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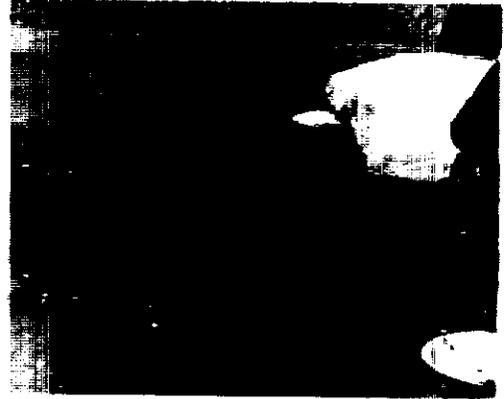
International Institute for Tropical Agriculture



**Southern Africa Root Crops Research Network  
(SARRNET)**

**Applying a Sub-Sector Analysis Approach to Studying the  
Marketing of Cassava and Sweet potato in Southern Africa:**

**The Case of Tanzania**



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Through The Southern Africa Root Crops Research Network (SARRNET) and  
Undertaken by a Team of Researchers from The Department of  
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As usual, views and opinions are purely those of the authors and we are fully responsible for all the errors and omissions in this report.

## EXECUTIVE SUMMARY

### BACKGROUND AND METHODOLOGY

This report presents a synthesis of results of three phases of a study titled “*Applying A Sub-sector Analysis to the Marketing of Cassava and Sweetpotato in Tanzania*”. The three phases were the Literature Review, Pre-Survey and Main Survey exercises. The latter survey was conducted during the months of May and August 2001.

The general objective of the study was to understand the structure and performance of cassava and sweetpotato marketing in Tanzania. The central-east marketing corridor was selected as a representative marketing channel to study how production areas (up country villages and districts of Dodoma and Morogoro regions) are linked with consumption centres such as Morogoro, Dodoma district and regional towns and the Dar-es-Salaam region, including its 4 city districts. The aim has been to delineate the flow of commodities from production sites through various marketing chains, village to village, village to district headquarters and village to regional headquarters and Dar-es-Salaam. During the main survey, structured interviews, using pre-tested questionnaires were administered for producers, traders, transporters and consumers in the 4 regions. Production and marketing constraints and challenges are discussed together with factors hindering increases in demand and utilisation (domestic consumption) of Sweetpotato and cassava.

The importance of cassava and sweetpotato in Tanzania can be viewed as follows. Although to a large extent Tanzania is self sufficient in food (e.g. 93 % in 2000/01), there are pockets of severe food shortages. The main source of calories for Tanzanians is maize which provides 62 percent of total calories. Rice, the other preferred staple, contributes 8 percent. The rest of the calorific intake comes from cassava (13 percent), sorghum (8 percent), root crops and bananas. Considering the challenges of meeting food needs on the basis of maize and rice, cassava and sweetpotato acquire great importance in Tanzania. The advantages of cassava and sweetpotato over other staple foods in Tanzania are many: tolerance to drought, capacity to provide yields in lowly fertile agro-ecologies and in seasons where other crops would fail, low requirements for external inputs like fertilisers, flexibility in planting and harvesting, and convenient in-ground storability. The crops also require less moisture and take shorter periods to mature relative to other staples like maize.

#### ***Key findings***

##### **Production Patterns, Trends, Costs and Income**

Cassava is one of the staple foods in the surveyed regions but more popular in the rural areas of the coastal regions of Dar-es-Salaam and Coast. Though there is a clear indication that the cassava marketing chain starts from up-country and disposals are at regional towns and cities, major supplies to consumption areas do not move very long distances in the case of cassava. Commercial producers of cassava, therefore, are found at production sites closer to markets compared to sweetpotato.

Sweetpotato are grown in both zones but for the coastal regions the crop is grown mainly by farmers with a background and origins from central or more upcountry regions around Lake Victoria, especially the "Sukumas". Production of sweetpotato is less dispersed compared to cassava, and is concentrated in the areas with greatest production potential.

In relative terms, more rural dwellers grow some amounts (often small amounts) of cassava, and there is less specialisation in this crop. Amongst the two crops' growers, a larger proportion of those growing sweetpotato indicated to be doing so for commercial purposes. Or more appropriately, very few sweetpotato growers plant them as a fallow, catch crop or a casual inter-crop in their field, a phenomenon common for cassava.

Whereas the percentages of farmers selling produce is similar for cassava and sweetpotato (85 and 89 % respectively), sweetpotato farmers are more specialised and market oriented than cassava farmers. This is evidenced by higher rates of monocropping (74% compared to 58% for cassava)<sup>1</sup>, marketable surplus, more risk taking and incidences of production in leased land.

Based on the survey there is only slight evidence that the area under acreage for cassava and sweetpotato is increasing very slowly. Production costs of both cassava and Sweetpotato are much lower in the central regions, ranging between TSh 10,000 and 20,000 per ha. In the coastal regions the costs range between TSh 30,000 to 40,000 per ha, mainly because labour is the most important and costly item, and it is relatively more expensive in the latter areas. Apparently, the opportunity cost of labour is lower in the central regions. One would expect that the lower production costs coupled with higher yields particularly for Sweetpotato in the central regions (compared with coastal regions) would result in higher producer income margins per hectare in these areas. This is not the case and mainly because of the low producer prices fetched up-country. For example the price per 100 kg bag of cassava and Sweetpotato in Dodoma is TSh 1,600 and 3,700 respectively. The prices for the same produce in Dar-es-Salaam are TSh 3,000 and TSh 8,300; about 100% difference.

Coast and rural areas of Dar-es-Salaam are the major suppliers of cassava to the city. However, urbanisation and acquisition of large pieces of land by farmers from urban centres, land speculators and non-agricultural investors from Dar-es-Salaam are increasingly reducing the land available for cassava production in the coastal regions, especially along the Bagamoyo road. One would conclude that, whereas urbanisation is desirable as it expands the market for the two products, this could be counterintuitive in the case of Dar-es-Salaam because the very reason pushes the crop out of the land. However, one may derive inspiration from the fact that former cassava land is not going into construction or other physical development, but is being allocated to higher value crops such as citrus, cashew, pineapple, passion and watermelon. A point here is that effort to enhance the quality and post-harvest processing and hence the value of cassava may enable it to compete and maintain its land.

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<sup>1</sup> The fact that cassava is planted as a cover crop, during fallowing and also sparsely intercropped indicates low levels of specialization and rating as major income source.

Where as farmers do not view planting material and other inputs to be a major constraint, there were clear indications that pests and diseases are a major problem. Efforts to address cassava and Sweetpotato pests and diseases problems, either through breeding or husbandry practices are yet to yield fruits.

### **Traders: Market Orientation and Operations**

Mainly small-scale traders market Sweetpotato and cassava. Their capital base comes from own savings, only a few (between 2 and 4%) managed to borrow from Savings and Credit Societies. One could therefore question whether this is an avenue to be explored in view of addressing financial constraints that may face traders if they are to increase their volumes of business. Transfer function is the major task undertaken by such traders whereby they buy stands of crops and harvest them at a rate suiting them, avoiding excessive extraction at any time to minimise post-harvest deterioration. Traders would then transfer produce to market areas. Traders accessing rural areas for produce are mainly wholesalers, who would often also operate retail selling of the same produce.

