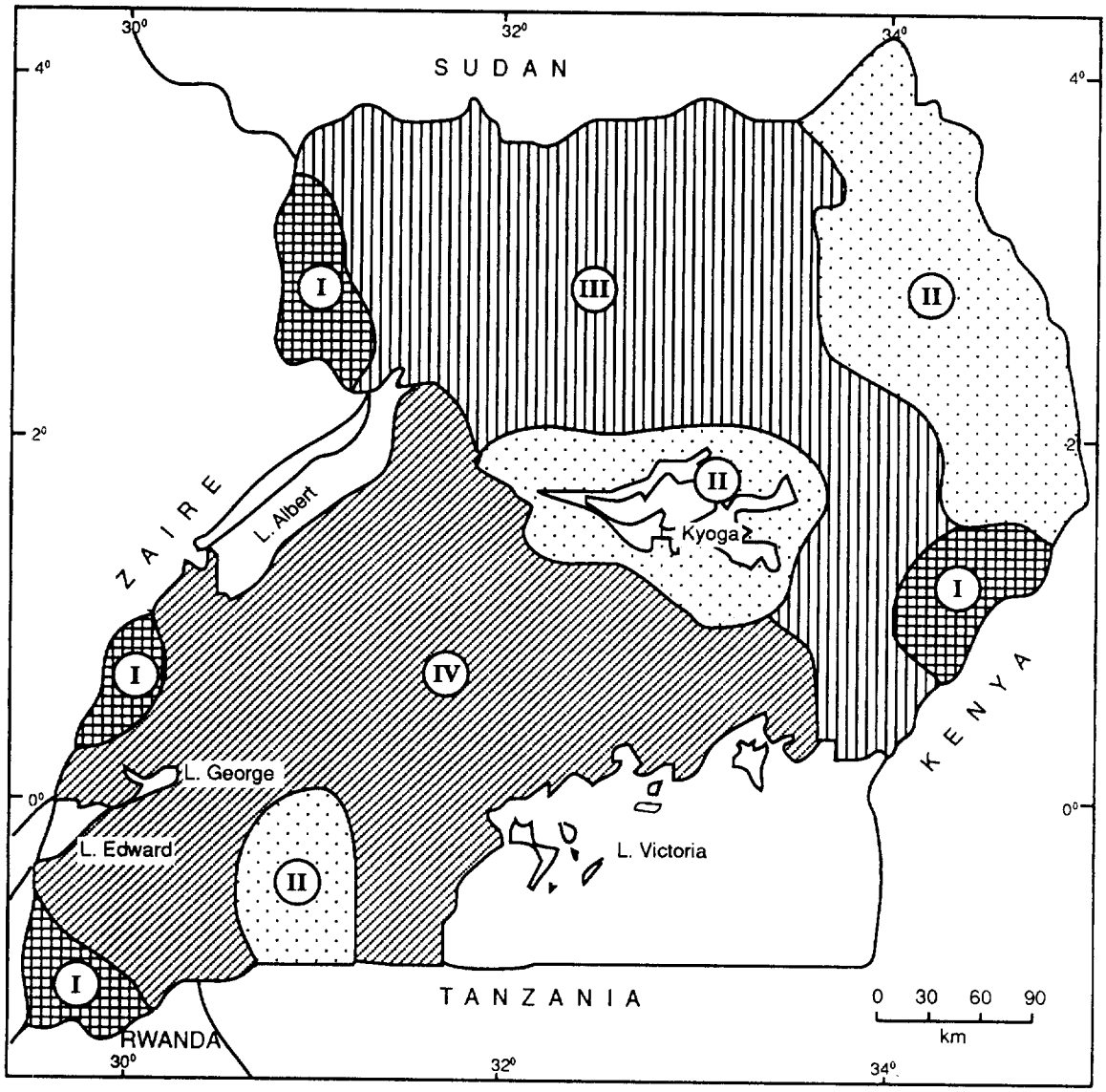
Iganga district to the east belongs to the short-grassland zone, the pastoral dry to semi-arid rangeland zone, and the southern and western tall-grassland zone.

The northwestern districts of Apac, Gulu, and Arua lie in the short-grassland zone. The southern part of Arua extends into the high-altitude zone.

Mpigi, Luwero, and Kabarole districts are located in the southern and western tall-grassland zone, which supports both perennial and annual crops in mixed farming systems. Mpigi district surrounds Kampala, Uganda's main urban center.

The northern part of Luwero extends into the pastoral dry to semi-arid rangeland zone. The western part of Kabarole is typical of the high-altitude zone that mainly represents Kasese and Bundibugyo districts.

All nine districts receive bimodally distributed rainfall. Mpigi is the wettest district, with annual average rainfall ranging from 1,250 to 1,625 mm; Luwero is the driest, with 825 to 1,250 mm per annum. In general, as one moves from the equator northward, the length of the dry season increases.



High-altitude zone

I Rigesi, Sebei, some parts of Ankole, West Nile, Toro, and Mbale. Producing temperature zone crops.

Pastoral dry to semi-arid rangeland zone

II East Ankole, West Masaka, Karamoja. Practicing pastoral systems.

Northern and eastern short-grassland zone

III Short grasslands and producing cotton, and finger millet. Mixed farming systems.

Southern and western tall-grassland zone

IV Tall-grass areas. Producing perennial and annual crops in mixed farming systems.

Figure 2. Distribution of Uganda's four major agroecological zones.

In 1991, Uganda's population was estimated to be 16,582,700 (1991 census, preliminary results). The nine surveyed districts contain about one-third of Uganda's population, or 5.6 million people in 1991 (Table 1). Iganga is the most populated of the surveyed districts, Gulu the least populated. These nine districts are overwhelmingly rural. Mpigi has the highest urban population because it is nearest to Kampala. Population density is greatest in the high altitude zone.

Table 1. Demographic characteristics of the surveyed districts in 1991.

District density	Population	Urban %	Intercensal annual growth rate (%) (1980-1991)	Area (km^2)	Population density (persons/km^2)
Kabale	417,218	7.0	2.2	1,653	246
Gulu	338,427	11.3	2.1	11,560	29
Iganga	945,783	4.7	3.5	4,823	196
Mpigi	913,867	15.0	2.9	4,486	202
Luwero	449,691	8.1	0.8	8,539	53
Kabarole	746,800	4.9	3.3	8,109	92
Arua	637,600	4.2	2.7	7,595	84
Apac	454,504	1.3	3.4	5,887	77
Mbale	710,980	8.5	2.2	2,504	284

Source: 1991 population and housing census. Statistics Department, Ministry of Planning and Economic Development, Entebbe, Uganda.

Sweetpotato and the Farm Household

In five of the seven districts, the majority of respondents in the production survey were women (Table 2). The high percentage of female respondents testifies to their important role in sweetpotato cultivation.

Table 2. Gender.

District	Number of respondents	Women (%)
Kabale	52	69
Gulu	53	72
Iganga	49	55
Mpigi	47	45
Luwero	50	56
Kabarole	46	62
Arua	49	39

The mean age of all respondents was 42. Most respondents had no formal education or had only some formal primary education. The highest attained level of formal education was found in Kabarole and Arua districts where 27% of the respondents had at least some secondary education (Table 3).[1]

Table 3. Education.

District	Number of respondents	Education level	
		Primary and below	Secondary and above
		%	
Kabale	52	98	2
Gulu	53	89	11
Iganga	49	86	14
Mpigi	47	80	20
Luwero	50	84	16
Kabarole	46	73	27
Arua	49	73	27

Overall, average household size was 9 persons. In most districts, household composition was equally divided between members older and younger than 14 (Table 4).

Table 4. Size and age.

District	Number of respondents	Mean size of household	Less than 14 years (%)
Kabale	52	7	49
Gulu	53	9	50
Iganga	49	10	51
Mpigi	47	8	52
Luwero	50	9	50
Kabarole	46	8	53
Arua	49	8	48

Assuming that members 14 years and above are actively involved in agriculture, then half of the household members were dependents. This has serious implications for the size of the available household labour force and underscores the importance of

1. In Uganda, nursery school lasts one year, primary school 7 years, and secondary school 4 years. A postsecondary technical or agricultural college typically offers 2 years of coursework, and a bachelor's degree at the university takes a minimum of 3 years.

developing agricultural innovations that do not call for extra labour. Family labour availability can be a serious bottleneck. Hired labour is rarely used because of the lack of cash.

Most of the respondents were full-time farmers (Table 5), ranging from 68% in Iganga to 90% in Luwero. In general, women are more involved in sweetpotato cultivation, whereas more men engage in part-time farming.

Relatively low levels of off-farm income were reported; these indicate the scarcity of off-farm employment opportunities in most parts of rural Uganda.

Table 5. Occupation and source of income.

District	Number of respondents	Mean percentage		
		Full-time farming	Part-time farming	Off-farm income
Kabale	52	76	24	10
Gulu	53	75	25	12
Iganga	49	68	32	6
Mpigi	47	71	29	8
Luwero	50	90	10	12
Kabarole	46	69	31	10
Arua	49	69	31	11

The majority of respondents owned and cultivated land allocated by a family leader (Table 6). Land ownership is mainly under customary tenure. Renting land to cultivate sweetpotato was not common. The low estimate of rented land in Kabale is suspect. Some respondents may have given false information because of a widespread suspicion that the government was planning to move them.

Table 6. Incidence of use of rented land.

District	Number of respondents	Percentage of land rented		
		None	1-50	> 50
Kabale	47	89	9	2
Gulu	52	65	16	19
Iganga	45	82	6	12
Mpigi	41	68	19	13
Luwero	46	63	17	20
Kabarole	45	93	3	4
Arua	47	60	29	11

Sweetpotato and the Farming System

Sweetpotato, at about 20% of the cropped area, occupies a prominent role in the farming systems in the surveyed districts. Farmers combine the different system components to achieve several objectives, such as food security (through own production or cash purchases), cash availability, risk minimization, and social prestige.

Unfortunately, most system components compete for the farmers' scarce resources. Whereas no attempt was made to investigate nonfarm enterprises, with about 25% of respondents in most districts being part-time farmers and about 10% reporting off-farm income sources, nonfarm enterprises are clearly important system components (Table 5).

Most households also own one or more kinds of livestock, mainly poultry, goats, sheep, pigs, and cattle. Livestock contribute to the system in terms of cash, protein (milk and meat), manure, draft power, and prestige.

Area allocation to different crops

The mean area under sweetpotato ranged from 0.3 acres in Arua to 1.3 acres in Mpigi (Table 7). These estimated averages should be used with caution, however, because the data were collected during different seasons over a two-year period. The amount of land planted to sweetpotato can vary considerably from season to season in the same district. For example, in Arua, at the time of the interview, most farmers had only small plots of sweetpotato for seed propagation in swamps because of a prolonged drought.

Table 7. Mean area (in acres) under sweetpotato.

District	Number of respondents	Mean (acres)
Kabale	49	0.85
Gulu	53	0.63
Iganga	48	0.88
Mpigi	41	1.34
Luwero	45	0.69
Kabarole	43	0.74
Arua	42	0.33

Although the area planted to sweetpotato in Table 7 is small in absolute terms, it is large in relative terms (Table 8). These smallholder farming systems also show diversity (Table 8).

Table 8. Relative importance (%) of each crop by district in the respondent households (the numbers in parentheses).

Crop	Agroecological zone and district (sample size)						
	High altitude	Mixed grassland	Short grassland		Tall grassland		
	Kabale (52)	Iganga (50)	Gulu (53)	Arua (50)	Luwero (51)	Mpigi (48)	Kabarole (46)
Sweetpotato	20.4	24.3	19.4	0.3	22.6	37.6	16.0
Sorghum	27.1	0.7	20.0	5.5	0.3	0.9	2.4
Cassava	0	16.0	13.8	29.7	17.6	13.6	12.7
Maize	8.2	21.1	8.6	5.9	4.6	8.8	6.3
Irish potato	7.9	0	0	0	1.2	0	1.7
Millet	1.8	3.2	8.2	13.6	0.7	0	7.4
Banana	4.2	5.6	0	0	14.1	16.9	24.1
Rice	0	0	3.6	0.1	0	0	0
Yams	0	0	0	0	0	1.6	0
Beans	18.8	10.9	4.2	13.1	8.2	8.8	15.1
Groundnuts	0	3.7	7.1	5.3	7.8	1.9	10.5
Sesame	0	1.3	8.7	1.8	0.2	0	0
Sunflower	0	0	2.8	2.7	0	0	0
Pigeonpea							
Cowpea	0	0	0	0	0	1.1	0
Green gram	0	0	0.2	0	0	0	0
Soybean	0	3.2	0	0	0.8	0	0.4
Peas	6.8	0.7	0	0	0	0	0
Other vegetables	1.1	0	1.1	0.4	1.5	2.4	0.6
Pineapple	0	0	0	0	0	0.4	0
Coffee	0	8.2	0	0	15.5	5.0	2.7
Cotton	0	1.1	0	0.3	0	0	0
Tobacco	0	0	0	3.0	0	0	0

In the high-altitude areas, sweetpotato is the major root crop in Kabale, whereas cassava predominates in Mbale. Maize, finger millet, sorghum, Irish potato, and banana are other important crops. High-altitude fruits and vegetables are also grown.

In Kabale district, sorghum is allocated the most land because it is a staple, popular for sorghum bread, porridge, and beer. Sweetpotato also accounts for substantial land in Kabale because it is more important for home consumption than is Irish potato, the other important root crop. Cassava is rarely grown. Vegetables are an important cash crop because the cool climate favours their production.

In the pastoral dry to semi-arid rangeland zone, the major food crops are sweetpotato, cassava, maize, millet, and banana. Cotton is the main traditional cash crop. In the more northerly, drier Apac, the major food crops grown (in order of importance) are cassava, sweetpotato, finger millet, sorghum, and maize. Other crops are beans, sunflower, groundnut, cabbage, and pigeonpea. In the pilot survey, many farmers reported having abandoned cotton cultivation.

In the northern and eastern short-grassland zone, finger millet, cassava, sweetpotato, maize, and sorghum are important food crops. The major traditional cash

crop for this zone is cotton. In Gulu district, sorghum and millet are important grains for food, porridge, and brewing. Sweetpotato and cassava are the major root crops. They are used for food and cash generation, and occasionally for brewing local beers. Sesame (simsim) and maize are also important subsistence crops, although with the current drive for nontraditional export crops they are becoming important sources of cash as well.

Cassava is the most popular root crop in Arua, and it was cultivated quite extensively as people returned from Sudan at the end of the civil war (1991-1992). Sweetpotato is, however, important in this area as a recovery crop following drought because it has a shorter maturity period than cassava.

In the southern and western tall-grassland zone, the major food crops are banana, sweetpotato, cassava, maize, and finger millet. The major traditional cash crop is coffee. In Mpigi district, banana is the preferred staple. Although sweetpotato and cassava are also consumed, most production ends up in Kampala markets, where both root crops are popular foods, especially for the urban poor.

In Luwero, sweetpotato also occupies the most cultivated land, followed by cassava, coffee, and banana. Luwero is relatively dry and close to Kampala. Both sweetpotato and cassava are important food and cash crops.

In Kabarole district, banana occupies the largest share of cultivated land (Table 8). Banana is the most popular staple food, followed by sweetpotato, beans, and cassava.

Sweetpotato is the most important root crop for the Basoga people residing in Iganga although maize, cassava, and banana are also extensively consumed. Sweetpotato also finds a ready market in the nearby industrial area of Jinja. The crop plays an important role in Iganga, Uganda's most populated district.