Both cassava and sweetpotato prices seem to be more supply driven than demand driven except during the Islamic month of Ramadan when they are a delicacy. Besides Ramadan, early and late season prices are the highest for both cassava and sweetpotato. More sweetpotato than cassava from central regions are delivered to Dar-es-Salaam market. The Dar-es-Salaam market therefore receives sweetpotato from both central and coastal regions; however, the two sources are not perfectly competitive due to alternating production seasons except for some few months when there is an overlap.

Sweet cassava varieties are more preferred by market-oriented farmers. There is a convincing correlation that suggests this is derived from traders' demands. Other preferred features include early maturity and fast turn over. As noted in the pre-survey, Sweetpotato from the coast is said to be salty and given a choice, consumers would opt for sweetpotato from the central regions.

An interesting finding here is that sweetpotato is significantly traded in all three identified marketing channels i.e. village-to-village (a rural-to-rural chain), village-to-district headquarters (again an upcountry chain) and rural-to-region headquarters including the Dar-es-Salaam city (significantly rural to urban chain). Cassava trade is more pronounced in the case of the last chain, rural to urban. This phenomenon has significant implications for developing the markets. The pronounced diversity of marketing channels for sweetpotato compared to cassava augurs well with the fact that it is a relatively high value crop compared to cassava. Secondly, the dichotomy between sweetpotato producers and consumers is more pronounced than in the case of cassava. Many rural dwellers would have cassava plants casually grown in their farms, and hence need not buy for domestic consumption. The number of rural dwellers, who consume but don't grow sweetpotato, implying that they are obliged to buy, enhances the rural-to-rural and rural to district/regional headquarters marketing chains for this produce.

From the traders' perspective, transportation is the major constraints to marketing. It accounts for over 50% percent of the marketing costs. Poor and inaccessible roads, long

distance to large markets lead to high costs and have thus reduced marketable surplus and market margins, particularly so for the produce from the central zone.

***Consumers: Food Chains, Domestic Consumption and Food Vendors***

It is the low-income earners, both in rural and urban areas, who mainly consume sweetpotato and cassava. They are a cheap food and figure prominently in their household's budgets. No significant processing of sweetpotato and cassava i.e. drying, making chips and pounding into flour takes place at either farmer, trader or consumer level. Much of the consumers reported simple processing in the form of boiling and drying. The major form in which cassava and sweetpotato are consumed is boiled fresh roots. There is significant room for exploring various ways and means to process sweetpotato and cassava. This is seen as the avenue through which cassava and sweetpotato can be commercialised and its trade and utilisation increased.

Urban markets for sweetpotato and cassava are segmented by income where the low-income strata eat cassava more frequently. However, unlike cassava for home consumption, snack cassava sold by vendors, as would be expected, might be less income segmented especially during Ramadan. Unlike cassava, the Sweetpotato market is more segmented by ethnicity than income – this was observed in the pre-survey.

There are also clearer indications now that sweetpotato and cassava pose as substitutes for other foods. Responses from consumers showed contrasting features on the role that each plays in the daily meal of a household. Where as cassava features strongly as a main meal (lunch and or dinner), Sweetpotato surfaced more prominently as a breakfast item. Cassava competes and acts as a potential substitute for maize, sorghum, millet (prepared as various types of "ugali") or rice meal, where as sweetpotato competes with wheat products like pancakes "chapatti", doughnuts and buns "maandazi" etc. Any intervener who aims to enhance domestic utilisation of cassava and sweetpotato may wish to consider seriously the fact that it is the low cost nature of the product that matters, augmented with the particular purposes that it plays in the daily meal of a low-income earner. In general, processing for low-income earners domestic consumption can foster major strides in the effort to enhance utilisation of cassava and sweetpotato in Tanzania.

The survey did not capture cassava or sweetpotato production and marketing that aimed at industrial processing or export markets. However, records show that industrial starch production was once undertaken in Sengerema, central Tanzania and was abandoned in the early 1990s due to low supply of raw material, i.e. cassava roots. It is also documented that Tanzania once exported dry cassava to animal feed producing factories in Europe. These are also areas worth exploring with the goal of enhancing utilisation.

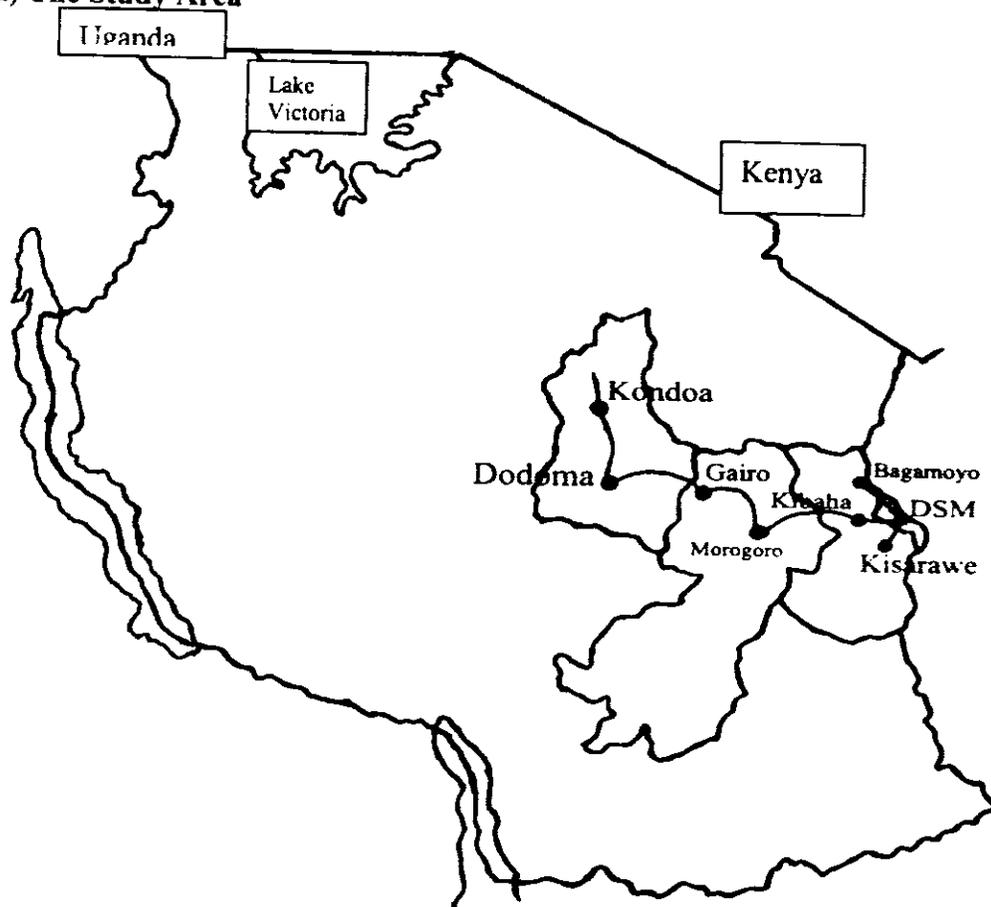
It was observed that, unlike round (Irish) potatoes, sweetpotato and cassava have not yet penetrated the international fast food chains. However, there is a potential for promoting cassava and sweetpotato to local food vendors popularly those known as 'Mama Lishe'. Although not an explicit target of this study but such food service establishments are privately or co-operatively operated by women in most urban centres in the country, catering mainly for 'blue collar' job and manual labour workers e.g. in factories and construction sites. Vendors in urban, residential estates and roadside markets currently sell cassava and Sweetpotato snacks

# Marketing of Cassava and Sweetpotato in Tanzania

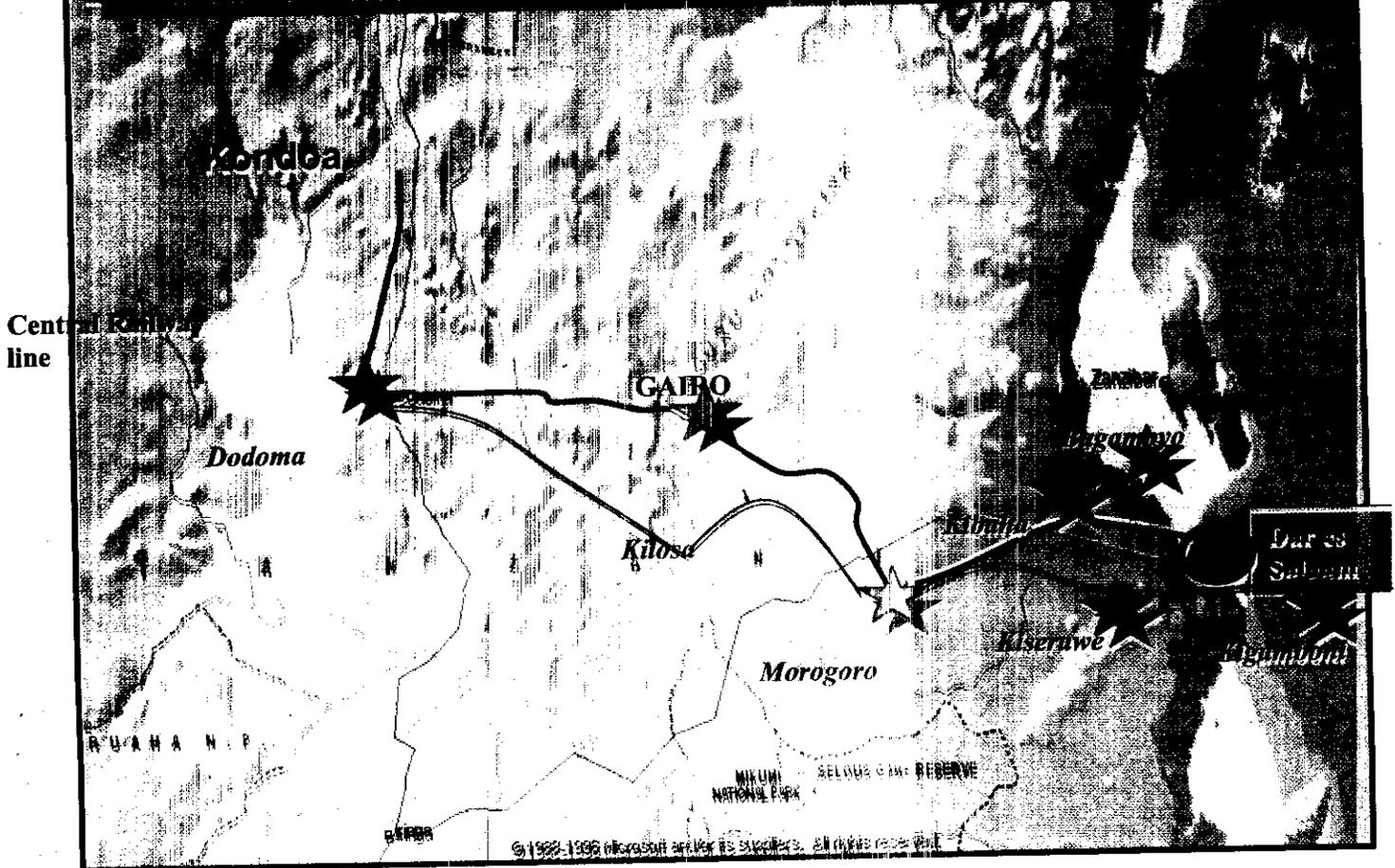
## 1. Introduction

This report is a synthesis of the cassava and sweetpotato Marketing Study in Tanzania that was undertaken over the period November 2000 and August 2001. The research entailed three stages, namely Literature Review, Pre-Survey and Main Survey Components. The main objective of the study was to understand the structure and performance of cassava and sweetpotato marketing in Tanzania. The central-east marketing corridor (Figure 1) was selected as a representative marketing channel to study how production areas (up country villages and districts of Dodoma and Morogoro regions) are linked with consumption centres such as Morogoro, Dodoma district and regional towns and the Dar-es-Salaam region, including its 4 city districts. The aim has been to delineate the flow of commodities from production sites through various marketing chains: village to village, village to district headquarters and village to regional headquarters and Dar-es-Salaam. In the main survey, structured interviews, using pre-tested questionnaires were administered for producers, traders, transporters and consumers in the 4 regions. Production and marketing systems, constraints and challenges are discussed together with factors hindering increases in demand and utilisation of sweetpotato and cassava.

Figure 1(a) The Study Area



**Figure 1 (b) Survey area in Tanzania:  
Cassava and sweetpotato production trade linkages**



In order to understand correctly the role and place of cassava and sweetpotato in the economy, we first review the economy's general performance, agricultural production (food and cash crops) and implications for food security – section 2 and 3. Section 4 onwards present results from the cassava and sweetpotato marketing study.

## 2. TANZANIA'S ECONOMIC AND SOCIAL TRENDS <sup>2</sup>

### 2.1 The Economy

Tanzania has of recent been experiencing positive macroeconomics developments. In the calendar year 2001, the economy grew by 5.6% in real terms compared with 4.9% in 2000. Table 1 presents selected key economic indicators.

<sup>2</sup> Unless specifically mentioned, statistics and analogy of this section is based on ESRF (2001/2002) Quarterly Economic Reviews. Volumes 4 to 5 of Issue 2. Economic and Social Research Foundation (ESRF), Dar-es-salaam, Tanzania.

**Table 1: GDP Growth Rate and Inflation**

Indicators	1999	2000	2001	2002
Real GDP annual Growth (Factor Cost), %	4.8	5.1	5.6	5.9
CPI inflation headline, %	7	5.5	4.9	4.5

In the year 2001, the agriculture sector grew by 5.5 % compared with 3.4 in 2000. The fisheries sub-sector led and recorded a growth rate of 7% followed by the crop sub-sector that grew at 5.9%. The main contributing factors to this growth rate were broader participation of the private sector and the expansion of market in neighbouring countries. Favourable weather conditions especially steady rainfall in many areas lead to increase in crop production as well as availability of pasture and water for livestock production. Likewise, non-occurrence and stabilisation of services against destructive pests and animals contributed much to the improved performance.