Crop calendars and labour demand

District crop calendars show planting and harvesting dates of major crops (Figures 3 to 9). The planting of most major crops is concentrated March-April—the beginning of the first rains in most areas of Uganda. Harvesting of most annual crops takes place from July to September in most districts. This is the dry season, the most suitable time for harvesting and drying. Swamp cultivation, if practiced, occurs during the dry season.

Whereas most farmers reported planting and harvesting sweetpotato throughout the year, planting is concentrated in March-April. Sweetpotato competes for labour with other crops during this planting period.

When labour becomes too limiting, sweetpotato planting is extended to May, when rains are tapering off. Farmers recognize that compared to other crops sweetpotato can establish itself at a lower soil moisture content. Sweetpotato can be harvested at any time of the year, and piecemeal harvesting can extend up to 12 months after maturity for some varieties.

Several crops compete for farmers' labour during peak planting and harvesting periods (Figure 3).

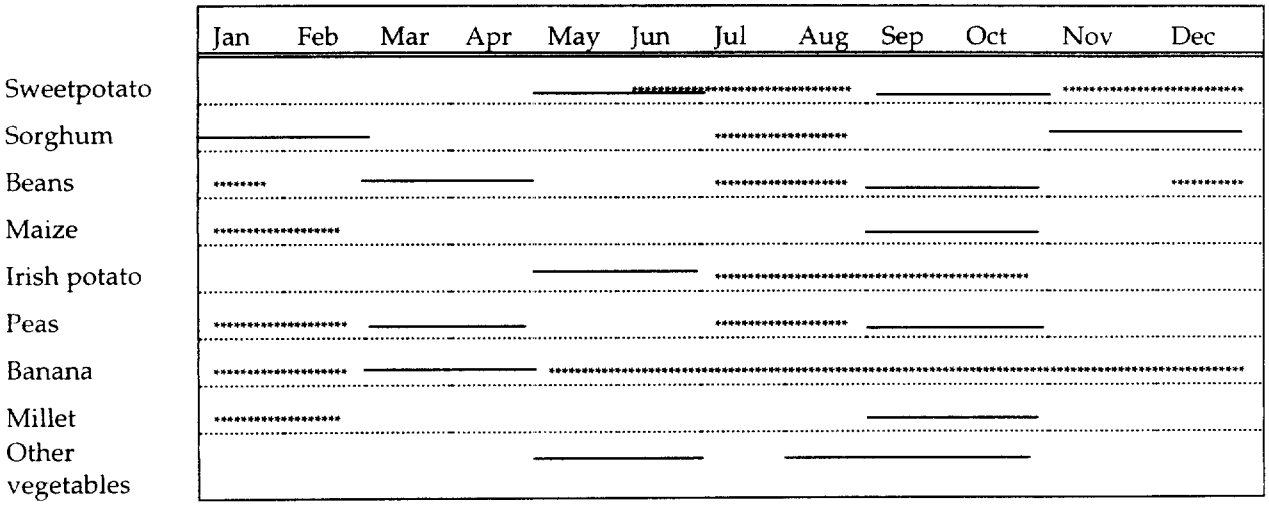


Figure 3. Crop calendar for major crops grown in Kabale district (— planting, * harvesting).**

In Gulu, different crops compete for planting labour in March-April and again compete for harvesting labour in July-August (Figure 4).

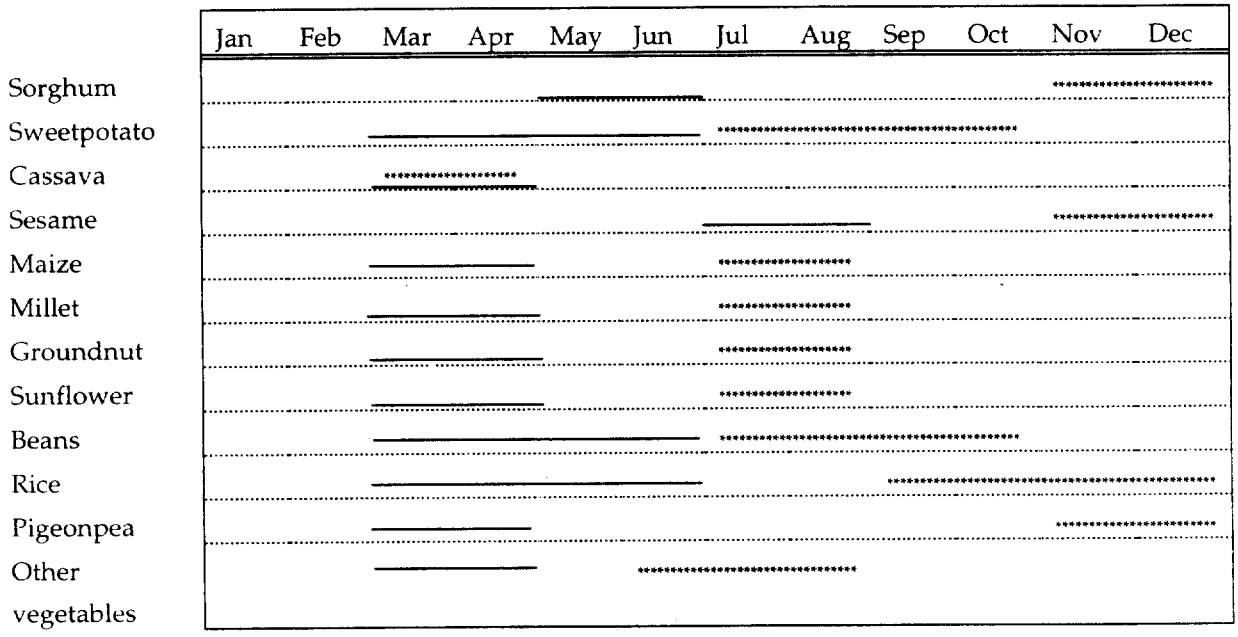


Figure 4. Crop calender for major crops grown in Gulu district (— planting, * harvesting).**

In Iganga, many crops compete for labour during the March-April planting and the July-August harvest (Figure 5).

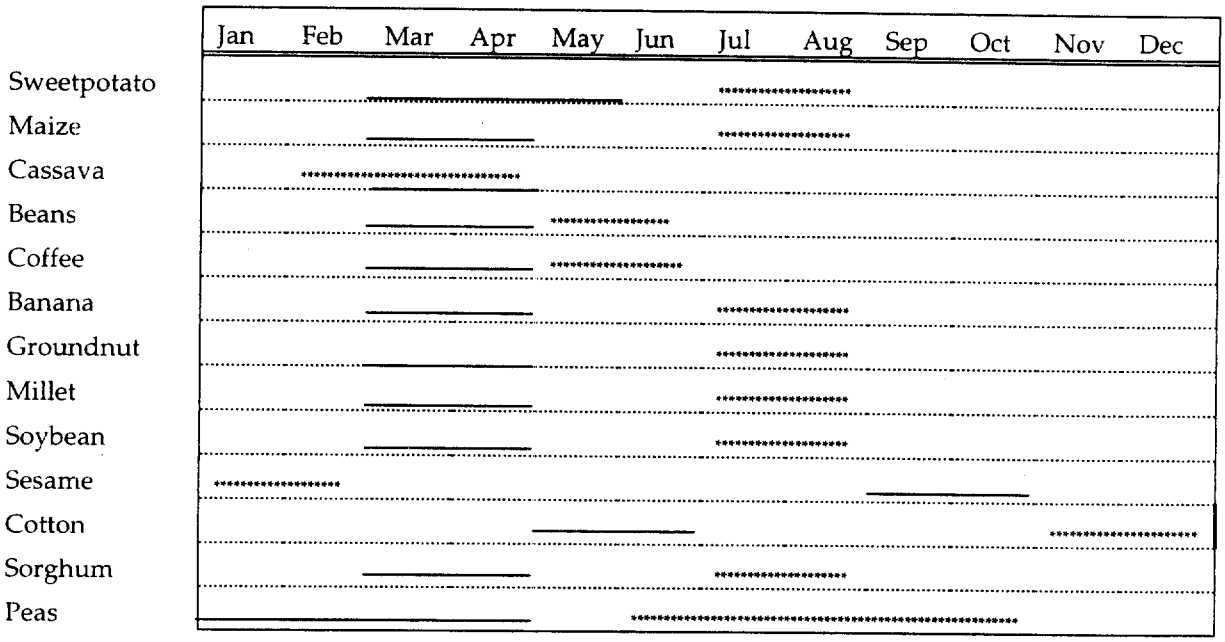


Figure 5. **Crop calendar for major crops grown in Iganga district (— planting, *** harvesting).**

In Mpigi and Luwero districts, farming activities are more evenly spread temporally, but peak labour demand still occurs in March-April (Figures 6 and 7).

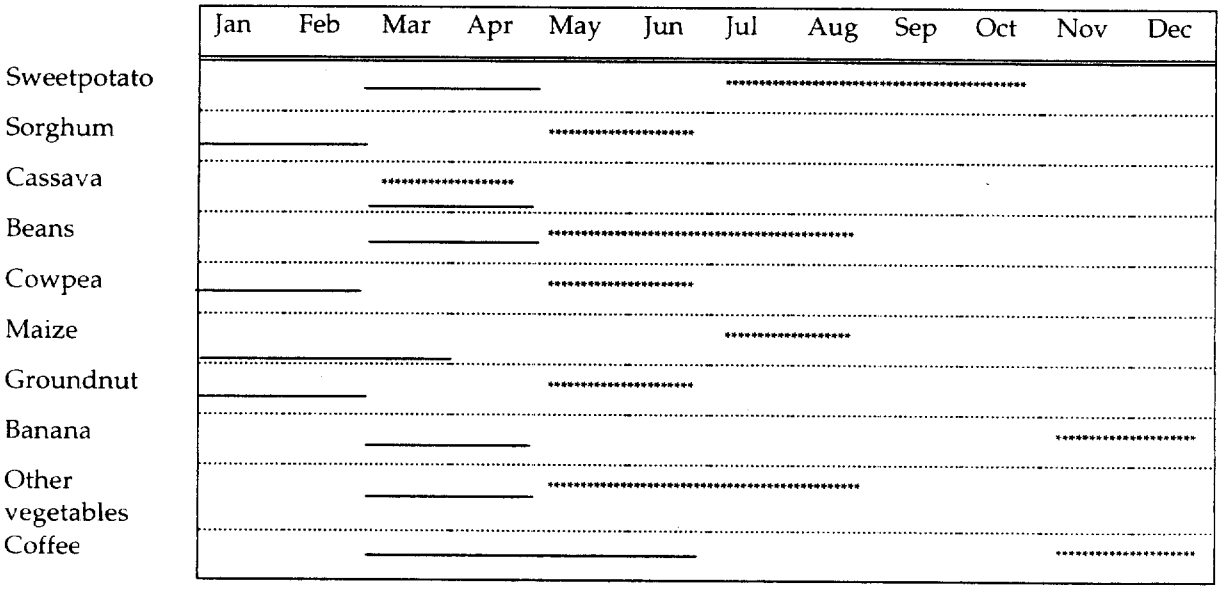


Figure 6. **Crop calendar for major crops grown in Mpigi district (— planting, *** harvesting).**

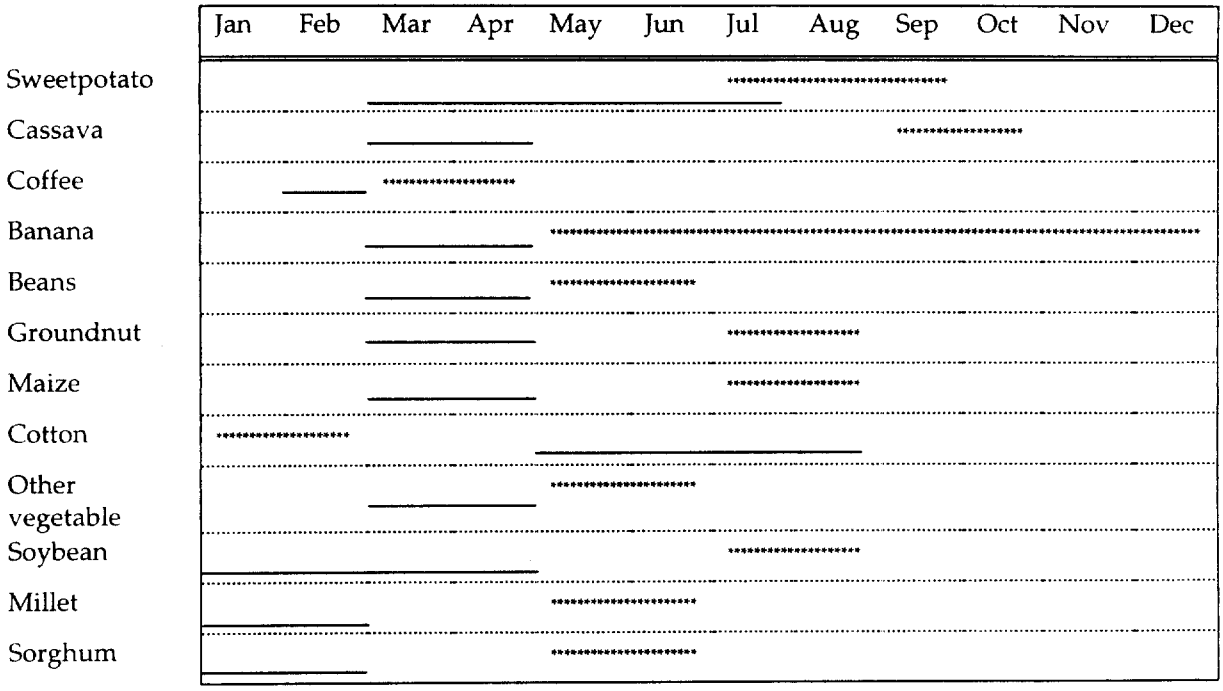


Figure 7. Crop calendar for major crops grown in Luwero district (— planting, * harvesting.**

The highest labour demand in Arua and Kabarole districts is also concentrated in the March-April planting season (Figures 8 and 9).

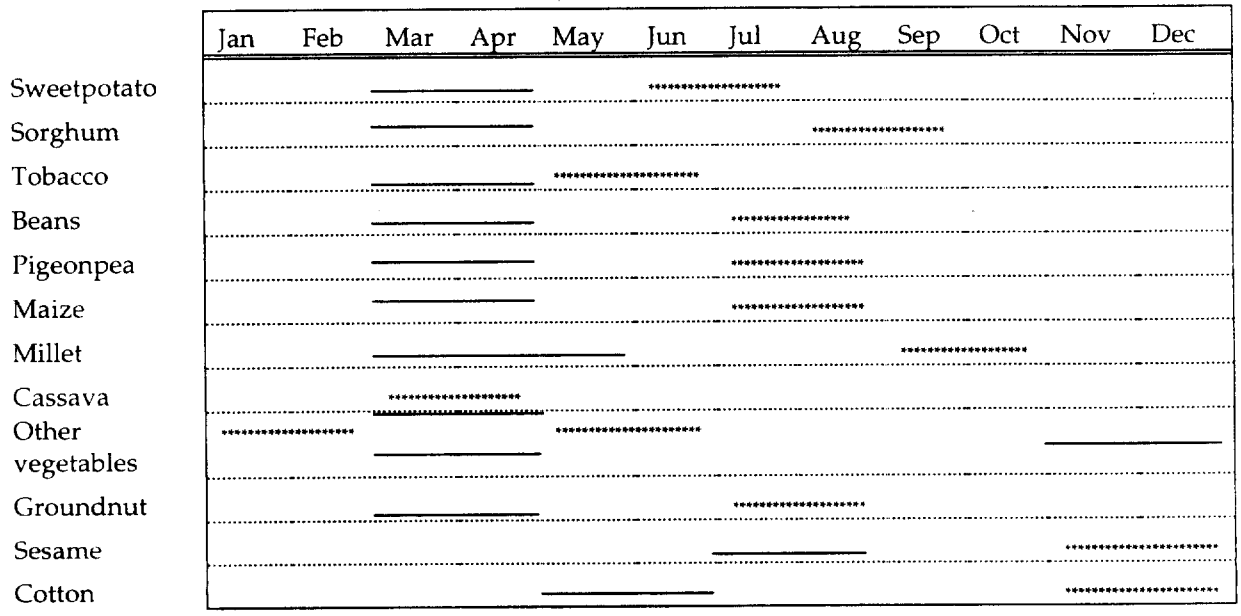


Figure 8. Crop calendar for major crops grown in Arua (— planting, * harvesting)**

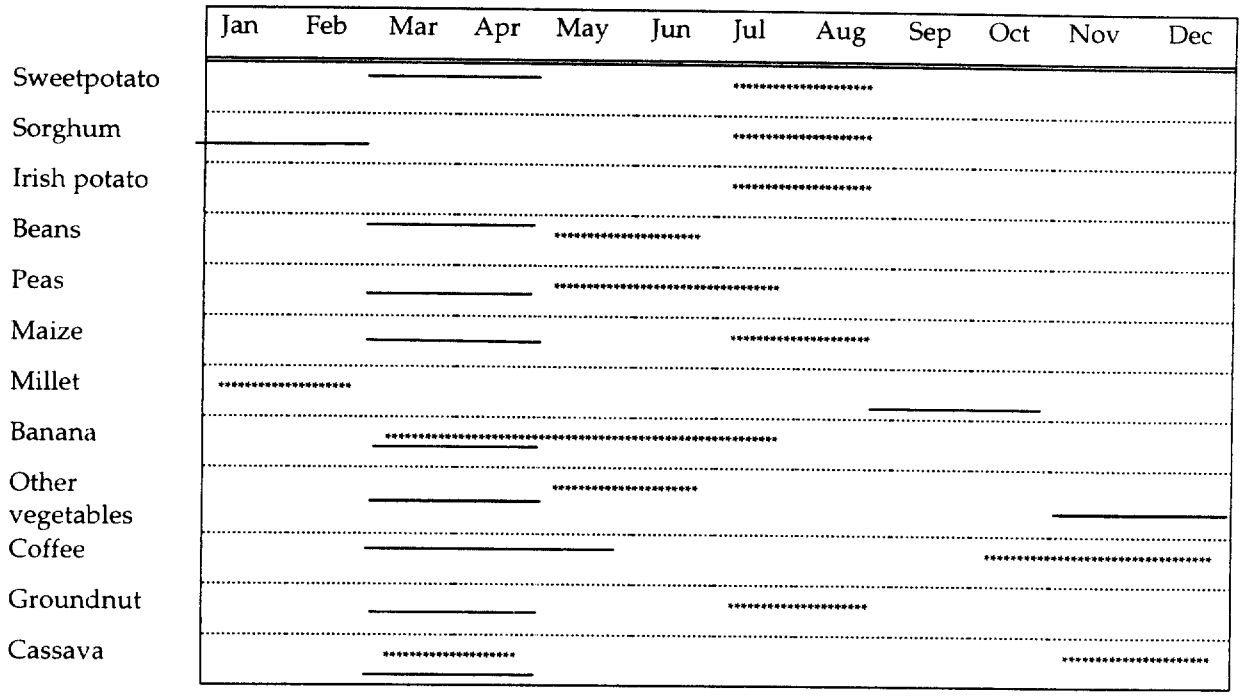


Figure 9. Crop calendar for major crops grown in Kabarole district (— planting, * harvesting).**

Multiple plantings of sweetpotato are common. For example, 64% of Apac respondents planted sweetpotato twice a year. In Mbale, three plantings was the modal number. In Apac, early planting for the first rainy season is in April-May, but it is still safe to plant in June. Planting in mid-July to August is the earliest possible time for the second rainy season, but some farmers plant as late as December. In Apac, 40% of the respondents perceived that ideal planting dates were variety-specific.

In summary, although sweetpotato is planted and harvested throughout the year, in most districts of Uganda the first rains (main rains) start in March or April, and this is the peak planting season. Peak harvesting occurs from June to September. Crops that are usually less tolerant of water stress are planted earlier in the season, and more hardy crops, such as sweetpotato and cassava, are sown later. Sweetpotato therefore fits well in the farm labour profile because farmers can afford to postpone its cultivation for some weeks, often without disastrous consequences.

Intercropping with sweetpotato

Sweetpotato is mainly cultivated as a sole crop, but intercropping is important in some districts (Table 9). Associating sweetpotato with beans was the most popular intercropping system. To a markedly lesser extent, beans, cassava, and maize were also planted in the same field with sweetpotato. In areas with high population densities (Kabale, Iganga, and Mpigi), sweetpotato intercrops appear to be more common.

Intercropping is probably a response that attempts to maximize returns from land. In the pilot study districts of Apac and Mbale, almost all farmers sole-cropped sweetpotato.

Table 9. Intercropping of sweetpotato.

District	Number of respondents	Sole-cropping (%)	Intercropping (%)		
			Beans	Cassava	Maize
Kabale	52	56	42	0	2
Gulu	53	60	38	0	2
Iganga	49	64	30	6	0
Mpigi	47	67	27	6	0
Luwero	50	96	2	2	0
Kabarole	46	63	28	2	7
Arua	49	61	35	0	4

Sweetpotato and crop rotations

In the high-altitude zone, 40% of Kabale respondents cultivate sweetpotato following a fallow period or sweetpotato comes next to last or last in the rotation system. In addition, 46% of Kabale respondents report that sorghum follows sweetpotato in the rotation. Distinct rotation systems for Kabale district are:

fallow -> sorghum -> sweetpotato -> beans/maize
fallow -> peas -> sweetpotato -> sorghum -> Irish potato

A generalized rotation system for Mbale, the other largely highland district, is cotton -> millet -> sweetpotato/cassava. In Mbale, cassava is regarded as a resting crop. In other words, cassava is left in the ground for 2-3 years, and harvested piecemeal (bit by bit) as needed. Cassava varieties that do not easily rot are selected for this purpose.

In the pastoral dry to semi-arid rangeland zone, rotation systems are diverse, but include:

fallow -> maize/beans -> cassava/millet -> sweetpotato
-> beans/maize or millet -> cotton -> cassava -> fallow.

In the northern and eastern short-grassland zone, rotation systems also vary, but generally include:

fallow -> cotton -> millet -> sesame -> cassava/fallow or
fallow -> sesame -> cassava -> sweetpotato -> maize/fallow.

In the southern and western tall-grassland zone, common rotations are:

fallow -> sweetpotato -> maize/beans -> millet -> cassava ->sweetpotato or fallow -> maize/beans -> sweetpotato -> cassava -> millet.

The tendency in this zone is to have sweetpotato second or third after a fallow, followed or preceded by a maize/bean intercrop.

The cropping systems described above are mere generalizations; rotations vary even by household. Each household formulates its own rotation system based on its resource endowments and priorities. Cropping systems analysis is further complicated because systems change according to climatic and economic factors as perceived by the household.

The Sweetpotato Cropping System

Uganda has different sweetpotato cropping systems in different areas. There are differences in seedbed type, rotation systems, intercrops, varieties grown, and type of land used for the cultivation of sweetpotato. Even where the same type of seedbed is used, seedbeds have differences in shapes and dimensions across farms, districts, and agro-ecological zones.

The dynamics of sweetpotato production and the land resource base

Most farmers have had a long experience cultivating sweetpotato. The average period of growing the crop ranged from 16 years in Mpigi district to 28 years in Gulu (Table 10). The majority of the respondents, therefore, have been growing sweetpotato for most of their lifetimes.

Table 10. Experience (in years) growing sweetpotato.

District	Number of respondents	Mean	Maximum	Minimum
Kabale	30	25	65	2
Gulu	42	28	60	3
Iganga	50	22	53	1
Mpigi	47	16	50	1
Luwero	49	20	51	2
Kabarole	45	19	50	2
Arua	48	21	70	1

Districts with high population pressure such as Iganga, Kabale, and Mpigi have experienced reductions in area devoted to sweetpotato over the past five years. Sweetpotato area is expanding in sparsely populated districts such as Gulu (Table 11).

Table 11. Change in sweetpotato area.

District	Number of respondents	Change in %		
		Increase	Decrease	Unchanged
Kabale	52	33	57	10
Gulu	53	73	22	5
Iganga	51	18	76	6
Mpigi	49	33	65	2
Luwero	50	41	57	2
Kabarole	46	47	42	11
Arua	49	47	42	11

However, with the continuing deterioration of soil fertility, expansion of banana weevil infestation, and high incidence of cassava mosaic disease in many districts, most farmers are likely to expand their sweetpotato acreage in the near future to ensure household food security.

In densely populated Kabale, sweetpotato acreage is decreasing. Some 57% of respondents have reduced the area devoted to sweetpotato since they started producing. Declining yield was reported as the main reason. Because of severe land pressure in Kabale, an increase in one crop usually means a decrease in another.

The opposite occurs in Gulu. Unlike Kabale, Gulu district still has virgin land that can be brought under cultivation.

In Kabale, declining soil fertility and disease are the most serious problems affecting sweetpotato production. In all other districts, lack of reliable markets, low prices in inaccessible areas, and the absence of household storage methods are more important contributors to shrinking sweetpotato acreage than are viruses and pests.

Uplands are commonly used for sweetpotato cultivation. But where population pressure has reduced land availability, swamps are used, even during the rainy season. During the dry season, farmers usually cultivate swamps not only to obtain roots but also to "store" vines for the coming planting season. During the rainy season, most swamps are flooded and hence difficult to cultivate.

Farmers cultivate uplands where soil moisture content is suitable. During the dry season, soil moisture declines in the uplands, while in swamps water recedes, making room for cultivation. Sweetpotato and vegetables are typically planted during the dry season.

Large trenches are dug to drain parts of the swamp for cultivation. Mounds or raised beds are used because they facilitate soil drainage.

In Kabale, about an equal percentage of respondents grow sweetpotato on upland, swamp, and flat land (Table 12). Because of population pressure in Kabale, most of the land, including hills and swamps, is used for agricultural production.

In some areas, swamps exist but are not easy to use when there is no distinct dry season during which the land drains to some extent, making them easier to manage.

Table 12. Topography of land used for sweetpotato.

District	Number of respondents	Topography of land (% response)					
		Upland	Swamp	Flatland	Upland and swamp	Upland and flatland	Swamp and flatland
Kabale	52	34	6	13	13	34	0
Gulu	51	14	2	29	33	0	22
Iganga	49	59	12	0	0	0	0
Mpigi	47	100	0	0	0	0	0
Luwero	49	98	2	0	0	0	0
Kabarole	45	100	0	0	0	0	0
Arua	49	2	0	0	98	0	0

Sweetpotato is a rustic crop, relatively tolerant of drought and infertile soils. In most cropping systems, the crop is either planted early to suppress stubborn weeds such as couch grass (*Digitaria scalarum*) or late on land too poor for most other crops. Most farmers also note that a finer seedbed is achieved after a sweetpotato crop.

In general, survey respondents use good land for sweetpotato (Table 13).

Table 13. Fertility of land cultivated in sweetpotato.

District	Number of respondents	Fertility of land (% response)				
		Poor	Good	Newly opened	Overused/eroded	Any land
Kabale	52	26	56	16	2	-
Gulu	51	54	4	-	42	-
Iganga	51	18	45	27	6	4
Mpigi	47	2	77	15	6	-
Luwero	49	22	24	15	39	-
Kabarole	45	13	69	-	18	-
Arua	49	8	84	2	6	-

Even though most farmers use good land for sweetpotato, they are aware that the crop has too much vegetative growth and not enough storage-root development when

grown on very good soils. This explains in part why some farmers use poor, overused, or eroded land for sweetpotato production. It is difficult for most farmers to determine optimal fertility for sweetpotato cultivation. The general consensus is that soils of medium fertility are good for sweetpotato.

Seedbed management and propagation practices

Mounds are the most common type of seedbed except in highland areas of Kabale, Kabarole, and Arua, where both mounds and ridges are used (Table 14). Mounds vary in diameter and height as does the number of vines planted per mound. Where soils are good (i.e., friable and light to medium), there is a tendency to have larger mounds than where soils are hard and difficult to work.

Table 14. Sweetpotato seedbed management.

District	Number of respondents	Seedbed type (% response)			
		Mound	Ridge	Mound/ridge	Flat
Kabale	51	0	84	16	0
Gulu	53	100	0	0	0
Iganga	49	100	0	0	0
Mpigi	47	100	0	0	0
Luwero	50	100	0	0	0
Kabarole	46	59	25	16	0
Arua	49	37	12	49	2

A typical mound, however, does not usually exceed 1 m in diameter and height. Leaves and manure are sometimes gathered first, and then soil is heaped on top to make a mound.

Ridges are commonly used on hill slopes and in swamps, especially in highland areas. Ridges help control soil erosion on hillside slopes and are used to improve drainage in swampy areas. They are usually several meters long, about 1 m wide, and less than 1 m high. Where mechanization is present, ridges are also used. Ridges or raised beds predominate in swampy areas or valleys.

The number of vines per mound is a function of mound size. Mounds in Kabale and Arua are significantly larger than those in other districts, often with a radius greater than 50 cm. The diversity of mound size and number of vines per mound across farms and districts indicates the limited knowledge on optimal mound size and plant populations by agroecological zone and soil type (Table 15).

Table 15. Vines planted per mound.

District	Number of respondents	Mean	Maximum	Minimum
Kabale	48	9	12	1
Gulu	50	4	4	3
Iganga	35	3	6	2
Mpigi	45	4	10	3
Luwero	46	7	9	4
Kabarole	23	3	6	2
Arua	33	8	15	3

Most farmers obtain vines for planting from their own fields. Only during drought or other natural calamities do farmers resort to procuring planting material from outside their farms. Usually, such material is provided free of charge from neighbors. Under extreme weather conditions, vines are bought and sold. This was the case in Arua, which was visited at the height of a dry season after farmers had just returned to the area. About 10% of the farmers in the 1989 pilot survey in Apac and Mbale also said that they paid cash for vines. Farmers take the need for planting material very seriously and have developed a number of strategies to ensure that vines are available.

Most farmers do not plant vines immediately after cutting, but let them wilt or preroot in a cool place for several days. Most farmers store their vines in the field seedbed covered with trash, or under a tree for up to three days (Table 16). Other forms of vine storage are near the home, on verandahs, in a hole covered with soil, and sometimes inside the house.

Table 16. Method of vine storage.

District	Number of respondents	Storage method (% response)					
		Seedbed	Hole	Under tree	Near home	House	Other
Kabale	27	74	4	15	4	-	4
Gulu	36	19	-	78	-	3	-
Iganga	28	48	-	48	4	-	-
Mpigi	41	64	-	36	-	-	-
Luwero	49	35	-	63	-	-	2
Kabarole	35	51	-	46	3	-	-
Arua	27	15	4	67	4	7	3

Explanations for not planting immediately after cutting include allowing vines time to sprout, lack of time or labour at the household level, drying to avoid breakage at planting, and removal of insect pests. Root formation (sprouting) also figured prominently as a reason for delayed planting (Table 17).

Table 17. Reasons for delaying planting of sweetpotato vines.