The other sectors in the economy performed variably. The mining sector's growth declined from 13.9% in 2000 to 13.5 in 2001, where lower levels of extraction of diamonds and gemstone were the causes. There was an increase in growth of the manufacturing sector, from 4.8% in 2000 to 5% in 2001. Completion of the privatisation of former parastatal manufacturing industries is behind this growth. The manufacturing sector now contributes 8.3% of the GDP. The construction sector grew by 6.7% (down from 8.4% in 2000). In tourism, the number of tourists increased from 501,669 in 2000 to 525,122 in 2001.

The government has set strategies for achieving GDP growth targets of 5.9% and 6.3% in years 2002 and 2003 respectively. The 2002/2003 Government Budget provides promising intentions in the areas of infrastructure investments, tax structure review, investment avenues and good governance through sound policies and political stability.

## **2.2 Foreign Trade**

Tanzania had a favourable balance of payment of US\$ 55 million in 2001, compared to a deficit of US\$ 35.3 million in 2000. There are therefore improvements in the economy and these are notable in inward capital transfers in form of foreign direct investments and loans to the government. Foreign currency reserves level in 2001 was equivalent to 6.1 months import requirements.

## **2.3 Population Developments**

Tanzania's population is estimated at 33.9 million people in 2001 (32.9 million in the mainland and 1 million in Zanzibar) of which 49% are male and 51% female. About 47% of the population are comprised of children less than 15 years. The life expectancy is estimated at 49 and 51 years for male and female respectively. The majority of the people in Tanzania live in rural areas. However as time unfolds the situation is changing with significant urban influxes. The 1998 census showed that urbanites have increased from 6% in 1967 to 18.4% in 1998. Tanzania mainland has a total labour force of 17.8 million people, an increase of 6.6 million people or 58.3% in the ten year period, 1990 to 2001. Traditional agriculture employs 13 million people, the informal sector 0.9 million people, the formal private sector 0.6 million, domestic workers 0.5 million, Government

employees 0.4 million and parastatals 0.1 million.<sup>3</sup> Unemployment in the whole country stood at 2.3 million people, or 6 %.

#### 2.4 Private Sector Developments

There are several government initiatives to foster a faster growth of the private sector in Tanzania. Significant steps have been taken to establish the Tanzania Investment Centre that is a “one stop shop” for investment in Tanzania. This initiative plus other policy reforms have led to an increased direct foreign investment. TIC, in 2001, approved 220 investment projects valued at TSh 1,091.8 billion, projected to generate employment of 24,699 persons. The manufacturing sector is the major beneficiary of FDI. In the year, the flow of FDI increased from US\$ 192.8 million in 2000 to 224.4 million. Positive inflows of FDI and general development of the private sector provide a positive picture for the development of the economy. Other initiatives that have led to improvements in the private sector development include the establishment of the Private Sector Reform Commission (PSRC), which handles valuation and processing of various take-overs of former public owned commercial entities to both local and international firms. Liquidation and litigation are also overseen by the Loans and Advances Realisation Trust (LART), which has mainly accommodated assets and liabilities of non-performing parastatals (Temu and Due, 2000).

**Figure 2: Tanzania: Geography and Regional Demarcation.**



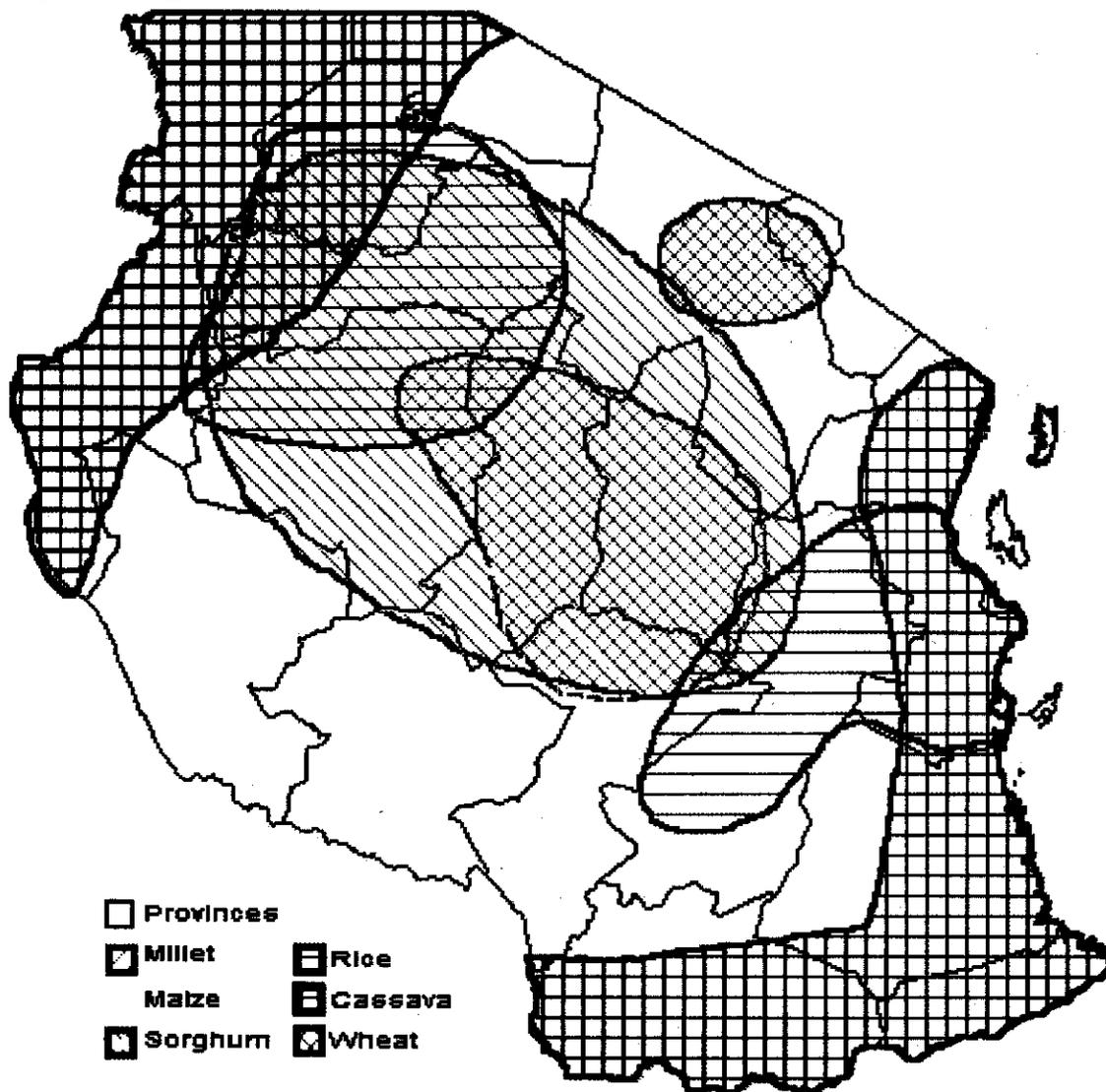
<sup>3</sup> GoTs Labour Force Survey 2001.