District	Number of respondents	Reason for delaying planting (% response)					
		Root formation	Lack time or labour	Drying to avoid breakage at planting	Removal pests	New leaf formation	Other
Kabale	26	4	77	4	-	-	15
Gulu	36	33	3	61	3	-	-
Iganga	28	61	21	-	-	-	18
Mpigi	41	71	2	20	-	5	2
Luwero	46	87	2	-	-	-	11
Kabarole	37	62	14	11	5	-	8
Arua	27	63	30	-	7	-	-

In the pilot survey, planting practices varied markedly between Mbale and Apac, and these differences had implications for the timing of vine storage. In Apac, only 7% of respondents planted vines on the same day they were cut compared 66% of Mbale farmers. In Mbale, vines are planted by hand; hence, risk of breakage diminishes. In Apac, a forked stick is usually used for planting. Therefore, Apac farmers need to leave vines to wither for 3 to 7 days before planting to avoid damage during planting. Apac farmers also reported that withered vines establish faster.

Farmers select planting material based on variety and the condition of leaves. A high proportion of respondents reject planting diseased or wilted vines (Table 18). Farmers recognize that vines will transmit diseases and that diseased vines do not yield well.

Table 18. Criteria farmers use when rejecting vines.

District	Number of respondents	Reasons for rejecting vines				
		Diseased	Wilted	Diseased and wilted	Too old/ young	Other
Kabale	52	43	-	5	-	2
Gulu	50	64	-	34	-	2
Iganga	46	98	-	-	-	2
Mpigi	40	80	-	20	-	-
Luwero	50	100	-	-	-	-
Kabarole	40	63	2	35	-	-
Arua	46	80	11	-	9	-

Although the majority of farmers plant the apical portion of the vine, in some areas they plant the middle part. The selection of healthy vines, particularly the apical portion (roughly the first 30 cm), can significantly reduce the spread of pests and diseases. Farmers also recognize that the apical portion (vigorous vine tip) establishes more rapidly (Table 19).

Table 19. Portion of vine planted.

District	Number of respondents	Apical	Middle	Apical and middle
			%	
Kabale	52	54	2	44
Gulu	53	87	-	13
Iganga	49	94	-	6
Mpigi	47	100	-	-
Luwero	50	100	-	-
Kabarole	44	100	-	-
Arua	49	59	2	39

The mean length of a typical vine for planting ranges from 31 cm in Luwero district to 37 cm in Kabarole district. Generally, it appears that farmers in most areas plant a vine length of 25 to 35 cm.

Varieties

Over time, farmers have selected a number of sweetpotato varieties that are identified by local names. This nomenclature is based on varietal characteristics such as yield, maturity period, root size and shape, leaf size and shape, and other factors such as place of origin and person who introduced the variety.

Even though varieties vary across farms and districts, several varieties are extensively grown in more than one district or agroecology. Such varieties usually tolerate a range of climatic conditions, have a high disease or pest resistance, and yield well. They may be identified by different names in different areas. Currently, farmers are dependent on local land races as no improved varieties have been released.

The number of reported varieties ranges from 36 in Kabarole to 17 in Mpigi. The reported varieties and their characteristics are shown for each district in Appendixes 1 to 7.

Some varieties (notably Kyebandula, Kawogo, Magabari, Sukali, Bitambi, and Tanzania) cut across districts. Most of these have good yields and good root qualities, and perform well in different types of soils.

Preferred sweetpotato varieties tend to be high yielding, resistant to common pests and diseases, of medium maturity with good in-ground storability characteristics,

suitable for piecemeal harvest with no fibers, and of good marketability, medium sweetness, and powdery texture. Most farmers grow more than one variety. Reasons given for this practice include varietal preference, lack of enough vines of any one variety, food security, spreading of yield over time, and losses from storage and pests or diseases.

Varieties such as Nabitololo, Bitambi, Kawungezi, Marafuelet, Tanzania and Kyebandula in Mbale were stable, that is, they have been grown for 20-30 years without changing their culinary qualities of becoming extremely susceptible to diseases and pests. Varietal stability was attributed to pest/disease tolerance or resistance, maturity period, taste, yield, and in-ground storability. In Uganda, viruses often cause varieties to degenerate over time. Moreover, if a variety is not adapted to poor soil conditions, then declining soil fertility can accelerate varietal degeneration. In Apac, only four varieties (Muyambi, Camo olo Obuc, Tedo Kere, and Aber) can be considered stable and are grown by a majority of farmers.

Red was the dominant skin colour of the storage roots in six of the seven surveyed districts. With the exception of Mpigi and Luwero, white-skinned roots were also common. In the pilot survey districts, the frequency of white-skinned varieties was substantially greater (Table 20). Eighty-three percent of the varieties in Mbale had white skin whereas only 16% had red skin. In Apac, 60% of the cultivated varieties had white skin. Reasons for preferring white-skinned varieties were not immediately clear. Some respondents stated that white-skinned roots are more susceptible to weevils than red or brown-skinned ones.

Table 21. Skin and flesh colour of sweetotato varieties.

District	Number of respondents by variety observations	Skin colour (%)			Flesh colour (%)			
		White	Red	Other	White	Cream	Yellow	Other
Kabale	166	42	37	21	88	10	1	1
Gulu	182	37	63	0	73	2	25	0
Iganga	165	31	61	8	96	0	4	0
Mpigi	93	1	98	1	100	0	0	0
Luwero	125	2	72	26	96	2	2	0
Kabarole	109	13	50	38	94	5	1	0
Arua	111	27	69	4	55	0	42	3

White-fleshed roots were dominant in all surveyed districts (Table 20). In Mbale, 76% of varieties had white-fleshed roots. In Apac, 83% of varieties had white-fleshed roots. Cream-fleshed varieties were uncommon and were perceived to be more susceptible to weevil attack.

Soil fertility management

Most respondents do not apply manure on sweetpotato; only one respondent reported the use of inorganic fertilizer. The percentage of respondents using manure ranges from only 2% in Iganga to 36% in Kabale (Table 21). Chemical fertilizers are used only in Mpigi district, near Kampala, where sweetpotato is grown as a commercial crop for the market. In the remaining districts, nutrient applications were rare and were limited to manure.

Table 21. Manure use on sweetpotatoes.

District	Number of respondents	Use (%)
Kabale	52	36
Gulu	53	4
Iganga	49	2
Mpigi	47	11
Luwero	50	4
Kabarole	46	10
Arua	49	12

Few farmers apply fertilizer or manure to the crop planted in the same field before the current sweetpotato crop. Responses range from zero in Kabarole to 26% in Kabale (Table 22).

Table 22. Fertilizer and manure use on the previous crop.

District	Number of respondents	Application (% response)			
		No	Yes	Fertilizer	Manure
Kabale	52	74	26	7	93
Gulu	53	98	2	100	0
Iganga	49	98	2	0	100
Mpigi	47	87	13	29	71
Luwero	50	98	2	0	100
Kabarole	46	100	0	0	0
Arua	49	94	6	0	100

As a result, sweetpotato cultivation appears to be starved for soil fertility resources. The use of commercial fertilizers may not be economical at current food crop prices. Moreover, commercial fertilizer is often unavailable.

Pesticide use

Respondents in Mpigi reported the highest pesticide use on sweetpotato weevils and caterpillars. In the other districts, the majority of respondents reported not using any pesticides on sweetpotato (Table 23).

Because Mpigi is near Kampala, pesticides are more available and less costly to obtain than in the other surveyed districts. Farmers are well educated on pesticide use, and sweetpotatoes fetch a higher market price, making it more economical to use pesticides in Mpigi than in the other districts.

Table 23. Pesticide use on sweetpotato weevils and caterpillars.

District	Number of respondents	Yes	No
		(%)	
Kabale	52	11	89
Gulu	53	36	64
Iganga	49	13	87
Mpigi	47	64	36
Luwero	50	32	68
Kabarole	46	7	93
Arua	49	2	98

The pesticide most commonly used on sweetpotato weevils and caterpillars is Ambush, which was reported to give the best results. Some farmers also applied Sumithion, Dursban, Dimecron, Dimethoate, and DDT/Safisafi. Some farmers did not know the name of the pesticide they used for control (Table 24).

Table 24. Pesticides used by farmers on sweetpotato weevils and caterpillars.

District	Number of respondents	Pesticide (%) among those using pesticides						
		Ambush	Dursban	Dimecron	Dimethoate	Sumithion	DDT	Unknown
Kabale	6	100	-[a]	-	-	-	-	-
Gulu	19	74	-	-	-	-	-	26
Iganga	7	29	14	14	14	-	-	29
Mpigi	29	69	10	-	-	21	-	-
Luwero	16	81	-	-	-	6	13	-
Kabarole	2	50	-	-	-	-	-	50
Arua	1	100	-	-	-	-	-	-

a. - = 0.

Other agronomic practices

Weeding is done by hand or by using a hand hoe. The rotation system, season, and weather conditions affect weeding frequency. Generally, the first rainy-season crop requires more weedings than the second rainy-season crop. For most varieties, the first

weeding is carried out two months after planting. Most respondents believe that sweetpotato requires a maximum of three weedings. On average, however, farmers weed twice. In wetter areas of each district, some farmers need to weed more than two times.

Most farmers recognize the importance of hilling up around plants, especially when weeding (Table 25).

Table 25. Farmers use of hilling up of sweetpotato.

District	Number of respondents		
		Yes	No
		(%)	
Kabale	52	90	10
Gulu	53	93	7
Iganga	49	96	4
Mpigi	47	96	4
Luwero	50	100	0
Kabarole	46	89	11
Arua	49	81	19

Reasons given for the practice of hilling up include root expansion, yield enhancement, and protection of roots from direct sunshine and weevil attack (Table 26).

Table 26. Reasons for hilling up.

District	Number of respondents	Reason (%)				
		Enhance yield	Root expansion	Avoid exposure to sun	Reduce weevil	Other
Kabale	45	58	33	9	-	-
Gulu	49	45	51	4	-	-
Iganga	47	23	30	36	9	2
Mpigi	44	30	30	27	5	8
Luwero	47	38	23	39	-	-
Kabarole	41	27	44	22	5	2
Arua	38	32	37	26	-	5

Farmers recognize that the practice of hilling up gives the sweetpotato plant enough soil for expansion in addition to being a way to enhance nutrient supply. Yields tend to be higher with this practice.

Farmers also believe that exposed roots are susceptible to adverse weather conditions and pest infestations. Exposed roots tend to turn green, sprout, and become unpalatable. They are also easily attacked by enemies such as sweetpotato weevil and

rats. Farmers are aware that hilling up during weeding can help avoid these and other problems, although this does not appear to be the primary motivation for the practice.

The practice of burying vine nodes varies among the different districts. Seventy percent of respondents in Luwero and Mpigi bury vine nodes to obtain higher yields (Table 27).

Table 27. Incidence of burying vine nodes.

District	Number of respondents	Yes (%)	No
Kabale	52	44	56
Gulu	53	28	72
Iganga	49	29	71
Mpigi	47	70	30
Luwero	50	70	30
Kabarole	46	42	58
Arua	49	23	77

Higher yields are achieved because buried vines tend to root at the nodes and produce more storage roots. Hence, farmers harvest more roots per plant than would be the case without this practice. In the other districts, most farmers do not bury vine nodes, but those who do obtain higher yields.

Sweetpotato Harvesting and Postharvesting

By far the most common mode of harvesting is piecemeal, reported consistently by more than 85% of the survey respondents. Some farmers also harvest all at once or use both methods of harvesting. Harvesting all at once is usually done when sweetpotato is destined for the market (Table 28).

Table 28. Sweetpotato harvesting method.

District	Number of respondents	Piecemeal	All at once (%)	Both
Kabale	52	90	10	0
Gulu	53	87	9	4
Iganga	49	100	0	0
Mpigi	47	100	0	0
Luwero	50	91	9	0
Kabarole	46	88	4	8
Arua	49	96	4	0

Piecemeal harvesting starts as early as 2 months after planting for some varieties. Women move around the field looking for cracks on mounds (indicative of a sizable root). One to two stoage roots are carefully removed using a sharp metallic rod or stick, then the mound is properly covered with soil. Farmers usually harvest enough sweetpotato for one or more meals for 1 to 2 days.

The duration of the piecemeal harvest varies by district, reported duration ranged from 3 months in Arua to 6 months in Kabale. In the other districts, the piecemeal harvest lasted 4-5 months. Harvest duration seems to be a function of variety, soil type, availability of other foods, household size, disease or pest infestation, and weather conditions. Harvesting too early results in reduced yields, whereas harvesting too late exposes roots to weevil attack.

Different varieties respond differently to piecemeal harvesting with some varieties producing larger roots and taking longer than others. Varieties with longer maturity periods were most suitable for piecemeal harvesting. Research is needed to understand clearly the reasons behind piecemeal harvesting.

Storage

A reasonably large proportion of respondents said they "store" sweetpotato for a few days not more than a week. Those who responded in the affirmative ranged from 48% in Luwero to 67% in Iganga (Table 29).

Table 29. Use of sweetpotato storage.

District	n	Yes	No
		(%)	
Kabale	52	60	40
Gulu	53	56	44
Iganga	49	67	33
Mpigi	47	53	47
Luwero	50	48	52
Kabarole	46	64	36
Arua	49	53	47

Sweetpotato was mainly stored inside the house, on the floor or in a basket; it was also stored in sacks outside the house. Many respondents in Gulu, Luwero, and Arua sliced and dried sweetpotato. Although the slice-and-dry storage method preserves sweetpotato chips for a much longer time, holding fresh roots on the floor inside the house for about 4 days appears to be the most common practice (Table 30). Slicing and drying occurs most frequently in drier parts of Uganda, where farmers must harvest their fields to avoid substantial losses of roots to sweetpotato weevils.

Table 30. Sweetpotato storage method.

District	Number of respondents	Floor in house	Basket	Slice and dry	Sack	Outside	Other
Kabale	31	50	40	3	3	4	-
Gulu	29	62	10	28	-	-	-
Iganga	33	61	29	-	-	-	10
Mpigi	25	79	-	-	4	17	-
Luwero	24	58	4	33	4	-	1
Kabarole	29	50	25	-	-	14	11
Arua	26	26	15	59	-	-	-

Keeping recently harvested sweetpotatoes on the floor is not really a storage method, but a practice farmers have developed to reduce harvesting labour by gathering enough for several days. Therefore, on-farm post harvest storage per se is still limited. Farmers mainly use in-ground storage. Those who slice and dry can store sweetpotato from 6 months to one year if the "chips" are properly dried, well handled, and stored under good conditions. Fresh sweetpotatoes have a rather short shelf life and are usually physically damaged during harvesting and transportation. They therefore tend to deteriorate rapidly under ordinary conditions.

Weevils are the most common storage pest reported by those who slice and dry. For the other methods, rats are the main pest problem. Farmers also recognized and reported rotting as a result of bacterial and fungal attacks. Physical examination indicated the presence of different kinds of molds on stored sweetpotato, but this warrants more study. Rotting is commonly caused by damage and bruises inflicted on roots during harvest and transportation.

The pilot survey in Apac and Mbale indicated that storage of sweetpotato in field pits was common. Farmers recognized that sweetpotato roots are perishable and must be properly stored after harvest. Different storage methods, such as household containers, leaves or grass, a pit covered with leaves or grass, and a pit covered with soil, were used. Some farmers line the pit with grass before placing sweetpotatoes in the pit. Others just stack sweetpotatoes in a corner of the field and cover them with banana leaves, sweetpotato leaves, or grass. Shallow pits can be covered with soil once the sweetpotatoes have been selected and placed in the pit. More than 95% of respondents used the "pit covered with soil" method and 50% also reported using the "pit covered with grass" method in these two districts. Sprouting and rotting occurred with these methods; changes in flavour and food value during storage were not investigated.

By product use

After harvest, many farmers use vines only as planting material (Table 31). The practice is to cut vines before the final harvest. Some farmers use vines for animals and manure, but most farmers seem to burn them or just throw them away.

In Gulu district, some farmers reported that they dry the vines, burn them, then collect the ash, dissolve it in water, and filter the residues. They reported using the filtrate called "salt" instead of common purchased salt to prepare sauce. This filtrate is reportedly used to cook vegetables and preserves them longer than common table salt would.

Table 31. Use of sweetpotato vines.

District	Number of respondents	Vine usage (%)					
		Planting material	Animal feed	Manure	Burn or throw away	Sell	Institute for salt
Kabale	52	68	4	10	16	2	-
Gulu	53	31	6	-	40	2	21
Iganga	49	43	-	-	57	-	-
Mpigi	47	57	24	2	17	-	-
Luwero	50	57	4	-	39	-	-
Kabarole	46	64	2	-	34	-	-
Arua	49	92	-	-	8	-	-

Most farmers throw away sweetpotato peelings, though some farmers feed them to livestock (Table 32). Where animals are kept and population pressure is high, limiting available grazing land, the feeding of peelings to livestock is more common.

Table 32. Use of sweetpotato peelings.

District	Number of respondents	Throw away	Use for animal feed	Other
Kabale	52	65	29	6
Gulu	53	83	17	0
Iganga	49	92	4	4
Mpigi	47	28	70	2
Luwero	50	52	48	0
Kabarole	46	77	23	0
Arua	49	36	53	11

Marketing

In four districts (Kabale, Gulu, Arua and Mpigi), a substantially high proportion of respondents said they sell sweetpotato. Half sell and half do not in Kabarole district, whereas the mayority of respondents do not sell in Iganga and Luwero (Table 33).

Table 33. Marketing of sweetpotato.

District	Number of respondents	Yes (%)	No
Kabale	52	73	27
Gulu	53	71	29
Iganga	49	35	65
Mpigi	47	70	30
Luwero	50	43	57
Kabarole	46	50	50
Arua	49	84	16

In most districts, farmers buy and sell sweetpotato in rural markets. Frequency of marketing depends on closeness to urban centers and institutions, the household's food situation at the time, prevailing prices, and other factors, such as family cash needs and road conditions.

Most respondents reported using sweetpotato proceeds to satisfy diverse household needs, such as salt, soap, sugar, clothes, paraffin, and food. Other uses include paying school fees, medical fees, and government tax, buying animals, hiring labour, and paying "bride price".

In most districts, farmers reported selling one-quarter or less of their sweetpotato harvest (Table 34).

Table 34. Proportion of sweetpotato harvest sold.

District	Number of respondents	Whole	Half	Equal to or less than one-quarter
Kabale	36	0	39	61
Gulu	35	9	20	71
Iganga	16	25	25	50
Mpigi	28	25	32	43
Luwero	21	48	29	23
Kabarole	21	19	24	57
Arua	34	3	38	59

The data in Table 34 support the hypothesis that sweetpotato is grown primarily for home consumption. Nevertheless, selling is common and provides critical cash requirements for low-income households. In districts near Kampala, such as Mpigi and Luwero, many respondents sell the whole field as a commercial crop.

In districts located farther away from Kampala (Kabale, Gulu, Arua, and Kabarole) farmers depend on the local markets for selling sweetpotato. On the other hand, in districts close to Kampala (Luwero, Mpigi, and Iganga) farmers sell sweetpotato mainly to traders who visit them (Table 35).

Table 35. Major sweetpotato buyers.

District	Numbers of respondents	Local market	Traders	Other farmers (%)	Institutions	Other
Kabale	38	63	18	18	-	1
Gulu	37	68	27	5	-	-
Iganga	17	6	71	11	12	-
Mpigi	32	16	75	3	6	-
Luwero	21	29	57	5	5	4
Kabarole	22	64	9	14	9	4
Arua	41	88	5	2	5	-

Where demand is high, traders will visit farms looking for sweetpotato. Where demand is low, farmers have to carry roots to the market. Farmers close to Kampala, the major consuming area, may not have to incur harvesting, packaging, and transportation costs as is the case with farmers in areas far away from Kampala.

In five districts (Kabale, Gulu, Iganga, Arua, and Kabarole) respondents reported having a market within 5 km. Head-loading is the most common method of transportation. In both Luwero and Mpigi, the nearest market was reported to be on average 26 km away, and transportation was mainly by truck (Table 36).

Table 36. Method of transporting sweetpotato

District	Number of respondents	Head-load	Truck	Bicycle (%)	Other
Kabale	37	95	-	5	-
Gulu	37	95	2	3	-
Iganga	13	15	77	8	-
Mpigi	26	15	73	12	-
Luwero	11	9	64	27	-
Kabarole	20	85	-	10	5
Arua	40	93	2	5	-

Schools, hospitals, and other institutions constituted only a small proportion of buyers, probably because the quantities they require can only be organized by a few large farmers. Whereas farm-gate and market prices are low at harvest, prices may double later in the season. Prices are determined by market forces, and government intervention does not exist.

Consumption

Seasonally, more sweetpotato is consumed from August to October, which coincides with the harvesting period, than at any other time of the year (Table 37). During a period of abundance, sweetpotato is eaten daily; the frequency of consumption drops to about twice a week in the main scarcity period, from January through the April planting season. Indicative of this seasonal consumption pattern, 38% of all survey respondents stated that sweetpotatoes are eaten from August to October, whereas 13% reported that sweetpotatoes are eaten throughout the year. Kabarole was the exception to this seasonal pattern. In Kabarole, sweetpotato consumption is concentrated from January through March.

Table 37. Period when sweetpotato is commonly eaten (% of respondents).

District	Number of respondents	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year-round
Kabale	42	2	2	2	2	2	6	6	2	10	7	0	10	49
Gulu	43	0	5	0	2	0	0	5	16	12	35	19	7	0
Iganga	25	0	0	0	12	4	28	12	24	12	0	4	4	0
Mpigi	27	11	7	7	7	4	4	4	19	0	7	0	4	26
Luwero	30	0	3	3	3	3	20	20	23	7	7	0	11	0
Kabarole	21	14	33	10	5	5	5	0	0	0	24	0	5	0
Arua	26	0	0	8	4	8	4	15	27	19	4	4	8	0

In the districts studied, the major sources of sweetpotato were own production and the village market (Table 38). Eighty-two percent of respondents consume sweetpotato obtained from their own fields; 15% reported buying it on the local market. The data in Table 38 confirm the subsistence nature of production and consumption.

Table 38. Source of sweetpotato commonly eaten in the household.

District	Number of respondents	Source of sweetpotato (% of respondents)				
		Own field	Village barter	Village market	Outside market	Own field / village market
Kabale	42	50	2	-	-	48
Gulu	43	100	-	-	-	-
Iganga	26	89	-	-	-	11
Mpigi	27	100	-	-	-	-
Luwero	30	90	-	-	-	10
Kabarole	22	96	-	-	-	4
Arua	26	58	-	15	4	23

Peeling and then boiling or steaming sweetpotato is the dominant form of consumption (Table 39). The only outlier is Kabale district, where sweetpotato is often boiled or steamed without peeling.

Table 39. Way in which consumers eat sweetpotato.

District	Number of respondents	Peel and boil or steam	Unpeel boil or steam	Peel or unpeel and boil	Mash with other food
Kabale	42	21	79	-	-
Gulu	43	100	-	-	-
Iganga	26	100	-	-	-
Mpigi	27	100	-	-	-
Luwero	30	100	-	-	-
Kabarole	22	96	-	-	-
Arua	26	54	-	46	4

In the pilot survey districts, all respondents reported peeling and boiling fresh roots. In addition, 40% of Apac respondents also processed sweetpotato into dried chips to store for eventual home consumption. Sweetpotatoes in Apac is usually chipped and dried from October through December. The dried sweetpotato is then eaten from February through May. Other processing methods were virtually nonexistent.

The high frequency of peeling and boiling or steaming as the prevailing form of consumption points to the limited use opportunities facing Ugandan farmers. Research into expanded use, including development of new, acceptable sweetpotato recipes, will be necessary to expand demand and stimulate increased production. Mashing with other foods such as beans and peas is acceptable in many areas, and research could take advantage of this to promote other combinations.

Cassava is widely viewed by respondents as a good sweetpotato substitute. In the market, cassava and sweetpotato are usually sold alongside each other, and their prices tend to reflect this substitution. An increased sweetpotato supply leads to a reduced sweetpotato price, which in turn shifts demand away from cassava, depressing cassava prices in the process. The reverse also seems true. Other alternatives to sweetpotato include Irish potato, posho (maize meal), and bananas.

For food preferences across the sample as a whole, about one-half of respondents reported matooke (bananas) as their most preferred food, 21% mentioned millet, 15% sweetpotato, and 8% cassava (Table 40). As their second choice, 34% reported sweetpotato, 11% each reported Irish potato and cassava, 10% reported sorghum, and 9% reported millet. Cassava ranked high as a third choice (23%) followed by sweetpotato with 21%. There was a mixed response regarding fourth and fifth choices, although posho was mentioned more frequently.

Table 40. Food preferences.

District	Kabale	Gulu	Iganga	Mpigi	Luwero	Kabarole	Arua
Number of respondents	41	43	26	27	30	22	26
First preference							
Matooke	34	0	77	78	80	64	4
Sweetpotato	24	21	12	4	10	18	8
Cassava	0	2	0	11	7	0	42
Irish potato	12	5	0	0	0	0	0
Sorghum	7	9	0	0	0	0	0
Millet	0	61	12	0	0	18	46
Posho	7	2	0	0	0	0	0
Other	16	0	0	7	3	0	0
Second preference							
Matooke	12	2	8	15	3	14	0
Sweetpotato	12	44	35	37	50	36	31
Cassava	0	14	8	7	23	0	23
Irish potato	26	0	0	19	7	23	0
Sorghum	19	16	0	0	0	0	35
Millet	5	14	8	0	10	18	12
Posho	14	9	8	4	0	0	0
Rice	0	0	35	11	0	9	0
Other	12	0	0	7	7	0	0
Third preference							
Sweetpotato	12	14	19	30	27	27	19
Cassava	0	33	12	41	27	27	12
Posho	15	5	27	4	3	0	4
Millet	8	14	8	0	3	14	31
Sorghum	23	30	8	0	0	0	23
Irish potato	15	0	0	7	13	23	4
Rice	0	0	15	7	0	5	4
Beans	19	0	4	0	3	0	0
Yams	0	2	0	7	20	0	0
Other	8	2	7	4	4	4	3

Matooke was the most preferred food; it is consumed in most districts of Uganda. Millet is popular in the north, east, and some parts of the west. Sweetpotato is second after bananas in western and central regions and after millet in the northern and eastern regions. Irish potatoes are popular mainly in the highland areas, whereas cassava is a common substitute for sweetpotato. Sweetpotato was second in importance in the diet to maize in Mbale, and second to cassava in Apac.

Sweetpotato leaves are almost never eaten, as reported by 99% of respondents. Cassava leaves were consumed by 23% of respondents and cocoyam leaves were eaten by 39% of respondents. However, sweetpotato tips are eaten in areas, bordering Zaire, which were not surveyed. Cassava leaves are more commonly eaten, but with the problem of mosaic and questions about cyanide levels, sweetpotato leaves would appear to be a good substitute both as a food and a feed.

Beans are often eaten with sweetpotato. However, regional variations occur because of differences in taste, preference, and availability. Field peas and greens with groundnut sauce are commonly consumed with sweetpotato in Kabale, whereas fish with sesame sauce is a common dish with sweetpotato in the north. Fish with groundnut sauce is common in the northern, eastern, and central regions. Fresh fish is commonly eaten with sweetpotato in areas near lakes or rivers. Fresh meat is not frequently eaten with sweetpotato as it tends to be reserved for foods such as matooke and millet. In Gulu district, okra with groundnut or sesame sauce and pigeonpeas are at times eaten with sweetpotato.

Although a higher proportion of respondents in all the districts reported that sweetpotatoes are never harmful, a sizable proportion mentioned some health problems associated with eating sweetpotato (Table 41). Common complaints associated with eating sweetpotato included heartburn, upset stomach, flatulence, and diarrhoa. These problems allegedly occur if a lot of sweetpotatoes are eaten or if they are eaten every meal. Sweetpotatoes were also reported to cause bloat and death in livestock, such as goats and pigs.

Table 41. Perceptions of the effect of sweetpotato consumption on health.

District	Number of respondents	Harmful to health (%)	
		Yes	No
Kabale	42	7	93
Gulu	43	44	56
Iganga	26	46	54
Mpigi	27	37	63
Luwero	30	27	73
Kabarole	22	50	50
Arua	25	16	84

Constraints

We used a scoring system to elicit information on the severity of constraints to increasing sweetpotato production. Scores ranged from 0 (not a problem) to 4 (a very serious problem). We elicited perceptions on 19 potential constraints presumed to be common to the seven surveyed districts, and gathered information on other more location-specific problems. We canvassed perceptions for two time periods: (1) the past five years and (2) the 1990-91 cropping season. Table 43 presents average scores by surveyed district for the perceived constraints over the past five years and Appendix 15 presents problems cited in the 1990-91 cropping season. Although there are several problem by district differences, the ranking of the perceived constraints is roughly the same for the two time periods.

General assessment

Of the constraints listed in Table 42, labour costs and transport costs received the highest average scores. In general, the availability of labour and transport was perceived to be less of a problem than their cost. This difference between perceived cost and availability reflects the cash and capital shortages facing poor sweetpotato-growing households. In contrast to labour costs and availability, a shortage of land was not perceived as a serious problem. This perception reinforces the earlier observation that these sweetpotato-growing households are relatively labour scarce and land abundant.

Sweetpotato weevils and butterflies were viewed as the next highest ranking constraints and were perceived as moderate to serious problems in the seven districts (Table 42).

Drought figured as an important source of abiotic stress. In contrast, with the exception of Kabale, waterlogging and flooding were perceived as insignificant or minor problems.

Pest infestation, especially the sweetpotato butterfly caterpillar (*Acrea acerata*), was reported to be severe during the dry season. Prolonged drought also leads to a scarcity of vines and deterioration of root quality.

Vertebrate pests, mainly monkeys, moles, and rats, were a source of serious concern in several districts. In general, the perception of the severity of these pests varied markedly across districts (Table 42).

Sweetpotato diseases, notably viruses and tuber rot, were reported and observed. Farmers seem not to recognize the economic importance of viruses, hence the low ranking given them. Viruses and tuber rot were reported in all the districts. Disease control methods are still limited and are complicated by farmers' lack of knowledge on diseases. Roguing could help, but most farmers resist eliminating diseased plants as some yield can still be obtained.

Table 42. Farmers Scoring[a] of constraints to sweetpotato production in Uganda by district.