### **3.0 Agricultural Production**

#### ***3.1 Food Production***

Food production trends and patterns are exemplified by Tanzania's staple food, i.e. maize. Other important food crops are rice, cassava, sorghum, millet and pulses. Maize is more geographically widely grown than other crops (Figure 2). However, in terms of quantity, Mbeya, Iringa, Rukwa, Ruvuma and Arusha account for about 50% of the total production. Despite the earlier noted period(2000-2001) of overall improvement in agriculture, longer term performance of the food crops sub-sector continues to perform relatively unsatisfactorily. Aggregated crop production for the 1999/2000 season is 7.32 million tonnes compared to 7.44 million tonnes and 7.97 million tonnes of 1998/99 and 1997/98 seasons respectively. Total cereal production is estimated at 3.37 million tonnes compared to 3.79 million tonnes of the previous 1998/99 season, down by about 11 percent. Total national maize production is estimated at 2.01 million tonnes, down by 18 percent from 1998/99 production of 2.45 million tonnes. In addition, the final cereal production has decreased by about 10.7 percent. However, the production of non-cereals increased by about 21 percent in the same period.

**Figure 3 : Agricultural Production Zones**



**Table 2: Food Crops Production 1998/99 – 2000/01**

Crop/Type	Total Production ('000 tonnes)		1997 98- 1998 99	1999 00- 2000 01*
	1997/98	1999/2000		
Maize	2,685	2,009.3	-9	13.4
Paddy	676	508.3	-25	11.4
Sorghum/Millet	799	817.2	-6	-2.8
Wheat	111	32.8	-26	127
Total Cereals	4,271	3,367.6	-11	10.3
Peas	462	673.7	14	-5.6
Banana	836	702.5	-10	-1.5
Cassava	1,758	1,780.7	2	-3.3
Peanut	644	797.7	-11	-1.7
Total Non-Cereals	3,700	3,954.6	-1	-3.1
Grand Total	7,971	7,322.3	-7	3.1
Cereals as a % of total	53.58	45.9		
	46.42	54.1		

\* Forecast

Source: Ministry of Agriculture and Food Security, Dar-es-salaam, Tanzania.

To a large extent, Tanzania is self sufficient in food (93 percent for the year 2000/01). However, there are both official and unofficial exports and imports of food crops across the borders. The country imports food to the tune of 2 to 4 percent of her requirements per year. There are some pockets of food shortages and consequently malnutrition at household level experienced in some areas. Although food production has been marginally increasing and in some year's food production exceeds the theoretical overall food requirements, the nutritional energy requirements are far from being met on a sustainable basis.

As indicated above Tanzania has produced sufficient food to feed its population. However, the available data indicate severe access difficulties across regions and age groups in rural areas as the high degree of concentration in rural incomes would lead us to expect. Average calorific intake per capital in Tanzania is estimated at 2,206 kcal/capita in 1989 above the 1,831 kcal/capita estimated in 1965. This level of food consumption is borderline. However, studies indicate the availability of food varies by farming system (and regions). FAO studies in 1992 shows about 2,200 kcal/day available across the country, while calorie intake in sorghum/millet system drops to 1,500 kcal/capita.

**Table 3: Food consumption per day by farming system**

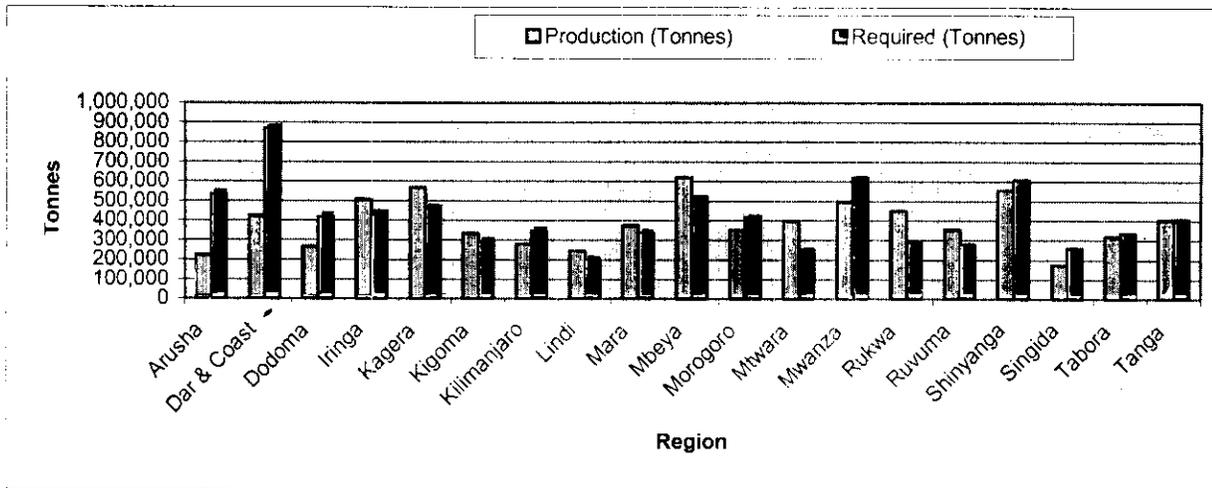
Farming system	Zone	Energy in kcal/day/capita	Protein in gr/day/capita
Cashew/cassava	South coast	2,141	52
Maize, coffee, cattle	Southern Highlands	2,510	76
Cotton, rice, sorghum	Central Semi-arid	1,547	52
Agropastoralist	Agro pastoral Semi-arid	2,168	80
Coffee, banana, dairy	Northern Highlands	1,606	41

Maize is the main source of calories for Tanzanians. In rural areas, maize, the preferred staple, and provides 62 percent of total calories. Rice, the other preferred staple, contributes 8 percent. The rest of the calorific intake comes from cassava (13 percent), sorghum (8 percent), root crops and bananas. The incidence of malnutrition among children is generally high. In rural areas, the incidence of children under-five with below 80 percent of the standard “weight for age” is between 40 and 60 percent. The incidence of severe malnutrition, children below 60 percent of standard “weight for age”, is between 4 and 9 percent. Studies indicate that the likelihood of a child dying increases substantially if a child is malnourished. The infant mortality rate in rural areas is 138 per 1000 live births. The mortality rate for children under five living in rural areas is 249 per 1000 live births. Child mortality rates in urban areas are significantly lower. The very high child mortality rate in rural areas is due to inadequate consumption of food, as well as malaria, diarrhoea and respiratory diseases. (Keenja, 2001).