Constraint	Score average	District						
		Kabarole	Iganga	Gulu	Mpgi	Luwero	Arua	Kabale
High labor cost	2.32	2.82	2.15	2.07	2.98	1.86	2.31	2.04
High transport cost	2.31	2.49	2.31	2.6	2.31	0.9	2.85	2.74
Weevils	2.18	2.18	2.65	1.91	2.56	1.42	2.57	1.94
Sweetpotato butterfly	2.13	2.51	2.67	1.92	2.28	1.88	1.96	1.69
Lack of transport	2.12	2.14	2.09	2.43	2.11	1.04	2.5	2.56
Drought	1.95	2.04	2.02	1.6	1.83	1.78	2.27	2.12
Low market prices	1.95	2.58	1.69	2.28	1.51	1.44	2.09	2.07
Other rodents	1.91	2.80	2.13	1.74	1.50	1.66	2.00	1.51
Moles and rats	1.88	1.64	3.71	1.43	1.58	1.08	1.59	2.12
Shortage of farm implements	1.82	1.56	2.27	1.91	2.07	0.7	2.45	1.79
Lack of sacks	1.51	1.60	1.14	2.10	1.54	0.54	2.07	1.60
Tuber rot	1.49	1.82	1.55	1.55	1.48	1.24	1.59	1.20
Monkeys	1.48	0	3.83	0	3.00	0	3.50	0
Labor shortage	1.38	0.91	1.67	1.38	1.66	0.96	1.57	1.48
Lack of "clean material"	1.32	1.38	1.73	1.6	1.02	0.46	1.71	1.35
Virus	1.31	1.49	1.47	0.62	1.44	0.84	1.24	2.04
Land shortage	1.30	0.98	1.73	1.36	1.56	0.68	1.74	1.04
Lack of planting material	1.17	0.84	1.35	1.25	0.53	0.84	1.98	1.42
Porcupines	0.81	2.67	0	0	3	0	0	0
Wild pigs	0.53	1.09	0	0	1	1.18	0.37	0.06
Flooding	0.52	0.24	0.23	0.25	0.07	0.6	0.76	1.46
Mites	0.45	2.17	1	0	0	0	0	0
Squirrels	0.29	2.00	0	0	0	0	0	0
Average	—	1.74	1.71	1.30	1.61	0.92	1.70	1.40
No. of observations		46	49	53	47	50	49	52

a On a scale of 0 to 4, where 0 = not a problem, 1 = minor, 2 = moderate, 3 = serious, 4 = very serious.

A disease or complex that leads to browning of the skin was also reported in Arua district.

In several districts, lack of clean planting material was reported more constraining than lack of planting material per se. More often than not, unclean material is either diseased or pest-infested, and most farmers reported that they would not plant such vines.

Low market prices, a shortage of farm implements, and a lack of packaging material were reported as minor to serious problems (Table 42). A notable social constraint in Arua is that goats are allowed to graze freely during the dry season. They eat up all vines, leading to a chronic shortage of material at the beginning of the planting season.

In the pilot survey districts of Apac and Mbale, rodents and weevils were the most serious constraints. Virus incidence was low in both districts, but appeared to be increasing in Apac. Inadequate availability of planting material was not a problem in

Mbale, but was a major constraint in Apac. The incidence of sweetpotato butterfly infestation was increasing in Apac, but not in Mbale. In both districts, erratic rainfall and drought were serious production constraints. Farmers in both districts voiced concern about varietal deterioration and damage from pests and diseases. They expressed the need for higher yielding and generally improved varieties. Low commodity prices, lack of markets, and lack of credit were serious constraints to production. Insufficient landholding size was a constraint in Mbale, but not in Apac. Insufficient labour availability was a serious problem at peak periods of demand as most households depend on family labour and have to do several agricultural tasks at the same time. In both districts, the peak periods of labour demand occurred from March through May and August through October.

Sweetpotato weevil

More detailed information was requested in the production questionnaire on damage caused by sweetpotato weevil. Although loss from weevils is high, it has not yet been well researched and quantified.

Respondents were asked whether season, vine density, or variety affected weevil damage. The majority of respondents in all districts agreed that season influences weevil attack (Table 43). Weevil damage tended to be serious in periods when sweetpotatoes were rarely eaten. In addition to reducing yields, weevil attack often rendered sweetpotatoes unpalatable. In contrast, vine density appeared to farmers to have no significant relationship with weevil attack (Table 43).

Table 43. Factors influencing weevil damage in sweetpotato.

District	Number of respondents	Season	Variety (%)	Vine density
Kabale	52	91	37	12
Gulu	53	96	69	8
Iganga	49	94	71	4
Mpigi	47	100	62	44
Luwero	50	100	16	0
Kabarole	46	91	62	7
Arua	49	91	75	32

The response to whether variety influences weevil attack was mixed: respondents in some districts believed in differential varietal effects; others believed that differences in varietal resistance were not marked (Table 43). Respondents indicated that sweeter varieties were more susceptible to weevil attack than less sweet varieties. Moreover,

they stated that early-maturing varieties[2] were more susceptible to weevil attack than late-maturing ones.

Except in Gulu, Mpigi, and Arua, the majority of respondents reported that weevil attack does not force them to harvest early (Table 44).

Table 44. Farmers who were forced to harvest early because of weevil damage.

District	Number of respondents	Yes (%)	No (%)
Kabale	52	27	73
Gulu	53	60	40
Iganga	49	42	58
Mpigi	47	87	13
Luwero	50	34	66
Kabarole	46	49	51
Arua	49	53	47

The fact that many farm households do not harvest early because of weevil damage is probably a reflection of limited postharvest storage opportunities and overreliance on in-ground storage. If acceptable postharvest storage techniques were available, farmers would likely respond rationally to a weevil attack by harvesting and storing sweetpotatoes.

Harvesting early in response to weevil attack is common in Gulu and Arua (Table 44) because in those areas the slice-and-dry method of sweetpotato storage is well accepted. The proximity of Mpigi to Kampala markets means that sweetpotato can be easily sold to Kampala traders in case of a weevil attack. This kind of flexibility does not seem to be available in other districts.

Weevils do not necessarily need a storage root to attack. If weevil pressure is high, the insect will invade the sweetpotato stem even if no storage roots are available.

Agricultural Extension and Policy

Most farmers did not have contact with any agricultural extension officer in the year preceding the survey period. Extension agents met with sweetpotato growers in Luwero and Kabarole districts, but interactions between farmers and extension staff were not reported in the other districts. Although this lack of contact may indicate lack of extension service availability, it may also mean that farmers are not aware of the

[2] Early-maturing varieties tend to have some roots ready for harvest after 2 to 3 months of growth. However, in most cases, 4-5 months of growth are needed to obtain full-sized roots.

value of seeking advice from the resident extension officer. Most farmers did not realize that extension officers are posted in their areas.

When asked what kind of action was deemed necessary to increase sweetpotato production, farmers gave numerous mixed responses. Though felt needs tended to be different in different districts, many respondents mentioned farm implements, pesticides, and new sweetpotato varieties as the items needed to improve the productivity of their crop (Table 45).

Table 45. Action required to promote sweetpotato production.

District	Kabale	Gulu	Iganga	Mpigi	Luwero	Kabarole	Arua	Average over 7 districts
				%				
New variety	30	32	2	5	24	0	13	15
Pesticides	45	34	39	20	31	12	0	26
Fertilizer	2	0	2	5	2	0	4	2
Implements	17	17	23	42	30	7	52	27
Market	0	4	4	10	0	38	6	9
Credit	0	13	11	7	13	5	13	9
Extension	0	0	19	7	0	19	10	6
Other	6	0	0	4	0	19	2	4

Concerning whom should take action to improve sweetpotato production, most farmers assigned responsibility to the government (Table 46).

Table 46. Who needs to act to improve sweetpotato production.

District	Number of respondents	Government	Researcher	Extensionist	NGO	Cooperative	Farmer
			%				
Kabale	52	100	-	-	-	-	-
Gulu	53	84	-	16	-	-	-
Iganga	49	60	-	40	-	-	-
Mpigi	47	100	-	-	-	-	-
Luwero	50	70	11	4	-	15	-
Kabarole	46	68	-	21	4	-	7
Arua	49	82	6	12	-	-	-

These responses underscore the high confidence and expectations most farmers attach to government agencies. Government policy is moving toward privatization. Hence, farmers' expectations may not be realized.

Summary and Conclusions

The national sweetpotato survey has acted as an eye-opener on the extent of sweetpotato cultivation, production methods, use, marketing, and constraints. It has given us an opportunity to discuss with farmers their problems and priorities and to identify areas for research.

The survey unveiled issues that had previously not been known with certainty. Sweetpotato is cultivated in all agroecological zones of Uganda, mainly by small-scale farmers, mostly women, who plant on average less than one acre per holding.

Many landraces are cultivated. They range in maturity period from 2.5 to 6 months. Most of these varieties have been selected by farmers on the basis of factors such as yield; maturity period; palatability; root color, size, and shape; root quality; sweetness; pest and disease resistance; and marketability. Some varieties are very popular and versatile; they are cultivated throughout the country. These varieties are sometimes called different names in different areas.

These local cultivars tend to be low yielding and prone to pests and diseases. Research into breeding, evaluation, and selection of better varieties is advanced, but requires strengthening. Tissue culture facilities at Namulonge are operational and there is a need to educate farmers on diseases and to clean, multiply, and distribute disease-free planting materials. Farmers clearly need high-yielding, disease- and pest-resistant varieties.

Sweetpotato is grown on all types of soils. Most farmers, however, use soils of medium fertility. Sweetpotato is cultivated in the uplands, on flat land, and in valley bottoms and swamps.

Manure is seldom applied, and inorganic fertilizer applications are even rarer. Pesticides are occasaionally used in serious cases such as seasonal infestation of sweetpotato butterfly caterpillars and sweetpotato weevils.

At current output prices, use of purchased chemical inputs is uneconomical. Purchased inputs are not only expensive, but may not be available when needed.

Mounds are commonly used, but, in highland areas, land is prepared in ridges to control soil erosion. Farmers rely heavily on traditional cultivation methods. Well-researched and recommended techniques for sweetpotato cultivation are still limited. The few techniques available have not been widely disseminated, and most farmers do not use them. Farmers report minimal contact with extension officers.

Mound size and plant populations vary across farms and regions. Research addressing optimal seedbed preparation and optimal plant populations for different varietal combinations needs to be strengthened.

Farmers tend to plant sweetpotato any time of the year, sometimes obtaining low yield as a result. Research is needed to determine optimal planting and harvesting dates for different agroecological zones. Most farmers plant sweetpotato as a sole crop,

probably because they lack knowledge on the advantages of intercropping, lack knowledge on proper intercrops, or plant sweetpotato when the season is inappropriate for other crops.

Piecemeal harvesting is prevalent and usually starts at about 2 months after planting. Peeling and boiling or steaming is still the major method of preparation for consumption. Sweetpotato is perishable and has very short shelf life; postharvest storage is virtually nonexistent. Only a few farmers slice, dry, and store their sweetpotatoes. Sliced and dried sweetpotatoes can be stored reasonably well, but they are attacked by storage weevils and palatability is affected.

Industrial use of sweetpotato does not exist in Uganda. Hence, there are limited use opportunities both on and off the farm. Research into storage and expanded use of sweetpotatoes both on- and off-farm is a priority. Currently, in-ground storage is the practice, and research is evaluating different varieties for the traditional piecemeal harvesting.

However, in-ground stored sweetpotatoes are prone to pests, diseases, thieves, and extreme weather conditions. Unfortunately, varieties with a short maturity period do not store for long underground. Research into postharvest storage methods may supply longer term solutions.

Like many other food crops in Uganda, sweetpotato is cultivated primarily for home consumption. Nonetheless, significant quantities are sold in both rural and urban markets for cash. Usually, less than one-third of the product is sold and the proceeds are used to purchase household necessities. Commercial sweetpotato growers are currently limited to the vicinity of towns and institutions where good roads exist.

Most rural roads are poor, and vehicles or bicycles are not available, so the main means of transporting sweetpotatoes to the market is by head-load. In accessible areas, motorized transport and bicycles are used to ferry sweetpotatoes to urban consumption areas. On-farm prices are still too low to encourage commercial production.

Most farmers provide their own planting materials (vines), but in times of scarcity cuttings are bought and sold. The apical portion, about 30 cm, is usually planted for quick establishment.

In most areas, sweetpotato is commonly eaten from August to October, when it is consumed on average six times a week. From January to April, sweetpotato is eaten less, approximately once or twice a week. Most farmers eat sweetpotato from their own fields, though in times of scarcity it is purchased.

In terms of food preference, sweetpotato ranks second after bananas and millet. Sweetpotato leaves are not commonly eaten, though they are fed to livestock. There is a need for research into ways to use leaves as a human food in Uganda. Sweetpotato leaves are known to be rich in vitamins (A, B_2, C) and iron, and they contain moderate levels of calcium ash and fiber. They would probably be eaten if mixed with other greens. Research is needed on acceptable ratios, and preparation of appetizing and

appealing dishes from tips. Sweetpotato tips are underexploited. They could have a significant role to play in helping to alleviate nutritional problems such as night blindness, scurvy, and anemia among the rural poor. Peels are thrown away or fed to livestock.

Farmers reported several biological, physical, and socio-economic constraints to increased production and use. Farmers believed that vertebrate pests and insect pests, especially sweetpotato weevils and sweetpotato butterfly caterpillars, were the most important biological constraints they faced. Farmers' present methods of pest management are far from effective.

The most important climatic constraint reported was drought. Drought was reported as serious in Kabale, Luwero, and Arua, and was also ranked high in other districts. Aside from direct effects on yield, drought reduces available planting materials and leads to poor-quality roots. Pest attacks were also reported to be more severe during the dry season.

Research into drought-tolerant varieties and optimal planting dates would go a long way in addressing this problem. As already noted, farmers have devised several ways to preserve vines even at the peak of a drought. Research is needed, however, to complement their efforts and devise less cumbersome methods of vine management.

In the absence of irrigation facilities, weather forecasting and early warning systems can provide farmers with useful advance information. Currently, farmers resort to valley bottoms and swamps during drought to maintain vines.

Cases of flooding were reported, but this does not seem to be a widespread. It appears that sweetpotato can reasonably tolerate waterlogging.

Several socioeconomic issues were reported as serious constraints to increased production and use. Notable among them were high transport and labour costs. There is a need for research on labour-saving technologies such as draft power at the household level and techniques to widen sweetpotato use so as to broaden the market.

Many socioeconomic constraints have serious policy implications. Although farmers report a shortage of farm implements, the truth seems to be that implements are available but at prohibitive prices. A stronger policy emphasis on sweetpotato coupled with improvements in infrastructure could solve the current problem of low farm prices.

Besides problems with credit availability, interest rates are very high (about 42% per annum) and collateral in the form a of land title or permanent buildings is required. Only a few agricultural enterprises yield returns high enough to support such an interest rate and collateral requirement. There is a need for research into our credit structure with the aim of advising policy-makers on farm credit.

A notable social constraint was in Arua, where open grazing during the dry season is allowed. Goats eat sweetpotato vines, and this leads to a shortage of vines at the onset of rains.

In spite of the demonstrated importance of sweetpotato, the crop still faces numerous constraints that merit serious research and policy attention. Research needs to be further strengthened and a policy commitment should be made to improve the productivity and use of this important food crop.

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Appendix 1. Characteristics of sweetpotato varieties grown in Kabale district (52 respondents).

Variety name	Farmers growing	Months hvst	Yield	Skin color	Flesh color	Weevil resistance	Drought tolerance	Disease resistance	Storability	Market acceptance	Suitability for piecemeal harvest	Cooking quality	Sweetness	Firmness	Fiber content	Overall preference
Muguma	7	6	3	1	2	2	2	2	3	3	2	2	3	3	2	3
Nderera (a)	47	6	2	1	1	2	2	1	2	2	2	2	2	2	0	2
Nyinansase	4	6	2	1	1	2	2	2	3	2	2	2	3	3	0	2
Shingicumu	2	5	2	1	2	1	2	3	3	2	2	2	2	2	0	2
Kitambira	1	6	2	1	1	1	1	1	1	3	-	-	-	-	-	-
Terekakateebo	1	6	1	1	3	2	2	1	-	-	-	-	-	-	-	-
Kamamanzi	3	7	2	3	1	2	1	1	2	2	2	2	2	2	1	2
Kikoyo	2	6	1	3	1	2	1	1	3	3	3	3	3	3	0	3
Kaijamundegye	8	7	2	3	1	2	2	2	3	2	2	3	2	2	0	2
Magabari	8	6	2	2	2	3	1	2	2	2	2	2	3	3	0	2
Nyinakamanzi	14	6	2	3	1	2	2	1	2	2	2	2	1	1	2	2
Nshemeza (b)	32	6	2	2	1	2	2	1	2	3	2	2	3	2	0	2
Kashogonyo	5	6	2	3	1	2	2	2	2	2	2	1	2	1	1	2
Nyinabushegere	8	7	2	2	1	2	1	1	2	1	2	2	1	1	0	1
Kanyasi	4	6	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Rwampara	1	6	2	1	1	1	2	1	1	3	1	1	2	0	0	2
Kyebandura (c)	6	6	2	2	1	3	2	2	2	2	2	2	2	2	0	2
Rwasa	1	6	1	1	1	2	1	1	3	1	3	3	2	2	0	-
Masaka	1	6	2	3	1	2	3	3	3	3	-	1	3	3	0	3
Ruti	2	5	2	1	1	2	1	2	2	2	2	2	1	2	1	3
Kahungezi	2	6	2	3	1	1	1	1	2	-	-	-	-	-	-	-
Kanegeti	1	7	2	1	1	3	2	2	2	3	-	1	3	3	0	3
Kiriza	1	6	1	1	1	3	1	2	2	0	3	3	1	1	0	3
Nora	1	5	2	1	3	-	2	-	1	3	-	1	3	2	0	2
Nyiragiteke	3	6	2	2	1	1	2	1	3	2	3	2	2	3	1	3
Turatugure	1	4	-	2	4	1	1	-	2	2	-	2	3	2	2	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1 = White
2 = Cream
3 = Yellow
4 = Other

(a) also called Murerabaana
(b) also called Rushemeza
(c) also called Kitekamaju/Kiteeka

Other varieties
Kajega
Steven
Senzamugabo
Kyaruhama

Appendix 2. Characteristics of sweetpotato varieties grown in Gulu district (53 respondents).

Variety name	Farmers growing	Months hvst	Yield	Skin color	Flesh color	Weevil resistance	Drought tolerance	Disease resistance	Storability	Market acceptance	Suitability for piecemeal harvesting	Cooking quality	Sweetness	Firmness	Fiber content	Overall preference
Kampala	41	4	2	2	1	2	3	2	3	3	2	3	3	2	0	3
Odeyo chan	40	3	2	2	3	1	1	2	1	2	2	2	2	2	0	2
Agona	3	3	3	2	1	2	2	2	2	2	3	2	1	2	1	2
Limkor Adong (a)	40	3	2	1	1	2	2	2	2	2	2	2	2	2	0	2
Nylon (b)	13	3	2	1	1	3	2	2	2	2	2	2	2	2	0	2
Bwom dege	2	3	3	1	1	2	2	2	2	2	2	2	2	2	0	3
Mukiga	4	4	2	1	1	3	3	3	3	2	2	3	2	3	1	2
Atitina (c)	8	3	2	2	1	2	2	2	2	1	2	2	2	2	0	2
Kirombe	3	4	2	1	1	2	2	1	2	2	2	1	2	1	0	2
Lacan komtek	3	3	3	1	1	2	2	1	1	1	1	1	2	2	2	1
Min Acuma	3	3	2	2	2	2	2	2	2	2	2	2	1	2	0	2
Ocoola	2	4	2	1	1	2	2	1	3	2	1	3	2	3	0	2
Cwara Opok	4	3	2	2	1	2	2	3	2	2	3	1	2	2	0	2
Olula	3	4	2	2	3	3	2	3	2	2	3	2	2	1	0	2
Lalira	5	4	2	2	1	2	2	3	1	2	2	2	2	3	0	2
Godero	4	4	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Ladwe Aryo	1	2	2	2	1	2	1	2	1	1	1	3	1	2	0	2
Adyaka	3	3	2	2	3	2	3	2	2	2	2	2	2	1	0	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1= White
2= Cream
3 = Yellow
4 = Other

(a) also called Minkwet
(b) also called Ladwe Aryo/Abutete/Otaro
(c) also called Kaliri

Other varieties
Ladwe Acel

Appendix 3. Characteristics of sweetpotato varieties grown in Iganga district (49 respondents).

Variety name	Farmers growing	Months hvst	Yield	Skin color	Flesh color	Weevil resistance	Drought tolerance	Disease resistance	Storability	Market acceptance	Suitability for piecemeal harvest	Cooking quality	Sweetness	Firmness	Fiber content	Overall preference
Siliki	30	3	2	1	1	2	2	2	2	3	2	2	3	2	0	3
Mpeifumbiro	7	3	1	3	1	2	2	2	2	2	2	2	2	1	0	2
Masita	5	4	2	2	1	2	1	2	2	3	2	2	2	3	0	2
Kisubi (a)	8	4	2	2	1	3	2	2	2	2	2	2	2	2	0	2
Sulaoluti	29	4	3	2	1	2	2	2	2	3	2	2	2	2	0	2
Kawogo	9	4	2	2	1	2	2	2	3	2	3	2	2	2	0	2
Bukokola	5	3	2	2	1	2	2	2	3	-	2	2	2	2	0	2
Wagabolige	6	3	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Kasoga	7	3	2	1	1	2	1	2	2	3	2	2	2	2	0	3
Tanzania	6	3	2	2	3	2	2	1	1	2	1	2	2	2	0	1
Sukali	7	4	3	1	1	2	2	2	2	2	2	2	2	2	0	2
Ntudebuleku	3	3	2	2	1	3	2	2	2	2	2	2	2	2	0	2
Kikondo (b)	3	3	2	2	1	3	2	2	2	3	3	2	3	3	0	3
Kabugo	2	3	1	3	1	2	2	2	2	2	2	2	1	1	0	1
Katalaako	10	4	2	2	1	3	2	2	2	2	2	2	2	2	0	2
Kyebandula	5	3	2	2	1	3	2	2	2	2	2	2	2	2	0	2
Kaduku	1	3	3	1	1	2	2	2	3	-	-	3	2	2	0	3
Tyama	2	4	3	3	1	3	3	2	2	-	2	2	3	2	0	3
Nzisabigogo	4	4	3	1	1	3	2	1	2	2	2	2	2	2	0	2
Bukoli	2	3	3	2	1	2	2	1	2	2	2	2	2	3	0	2
Kakofu	2	3	2	2	1	3	2	1	1	1	1	2	2	2	0	2
Kayobyo	2	3	1	1	1	-	1	0	0	1	1	2	2	2	1	2
Nalulungi	1	3	0	-	-	0	1	0	0	0	0	2	3	3	0	2
Kipokopa	1	-	-	-	-	-	2	-	-	-	-	2	2	2	0	2
Nakahima	1	3	2	3	1	3	2	2	2	2	2	2	1	2	3	1
Kigaile	1	3	1	3	1	2	2	1	1	1	2	2	2	3	0	2
Escort	1	3	1	2	1	0	2	1	-	3	3	2	2	1	0	2
Mwezigumu	1	3	3	2	1	3	2	1	2	2	2	2	2	3	0	2
Nakulyaku	1	4	3	2	1	1	3	1	2	1	1	3	1	1	0	1
Mutesi	1	5	3	2	1	1	1	0	1	-	1	1	3	1	0	3
Kabonge	1	3	2	3	1	2	2	2	2	1	2	1	2	1	0	1
Bulili (c)	1	3	3	2	1	2	2	-	2	-	2	2	2	2	0	2
Wanubi	1	3	3	2	1	1	1	2	0	3	1	1	3	1	0	3
Munafu Ajawo	1	3	2	2	1	2	2	2	2	-	-	3	2	3	2	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1 = White
2 = Cream
3 = Yellow
4 = Other

(a) also called Bitambi
(b) also called Kikondo Kya Bus
(c) also called Bulili Bwa Mpube

Other varieties
Butakoli
Yasabu

Appendix 4. Characteristics of sweetpotato varieties grown in Mpigi district (47 respondents).

Variety name	Farmers growing	Months hvst	Yield	Skin color	Flesh color	Weevil resistance	Drought tolerance	Disease resistance	Storability	Market acceptance	Suitability for piecemeal harvest	Cooking quality	Sweetness	Firmness	Fiber content	Overall preference
Kawogo	42	6	2	2	1	2	2	2	2	3	2	2	2	2	1	2
Nakajwala	5	3	3	2	1	3	1	2	2	2	3	2	2	2	0	3
Namubiru	10	4	2	2	1	3	2	1	2	2	2	2	2	2	0	2
Kimotoka	8	4	3	2	1	2	2	2	2	2	2	2	2	2	1	2
Mutekisa	7	4	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Kyebandula	5	5	1	2	1	2	1	1	2	2	2	1	2	2	0	2
Kalebe	2	8	3	2	1	3	3	3	2	2	3	2	2	3	0	2
Nantongo	2	4	3	2	1	3	2	3	2	2	1	1	2	3	0	1
Meru	3	5	2	2	1	3	2	2	2	2	2	3	3	2	0	2
Nakato	2	6	2	2	1	3	2	1	2	2	3	3	3	3	2	3
Nanyonga	1	3	2	2	1	2	1	2	1	1	1	2	2	2	0	2
Senior	1	3	1	2	1	3	1	2	1	1	1	1	2	1	0	1
Matugakibe	1	4	3	3	1	2	1	2	2	2	3	1	3	2	0	3
Kisakyamaria	1	5	3	1	1	2	2	2	2	2	3	3	2	2	0	2
Kabusu	1	4	2	2	1	2	3	2	3	2	2	2	2	3	1	2
Bitambi	1	5	2	2	1	3	2	2	2	-	2	3	3	2	0	3
Nabweshibira	1	4	2	2	1	3	-	3	2	2	-	2	2	3	0	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1 = White
2 = Cream
3 = Yellow
4 = Other

Other varieties
Butakoli
Yasabu

Appendix 5. Characteristics of sweetpotato varieties grown in Luwero district (50 respondents).

Variety name	Farmers growing	Months hvst	Yield	Skin color	Flesh color	Weevil resistance	Drought toleance	Disease resistance	Storability	Market acceptance	Suitability for piecemel harvest	Cooking quality	Sweetness	Firmness	Fiber content	Overall preference
Kavunza	1	4	2	2	1	2	2	2	2	2	2	3	2	2	2	2
Kabagambe	1	3	2	3	1	3	2	2	2	2	2	2	2	2	1	2
Masaka	1	4	2	2	3	2	3	2	2	2	2	2	2	3	1	3
Damali	1	3	1	2	1	3	2	3	2	2	3	2	2	2	1	2
Sekanyolya	2	3	1	3	1	1	3	1	1	1	2	1	2	2	1	2
Kibedi	2	4	3	2	1	2	2	2	3	2	3	1	2	2	1	2
Mwezigumu	1	2	2	3	1	1	2	1	1	2	2	1	2	2	0	2
Bitambi	11	4	2	2	1	2	1	1	2	2	2	1	2	2	0	2
Munyera	4	4	3	3	1	2	2	1	2	2	2	1	3	2	1	2
Mityana	1	3	3	2	1	2	1	1	2	2	2	1	2	2	1	2
Ntudebuleku	1	4	3	2	1	3	1	1	1	2	0	1	2	1	0	2
Latest	2	3	3	2	1	2	2	1	2	2	2	1	2	2	1	2
Ngalozabakyala	1	3	3	2	1	1	3	2	3	3	2	1	3	2	0	3
Ngoma	1	4	3	3	1	2	2	1	2	2	2	1	3	3	0	2
Nantongo	3	3	2	2	1	2	2	1	3	2	3	1	2	2	0	2
Kawogo	9	4	3	2	1	2	1	1	2	3	2	1	2	2	0	2
Nylon	13	4	2	2	1	2	2	2	2	1	2	2	2	2	2	2
Nambi	1	7	1	2	1	1	2	2	2	1	2	2	2	2	0	3
Nakato	1	4	2	2	1	3	1	2	3	3	3	2	3	2	0	3
Zirimunsawo (a)	6	3	2	2	1	2	1	2	1	2	2	2	3	1	0	2
Sukali	14	3	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Sowola	4	3	3	2	1	2	1	1	2	1	2	1	1	1	0	1
Kyebandula	6	4	2	2	1	2	3	2	2	3	2	1	3	3	0	3
Bula	1	4	1	2	1	2	1	3	1	2	1	2	1	2	2	2
Magabali	1	3	2	1	3	1	1	1	1	2	2	1	2	3	1	2
Old kawogo	24	5	2	3	1	2	2	2	2	2	2	2	2	2	0	2
Nairobi (b)	1	3	3	1	3	3	1	1	1	1	2	1	2	1	0	2
Nabukenya	6	3	3	2	1	2	2	2	2	2	3	2	2	2	2	2
Kasanda	2	3	2	2	1	3	2	2	2	2	2	2	2	2	1	2
Lunyonyi	2	4	2	2	2	2	3	2	3	2	2	3	3	2	1	2
Malaya	1	4	3	2	1	3	2	3	2	1	3	2	2	3	3	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1 = White
2 = Cream
3 = Yellow
4 = Other

Other Varieties
(a) = Zindimukoti
(b) = Tanzania

Appendix 6. Characteristics of sweetpotato varieties grown in Kabarole district (45 respondents).

Variety name	Farmers growing	Months hvst.	Yield	Skin color	Flesh color	Weevil resistance	Drought tolerance	Disease resistance	Storability	Market acceptance	Suitability for piecemeal harvest	Cooking quality	Sweetness	Firmness	Fiber content	Overall preference
Musemeza	6	4	2	3	1	2	2	1	2	3	2	1	3	2	1	2
Bagara	2	4	3	2	1	3	3	1	2	3	2	2	2	2	1	2
Kasarina	1	4	2	3	3	2	1	1	2	3	2	1	3	1	0	2
Kibingo	2	3	2	2	1	2	2	2	2	3	2	2	2	2	0	3
Kaburigiya	1	3	2	3	1	1	1	1	2	3	2	2	3	3	0	2
Kyanika	1	6	2	3	1	2	2	2	2	3	2	1	3	2	0	3
Kalebe	2	3	3	1	1	2	1	2	2	2	2	2	2	3	0	2
Mbikizehansi	1	1	3	2	1	3	1	2	2	3	2	1	3	2	0	3
Musa	2	3	3	3	1	2	1	2	2	3	2	2	3	2	0	2
Kikara	2	7	3	2	1	2	3	1	3	3	3	2	3	3	0	3
Kikondo	2	5	3	3	1	2	3	2	2	2	2	2	3	3	0	3
Mutemba	1	4	1	1	1	1	1	2	1	2	1	2	2	2	0	2
Katambara	1	4	2	3	1	1	2	2	3	-	3	2	3	3	1	3
Yosefu	1	4	3	1	1	2	2	2	2	-	2	3	2	2	0	2
Kaninga	1	3	1	3	1	3	3	2	3	2	3	1	3	1	0	2
Kisabu	1	3	2	1	1	1	3	1	-	2	1	1	2	1	0	2
Turakajega	1	2	3	2	1	2	3	2	2	2	2	2	1	2	0	2
Magabali	1	3	2	1	1	1	2	1	1	1	1	1	2	1	0	2
Ndabirya	1	2	3	2	1	-	3	2	1	2	1	1	2	2	0	2
Matama	1	6	2	3	2	2	2	1	3	3	3	2	2	2	0	2
Kiboga	5	7	2	2	1	2	2	2	3	3	3	2	3	3	0	3
Nylon	9	4	2	2	1	2	1	2	2	2	2	2	2	2	0	2
Kawogo	22	5	2	3	1	2	3	2	3	3	3	2	3	3	0	3
Sema	5	3	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Mukazi	13	3	3	2	1	2	1	2	2	3	2	2	2	2	0	3
Kyebandura	4	4	2	2	2	2	2	2	3	2	3	2	3	2	0	2
Rugunika	1	3	2	2	1	2	1	2	1	3	1	1	2	3	0	3
Rutambi	2	4	2	2	1	2	2	2	3	2	2	2	3	3	0	3
Kisakyamaria	2	4	2	1	1	2	1	2	2	2	2	1	2	2	0	2
Nantongo	5	4	3	2	1	2	1	2	1	2	2	1	2	2	0	2
Sukali	5	4	2	1	1	2	1	2	2	2	2	1	3	2	0	3
Majani	1	6	2	3	1	1	3	2	1	2	2	3	2	3	0	2
Bitambi	1	4	1	2	1	3	1	3	1	2	2	2	1	2	0	2
Kakoba	1	6	2	3	1	1	1	1	2	3	2	2	3	3	0	2
Tegaorugari	1	2	3	1	1	2	2	2	1	3	2	1	1	1	0	2
Myezi esatu	1	3	2	3	1	2	1	2	2	2	2	2	2	2	0	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1 = White
2 = Cream
3 = Yellow
4 = Other

Appendix 7. Characteristics of sweetpotato varieties grown in Arua district (49 respondents).