### 3.2 Food Security Status for 1999/2000 – 2000/2001

The total domestic food production, based on final crop production forecasts for 1999/2000, is 7.32 million tonnes. Of the total production, cereal production is 3.37 million tonnes, while non-cereals production is 3.95 million tonnes. The total national maize production for the season is estimated at 2.01 million tonnes. Compared to requirements, a shortfall of about 301,512 tonnes of food (cereal equivalent) is estimated. This is made up of maize alone having cross-substituted maize shortage for surplus non-cereals

**Figure 4: Current food production and requirements by regions**



Source: Food Security Department MAFS, 2000

**Table 4: Tanzania Food Supply Analysis and Self Sufficiency Ratio for 2000/01**  
(Based on 1999/2000 Final Food Crop Production Forecasts)

<i>Region</i>	<i>Production (Tonnes)</i>	<i>Required (Tonnes)</i>	<i>Deficit/Surplus (Tonnes)</i>	<i>Self-sufficiency Ratio (SSR)</i>
Arusha	224,497	532,408	-307,910	42
Dar & Coast	422,173	869,562	-447,389	49
Dodoma	264,945	416,801	-151,856	64
Iringa	505,782	436,771	69,011	116
Kagera	567,891	459,338	108,553	124
Kigoma	333,480	291,353	42,127	114
Kilimanjaro	278,943	345,138	-66,195	81
Lindi	244,288	201,363	42,925	121
Mara	374,207	338,945	35,261	110
Mbeya	618,339	519,524	98,815	119
Morogoro	350,842	415,308	-64,466	84
Mtwara	395,985	252,194	143,791	157
Mwanza	494,854	620,740	-125,886	80
Rukwa	448,297	291,460	156,837	154
Ruvuma	352,354	279,175	73,180	126
Shinyanga	552,082	608,373	-56,291	91
Singida	172,631	258,303	-85,673	67
Tabora	318,684	333,795	-15,111	95
Tanga	402,074	406,309	-4,234	99
<b>Total Tanzania</b>	<b>7,322,348</b>	<b>7,876,860</b>	<b>-554,512</b>	<b>93</b>

Source: Food Security Department, MAFS (2000)

### **3.3 Cash crops production**

Traditional cash crops such as cotton, cashew, coffee and tobacco are less spatially spread (Figure 3 above). Most inputs such as fertiliser are used in maize and the traditional cash crops such as coffee, cotton, tea and tobacco. Coffee is Tanzania's first export crop. It is grown by both smallholder and plantations (estates) holders and contributes 17% of Tanzania's foreign exchange earnings. Cotton is Tanzania's second export crop. It is mainly a smallholder's crop, and contributes 14% of the country's foreign exchange earnings. The third ranked crop is cashew, which is mainly a smallholder crop and contributes 10% of the total value of Tanzania's foreign exchange earnings. Other important crops include tea, an estate crop contributing 6% of the Tanzania's traditional agricultural exports. Tobacco is also mainly a smallholder crop and contributes 2% of the Tanzania's export earnings. African Palm, a smallholder crop is an important source of edible oil. The palm oil industry is generally underdeveloped with an average production of only 6,000 t of palm oil per year. One can also not neglect the contribution of sisal, which is essentially an estate crop that contributes 1% of Tanzania's foreign exchange. A typical smallholder farmer would combine both food and cash crops in farm sizes averaging between .9 to 3ha of land. As noted above preferred cereal marginally fulfils food requirements and hence sweetpotato and cassava have a role.

## 4. Cassava and Sweetpotato Production, Marketing and Consumption

### 4.1 Background

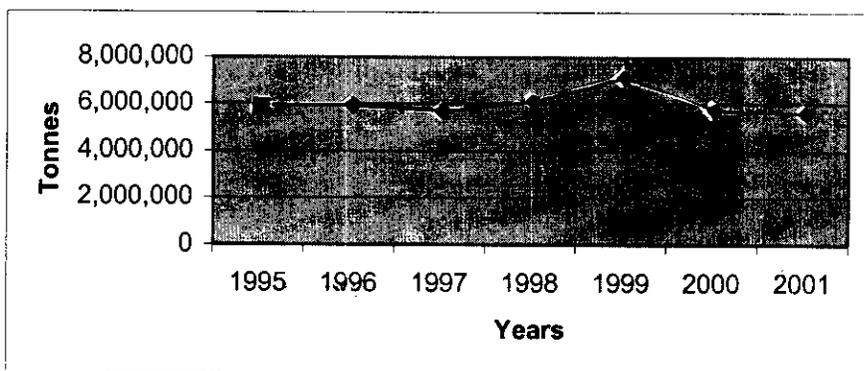
Considering the challenges of meeting food needs on the basis of maize and rice discussed above, cassava and sweetpotato are important food crops in Tanzania. The advantages of cassava and sweetpotato over other staple foods in Tanzania are many: tolerance to drought, capacity to provide yields in agro-ecologies and seasons where other crops would fail, low requirements for external inputs like fertilisers, flexibility in planting and harvesting, and convenient in-ground storability. The crops also require less moisture and take shorter periods to mature relative to other staples like maize. The crops are also acquiring importance as food security alternatives for small farmers in Tanzania

### 4.2 Production Trends

In the past 10 years cassava and sweetpotato production in Tanzania averaged the 6,000,000 and 436,000 tons respectively per annum, (Figures 5 & 6, See also Annex 1)<sup>5</sup>. For cassava this amount shows that the crop is fairing very well in comparison with other staples such as maize (2.44 million tons). In addition, the production trend for cassava during the same period has been simply stable with no apparent increasing trend. Unlike cassava, sweetpotato production has been increasing in the last 10 years. Annual variation in production is much higher for Sweetpotato than for cassava. Appendix 1 (a to d) presents comparative area cultivated and production of root and roots and other crops in Tanzania.

Estimated productivity of both crops suggests that there is room for improvement. Cassava yield per ha is estimated at 10.5 tonnes ranging from 1.5 to 35 tonnes per ha. That of Sweetpotato ranges between 5 to 18 tonnes per ha (Nweke et. al.,1998). Annex 1 presents areas cultivated and production trend, 1980 to 1999 for the two crops.

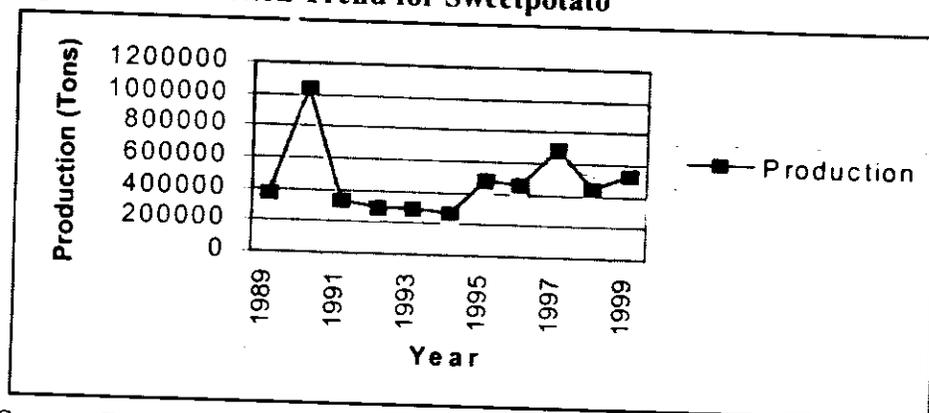
**Figure 5: Production Trend for Cassava**



Source: FAO statistics Database, 2000

<sup>5</sup> A thing to note (Annex 1) is the variability of estimates of production by different sources. FAO GIEWS sounds reasonable if one considers an average yield level of about 9t/ha under 700,000ha under cassava.

**Figure 6: Production Trend for Sweetpotato**



Source: FAO statistics Database, 2000

From the field survey and interviews, cassava and sweet potato yields are modest and below research centres yield potential estimates. Furthermore, yields do not vary much with location, except for cassava having higher yields in Dar es Salaam. Decisions on scales of production therefore mainly depend on the availability of produce markets.

**Table 5: Crop area (acres) and yields (bags/acre) by region\***

Region	Sweetpotato Farmers				Cassava Farmers			
	Sweetpotato		Maize		Cassava		Maize	
	Farm Size, ha	Yield t/ha	Farm Size, ha	Yield t/ha	Farm Size, ha	Yield t/ha	Farm Size, ha	Yield t/ha
Dar es Salaam	4.87	16.68	1.79	4.46	3.75	43.8	1.15	5.00
Coast	1.56	14.76	3.40	4.30	2.46	28.18	1.97	6.43
Morogoro	1.43	19.35	4.35	7.00	1.27	23.30	2.01	12.21
Dodoma	1.78	15.68	5.18	6.26	1.48	26.36	3.01	6.13
Total	1.96	16.64	4.12	5.90	2.00	28.19	2.24	8.27

\*A bag of Sweetpotato/cassava weighs 90-120 kg

Source: Survey (2001).

With regard to preferred varieties, interviewed farmers mentioned many local names. However, characteristics of the preferred cassava varieties are sweetness, in-ground storability, high yield, tolerance to diseases and early maturity. Local names mentioned by respondents include Mzungu, Kibanga meno and Kigoma. In the case of Sweetpotato, preferred varieties are mentioned to be sweet, starchy, high yielding, in-ground storable and fast cooking with local names such as Gairo, Nyekundu (Red) grown by over 50% of farmers. It will be observed further below, that the same features and characteristics figure strongly amongst attributes preferred by consumers.

### 4.3 Research and Development

Research on root crops i.e. cassava and sweetpotato has a long history in Tanzania. For example a research program that specifically targeted cassava was established in 1930s at the East African Agricultural Institute in Amani, Tanga. This program was later (1974) transferred to Ukililuguru Research Center in Mwanza. However, most of the research done on these crops has been on the supply side, that is, agronomic aspects to increase productivity and production. Less effort was devoted to understand the demand side such as harvesting processes to improve product quality and socio-economic studies including

marketing. Only a handful of economic studies included evaluating the economic impact of diseases such as cassava mosaic and streak diseases have been conducted. Recently, studies to address the demand side, especially in post harvest processes and marketing, have been initiated. The staff of the Ministry of Agriculture and Food Security provides extension service for cassava and Sweetpotato. However, the quality of the extension service is not uniform throughout the 20 regions because of differences in crop priority and existence of agricultural projects in some regions that do not cater for the whole country. In general R&D has had a strong bias towards traditional food and export cash crops.

#### 4.4 Production Costs and Margins for Sweetpotato

Analyses of prices, production costs and margins for cassava and sweetpotato are summarised in Tables 6 and 7. Gross margins for each farmer were calculated as the difference between revenue per hectare and total variable costs. Family labor was also priced using the equivalent market value. Some households have negative margins; which is explained by the fact that farmers do not price family labour. Negative gross margins could also be attributed to intercropping where labour costs such as those for weeding are shared between two or more inter-crops.

In general, results indicate high variability in price, costs and yields. Coastal regions of Dar es Salaam and Coast have relatively higher producer prices, explained by high demand derived from large urban markets close-by. The labour cost in these areas is also high due to high opportunity cost for labour. Prices and labour cost in the central regions of Morogoro and Dodoma are relatively lower. However, access to markets seems to favor Morogoro and Dar es Salaam more (highest gross margins) in spite of their high production cost. Morogoro region seems to strike the best balance between yields, price and production cost.

**Table 6: Yields, Production Costs and Margins for Sweetpotato**

Region		Yields (bags/acre)	Price (TSh./bag )	Revenue	Plough1	Ridgec1	Nursecl	Plantcl	Weedc1	Totalc1	G/Margin
Dar	Mean	16.6	<b>8,375.0</b>	139812.5	17750.0	19583.3	1900.0	7187.5	9000.0	47,975.0	<b>91,837.5</b>
	StD	8.2	2,150.5	81920.2	9794.3	12587.3	1555.6	1998.8	4320.4	26,182.1	85,579.6
Coast	Mean	14.7	<b>5,038.0</b>	75866.6	9865.3	13730.7	1900.0	4980.7	9909.0	37,326.9	<b>23,950.0</b>
	StD	9.7	1,621.8	59280.1	9155.9	9859.2	1140.1	4405.6	3923.7	19,623.9	61,007.4
Morogoro	Mean	19.3	<b>3,244.4</b>	56827.7	10666.6	17500.0		3250.0	6700.0	23,633.3	<b>44,055.0</b>
	StD	8.5	2,210.1	29689.5	1154.7	9983.3		1500.0	2600.0	12,283.5	27,557.5
Dodoma	Mean	15.6	<b>3,742.1</b>	51093.7	13444.4	6871.4		7722.2	1950.0	20,533.3	<b>30,057.8</b>
	StD	15.0	1,778.6	47922.5	18206.1	4690.3		9324.4	900.0	17,423.5	47,162.5
Total	Mean	16.6	<b>4,580.3</b>	72255.5	11989.1	13781.3	1900.0	5734.0	8529.7	33,509.6	<b>38,487.6</b>
	StD	10.7	2,449.6	58877.6	11381.0	10053.3	1126.9	5331.2	4371.6	21,318.5	56,398.3

Source: Survey (2001)