Variety name	Farmers growing	Months hvst	Yield	Skin color	Flesh color	Weevil resistance	Drought tolerance	Disease resistance	Storability	Market acceptance	Suitability for piecemeal	Cooking quality harvest	Sweetness	Firmness	Fiber content	Overall preference
Karamoja	42	3	3	2	3	2	1	2	2	3	2	1	3	2	0	3
Ombivu	20	3	3	1	1	2	2	2	2	2	2	2	2	2	1	2
Ewamaku	1	3	1	2	1	1	3	1	3	1	3	3	1	3	0	1
Sanje	4	3	2	2	1	2	2	2	2	2	2	1	2	2	1	2
Singanakilo	3	3	3	2	1	2	2	2	1	2	1	1	2	2	1	2
Moyomaku	3	4	3	2	1	2	3	1	3	2	3	2	2	2	0	2
Imbu	2	4	3	1	1	2	3	2	3	2	2	2	2	3	1	2
Alayimaku	1	3	2	2	1	3	2	1	3	2	-	1	2	1	0	2
Imbalo	1	3	3	1	1	2	2	2	2	3	2	1	2	2	0	2
Mbutra	4	3	2	2	1	2	2	2	2	2	2	2	2	2	0	2
Edacu	4	4	2	2	1	3	2	2	2	1	2	3	1	2	1	1
Ogiba	4	4	2	3	3	1	2	2	2	2	2	2	2	2	1	1
Ayira	4	5	3	2	1	2	2	2	3	3	2	1	3	2	0	3
Sende	1	5	3	1	3	3	2	2	2	3	2	2	2	2	0	2
Ayivumaku	3	5	3	1	1	1	2	1	2	2	2	2	3	3	1	3
Kampala	1	5	2	2	1	2	2	2	2	3	2	2	2	2	0	2
Dele	1	8	2	2	1	3	3	3	3	2	2	3	2	2	3	2
Yellow	2	5	3	2	4	2	3	3	3	3	2	1	3	3	0	3
Andinyaku	4	4	3	2	1	2	3	1	2	3	2	2	3	3	1	2
Agonyako	1	4	3	1	4	1	2	1	3	3	2	1	3	2	0	2
Osisia	1	4	3	1	1	1	2	1	2	2	2	1	3	1	0	2
Arevu	1	5	3	1	1	2	2	1	2	2	2	1	3	2	1	1
Ekaka	1	4	3	2	1	1	2	1	2	3	2	2	2	3	0	3
Ezizia	1	4	2	2	1	1	2	1	2	3	-	2	2	3	1	2
Mugandamaku	1	6	1	2	1	2	2	2	3	3	2	2	3	3	0	2

KEY

Score
0 = Not at all
1 = Low
2 = Moderate
3 = Excellent

Skin color
1 = White
2 = Red
3 = Other

Flesh color
1 = White
2 = Cream
2 = Yellow
4 = Other

Appendix 8. Sweetpotato varieties no longer in Kabale district.

(Percentage of farmers who stopped growing the varieties, 52 respondents).

Kanyatsi	48.1	Nyakanyasi	3.8
Magabali	44.2	Kalebe	3.8
Nyinasasi	26.9	Kwezikumwe	3.8
Kahungyezi	26.9	Kirumbagaine	3.8
Rwampara	23.1	Kagume	1.9
Kikoyo	19.2	Kantere	1.9
Kifeefe	19.2	Orusiitazi	1.9
Nderera	19.2	Mulefu	1.9
Nshensera	17.3	Kaishikikorumogo	1.9
Kashogongoki	15.4	Bushogonyozi	1.9
Nyinabushegye (Kashogonyozi)	13.5	Kashusha	1.9
Kitekamaju	13.5	Nshashe	1.9
Kinuzi	9.6	Nakatetere	1.9
Kaijamundegye	9.6	Nyerazitekami	1.9
Magumba	9.6	Nyesenga	1.9
Mukobwa	7.7	Kiwoko	1.9
Senga	7.7	Kifukefuke	1.9
Muguma	5.8	Ruhemura	1.9
Nyinakamanzi	5.8	Kararambi	1.9
Kakoba	5.8	Kyatura	1.9
Shigicumu	5.8	Urunyanja	1.9
Ntungabooro	5.8	Bwendebufe	1.9
Kyantebe	5.8	Kitekye	1.9
Kajega	5.8	Mulela	1.9
Rubango	3.8	Mulenzi	1.9
Nkiriza	3.8	Kamamanzi	1.9
Stephen	3.8	Nkirizabaana	1.9

Appendix 9. Sweetpotato varieties no longer in Gulu district.

(Percentage of farmers who stopped growing the varieties, 53 respondents).

Labeja	67.5	Lulaku Olony	1.9
Cwala Opok	54.7	Lalaka Odwel	1.9
Obongo Odwogu	38.0	Apu	1.9
Lacan Komtek	35.8	Lalyongolyongo	1.9
Agaba	24.5	Ellena	1.9
Adimagu	20.8	Agoga	1.9
Nylon	17.0	Lalira	1.9
Atitina	11.3	Nyakoro	1.9
Lalaci (Odwelo)	9.4	Kimkene	1.9
Lukaliri	9.4	Ladwe Acel	1.9
Choko	7.5	Hitila	1.9
Obokowang Latedo	7.5	Ojiri	1.9
Nyakabana	5.7	Minacuma	1.9
Mukiga	5.7	Tekila	1.9
Lawena Ogwatu	3.8	Kinowi Abilli	1.9
Abilli	3.8	Lagungungu	1.9
Gordero	3.8	Ayengki Ipota	1.9
Mavule	3.8	Latidiki	1.9
Lalako-Oleny	3.8	Akedi	1.9
Ladibagu	3.8	Ladwe Aryo	1.9
Latongweno	3.8	Montoo	1.9
Tambarapa (Mon Keya)	3.8	Adibagu	1.9
Syoko	3.8	Lalaka Odwel	1.9
Ajuu	3.8		

Appendix 10. Sweetpotato varieties no longer grown in Iganga district.

(Percentage of farmers who stopped growing the varieties, 49 respondents).

Kawungezi	42.9	Nantondo	2.0
Kyebandula	42.9	Nakato	2.0
Magabali	36.7	Ndikiryanomwami	2.0
Bitambi	30.6	Kimotoka	2.0
Sukali	24.5	Nanyonga	2.0
Kalebe	10.2	Kitikyambazi	2.0
Kiwoko	8.2	Tulankusimire	2.0
Namwezigumu	6.1	Namubiru	2.0
Namujuna	6.1	Kimbalidde	2.0
Kawogo	4.1	Matuga	2.0
Tanzania	4.1	Stanley	2.0
Mutukulanjegere	4.1	Malembo	2.0
Kisakyamaria	2.0	Bugerere	2.0
Nantongo	2.0	Kalingu	2.0
Mulalama	2.0	Njulwe	2.0
Kabusu	2.0		

Appendix 11. Sweetpotato varieties no longer grown in Mpigi district.

(Percent of farmers who stopped growing the varieties, 47 respondents).

Nantongo	25.5	Nanjali	2.1
Kyebandula	36.2	Kifuko	2.1
Nantongo	25.5	Nylon	2.1
Namujuna	21.3	Magabali	2.1
Kawogo	14.9	Kiwogo	2.1
Kalebe	14.9	Tulankusimire	2.1
Kawungezi	12.8	Namuyima	2.1
Kiwoko	10.6	Kimalide	2.1
Kisakyamaria	6.4	Namwezigumu	2.1
Kabusu	6.4	Matuga	2.1
Mukutulanjegere	4.3	Stanley	2.1
Ndikiryanomwami	4.3	Nakato	2.1
Kitikyambazi	4.3	Namubiru	2.1
Nanyonga	4.3	Njulwe	2.1
Nantondo	4.3	Bikiramariya	2.1
Sukali	4.3	Nabuswo	2.1
Tokekulu	2.1	Bugerere	2.1
Muwuluawuluguma	2.1	Tanzania	2.1
Malembo	2.1		

Appendix 12. Sweetpotato varieties no longer grown in Luwero district.

(Percent of farmers who stopped growing the varieties, 50 respondents).

Kyebandula	58.0	Kibingo	4.0
Kawogo	30.0	Kandoiro	4.0
Bitambi	26.0	Sioko	2.0
Kawungezi	24.0	Kalingu	2.0
Magabali	20.0	Nnabosa	2.0
Kalebe	16.0	Masindi	2.0
Nakato	12.0	Nakasabu	2.0
Namujuna	12.0	Nabayinda	2.0
Kankunkumuke	12.0	Bulabikoyi	2.0
Sukali	10.0	Ndikiryanomwami	2.0
Ngarozabakyala (Ngarozacwa)	8.0	Nyindozabalalo	2.0
Muwuluawuluguma	6.0	Kifuko	2.0
Nylon	6.0	Kitikyambazi	2.0
Mukutulanjegere	6.0	Mwezigumu	2.0
Kiwoko	6.0	Munakukyanda	2.0
Kifefe	4.0	Nakamogoli	2.0
Kenya	4.0	Milinyansaka	2.0
Kawa	4.0		
Munyera	4.0		

Appendix 13. Sweetpotato varieties no longer grown in Kabarole district.

(Percent of farmers who stopped growing the varieties, 46 respondents).

Kasoga	41.3	Bamwita	4.3
Magabali	19.6	Kanyarwanda	4.3
Kansegenyuke	17.4	Kisabu	4.3
Kiboga	15.2	Bitambi	2.2
Tuura/ Tuurankusimire	13.0	Nylon	2.2
Matama	10.9	Kyarwampara	2.2
Kahungyezi	10.9	Nyinabushegyere	2.2
Kanyasi	8.7	Kifefe	2.2
Tega orugari	8.7	Kamamanzi	2.2
Kyebandula	8.7	Namujuna	2.2
Kihoko/Kiwoko	6.5	Ntudebuleku	2.2
Kalebe	6.5	Bikiramaria	2.2
Kigambo	6.5	Katikamuhogo	2.2
Kasabuni	4.3	Mukubigwambeba	2.2
Bamwita	4.3	Kigambokyamukyala	2.2
Kitekamaju	4.3	Nyinabarongo	2.2
Kakoba	4.3	Kibingo	2.2
Nyinakamanzi	4.3	Mutembanshaka	2.2
Mukutulanjegere	4.3	Ruhara Rwa Diisi	2.2
Matamabuku	4.3	Madugulu	2.2
Bagala/ Bagalalyazi	4.3	Kiisiki	2.2
Muguma	4.3	Kigere kya Njuba	2.2
Kikongo/Kikoyo	4.3	Kabokamuwala	2.2
Kahogo	4.3	Tema emuli	2.2
Kasunganyanja	4.3	Kamanyonta	2.2
Kyegeza	4.3	Matamagamugorewe	2.2
Nyinasasi	4.3	Ntega	2.2

Appendix 14. Sweetpotato varieties no longer grown in Arua district.

(Percent of farmers who stopped growing the varieties, 49respondents).

Imbu	24.5	Awubyawubya	2.0
Sikilimindi (Sekaremende)	14.3	Awugwewugwe	2.0
Ocaca	12.2	Padrimaku	2.0
Dele	10.2	Gulugulu	2.0
Alugube (Alugubia/ Alobia	8.2	Chanje	2.0
Ongugasi (Agasi)	8.2	Mboo	2.0
Imbalo (Mbalu)	6.1	Gboso	2.0
Mputa (Mbutra)	6.1	Balau	2.0
Kagoroko (Agoroko)	6.1	Kampala	2.0
Lumbu	6.1	Yellow	2.0
Osisya (Osisia)	6.1	Tengezi	2.0
Andinyaku	4.1	Ojiba	2.0
Padiroyomaku	4.1	Ayivu	2.0
Yi-type	4.1	Rubomaku	2.0
Ombivu	4.1	Yungua	2.0
Deleya (Deleri)	2.0	Namuganda	2.0
Odaliyo	2.0	Mbaloa	2.0
Musoga	2.0	Sanje	2.0
Arube arube	2.0	Jenje	2.0

Appendix 15. Farmers' scoring of constraints to sweetpotato production in 1991-92 by district.

Constraints	Average	Kabarole	Iganga	Gulu	Mpgi	Luwero	Arua	Kabale
High labor costs	2.83	3.14	2.44	2.84	3.39	2.8	2.64	2.59
High transport cost	2.57	2.51	2.31	3.07	2.57	1.74	2.97	2.83
Weevils	2.56	2.44	2.96	2.15	2.91	2.36	2.71	2.38
Drought	2.48	2.78	1.8	1	2.13	2.9	3.65	3.13
Shortage farm implements	2.44	1.89	2.31	2.96	2.59	1.8	3.02	2.48
Sweetpotato butterfly	2.26	1.29	3.55	1.83	2.55	2.46	1.94	2.23
Lack of transport	2.22	2.14	2.12	2.66	2.2	1.2	2.57	2.67
Low market prices	2.01	2.63	1.85	2.35	1.88	1.18	1.93	2.28
Mole rats	1.96	1.69	3.82	1.43	1.59	1.38	1.65	2.19
Other rodents	1.93	2.89	2.13	1.83	1.51	1.48	2.08	1.61
Lack of sacks	1.73	1.6	1.19	2.52	1.6	1	2.18	2.04
Land shortage	1.71	0.98	2.02	2.42	1.7	1.56	1.83	1.48
Labor shortage	1.69	0.96	1.77	1.87	1.91	1.8	1.63	1.88
Lack of "clean"material"	1.65	1.29	1.84	1.81	1.13	1.18	1.94	2.35
Lack of planting material	1.58	0.71	1.31	1.81	0.6	1.46	2.39	2.77
Tuber rot	1.58	1.98	1.74	1.62	1.56	1.26	1.63	1.26
Virus	1.46	1.53	1.57	0.72	1.63	1.28	1.22	2.28
Monkeys	1.26	0	3.83	0	3	0	2	0
Porcupines	0.83	2.83	0	0	3	0	0	0
Wild pigs	0.48	0	0	0	1.02	1.88	0.37	0.06
Mites	0.43	2	1	0	0	0	0	0
Flooding	0.39	0.04	0.25	0.25	0.15	0.18	0.43	1.44
Guinea fowl	0.30	0	0	0	2.13	0	0	0
Squirrels	0.29	2	0	0	0	0	0	0
Grasshoppers	0.14	0	0	0	0	0	1	0
Skin coat browning	0.14	0	0	0	0	0	1	0
Average Score		1.51	1.61	1.35	1.64	1.19	1.65	1.54
No. of observations		46	49	53	47	50	49	52