**Table 7: Yields, Production Costs and Margins for Cassava**

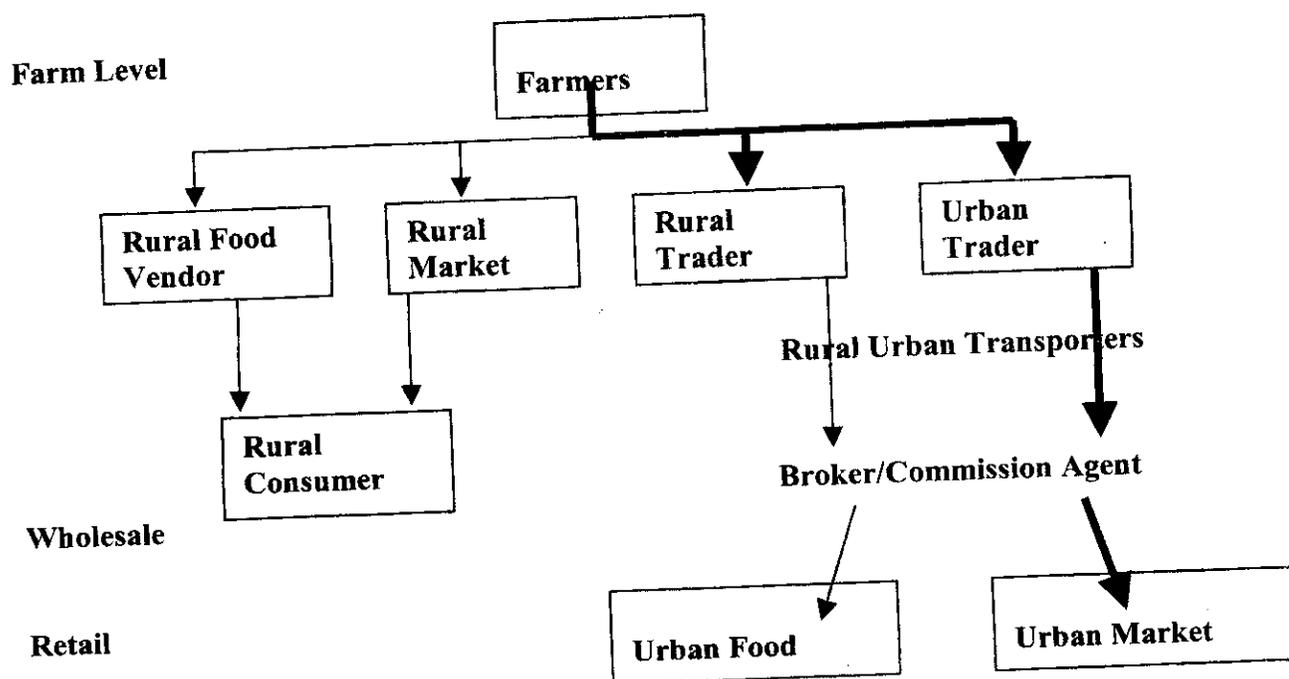
Region		Yields (bags/acre)	Price (Sh./bag)	Revenue	Plough1	Nurse1	Plant1	Weed1	Total1	G Margin
Dar	Mean	43.8	<b>3,000.0</b>	112,500.0	11,500.0	10,000.0	9,500.0	9,250.0	34,000.0	<b>22,250.0</b>
	StD	27.9	707.1	87,702.1	4,803.2	.0	2,563.4	2,434.8	8,084.3	81,068.7
Coast	Mean	28.1	<b>3,962.5</b>	110,828.1	19,347.8	4,700.0	9,180.9	14,456.5	44,230.4	<b>52,141.8</b>
	StD	22.4	2,218.7	84,512.2	15,347.0	5,498.4	3,932.8	11,769.4	26,647.3	90,085.4
Morogoro	Mean	23.4	<b>3,505.2</b>	83,263.1	19,666.6			6,166.6	19,375.0	<b>79,184.2</b>
	StD	12.1	2,582.7	73,881.0	8,962.8			2,753.7	14,407.0	72,841.2
Dodoma	Mean	26.3	<b>1,636.8</b>	36,318.1	6,076.9		3,500.0	4,807.6	11,107.1	<b>16,266.6</b>
	StD	46.3	1,296.2	47,002.2	3,904.3		1,000.0	2,868.9	6,811.1	40,888.7
Total	Mean	27.6	<b>3,047.5</b>	86,075.2	14,361.7	5,923.0	8,569.6	10,372.3	31,067.3	<b>48,088.6</b>
	StD	26.6	2,232.0	77,891.2	12,598.1	5,298.7	3,856.5	9,385.7	23,928.5	77,332.0

Source: Survey (2001)

#### 4.5 Description of the Marketing Chain

Traditionally sweetpotato and cassava have been grown as subsistence crops but in recent years production for the market has been increasing. Generally estimates of the actual percentages of the crops entering the market is not available, previous market surveys have indicated that the market for cassava and sweetpotato is relatively thinner compared to the market for other staples such as maize and rice. During the state-controlled economy era, cassava farmers enjoyed a better-organised market relative to sweetpotato producers as the government adopted cassava as an alternative crop to maize to avert hunger in drought years. In 1986, Tanzania made a firm commitment to pursue a market economy and has liberalising markets by reducing government intervention. The government has therefore been gradually withdrawing from commercial activities and remaining with regulatory functions. As emerging tradable crops, there is a broad scope for cassava and Sweetpotato marketing studies. Cassava and sweetpotato are mainly marketed by small traders. The marketing chain in which such traders are linked was identified by this research, and is presented in Figure 7 below. Note that, such traders influence and lead to the longest component of the sweetpotato and cassava marketing chain. In the rural market, retailers either vendors or those managing stalls at the local market buy produce directly from farmers – we termed them rural food vendors and rural market retailers. They manage relatively smaller volumes e.g. 50 to 100Kgs per trip. A rural trader is one who buys from farmers and moves the produce to significant distances but within the rural areas, e.g. the district or regional markets. They manage relatively larger volumes, e.g. 1 to 100 bags or “viroba” (weighing 50 to 100kgs each) and sell to upcountry town’s retailers. Urban traders are basically residing in the four districts of Dar-es-salam. They travel significant distances to upcountry production areas. They transport relatively larger volumes of produce, recorded volumes from the interviews ranged from 25 to 600 bags, each weighing 100kgs. They mainly sell to ultimate urban retailers through a broker or commission agent. They apparently don’t have direct contact with the urban retailers, vendors or hawkers. The ensuing sections characterise further the dynamics of the trade conducted by each.

Figure 7: Marketing Chain for Sweetpotato and Cassava



## 5. A Profile of Cassava and Sweetpotato Traders

### 5.1 Sampled Traders

Interviews were held with a total of 88 traders, 47 dealing with sweetpotato and 41 trading cassava. Table 8 presents their regional location of business and proportions. The majority of traders were interviewed in the further inland study region of Dodoma, 38 and 31 percent of the interviewees for the two crops respectively. Logically the inland areas are the catchments, where produce is obtained at relatively lower prices and transported to major demand areas.

Table 8: Sample size desegregated by study area

Area	Sweetpotato		Cassava	
	No	%	No	%
Dar es Salaam	7	14.9	9	22.0
Coast	12	25.5	11	26.8
Morogoro	10	21.3	8	19.5
Dodoma	18	38.3	13	31.7
Total	47	100.0	41	100.0

### 5.2 Gender of Traders

Most of the sweetpotato and cassava traders were male (Table 9), few female engaged in the trade and mainly as retailers, managing stalls of roots at local markets, or selling sweetpotato on the roadsides. Men do significant travelling and movement of produce from inland areas to urban centres. As will be observed further below, remoteness of production areas and the need to use crude means of transport, which do not reduce

drudgery such as bicycles to trading, centres. This is a significant constraint that may limit women's engagement in trading at distant markets, considering the other household chores for which women are responsible. Most of the traders were in their Middle Ages, between 26 and 45 years. Other researchers, however, argue that trade has mainly been simply dominated by man.

**Table 9: Gender of Sweetpotato and Cassava Traders**

Gender	Sweetpotato		Cassava	
	Number	Percent	Number	Percent
Male	38	80.9	34	82.9
Female	9	19.1	7	17.1
Total	47	100.0	41	100.0

### 5.3 Educational Status of Traders

The education status of the traders is generally low. In the case of sweetpotato, the majority of its traders had only primary education, i.e. standard 1 to 7 (83%). Very few had secondary education. In contrast, cassava, which traces its trading status to when it was advocated as a food security crop, has a larger number of traders having received secondary school education, i.e. form 1 to 4, (85%). Note that in the case of sweetpotato, we interviewed 5 (10%) of traders who had no formal education at all.

### 5.4 Nature of Traders Business

Interviewed traders were mainly retailers and wholesalers, apparently a good number, i.e. about 20 percent indicated to be doing both, Table 10. However, the majority were retailers, constituting 68 and 73 percent of all interviewed traders. As the names suggest, wholesalers are those who, as described above, would buy in bulk (in "Magunia, "Viroba" ranging from 25 to 600units) from farmers. They would then transport produce to distant places, mainly to villages; district and or regional headquarters markets and sell the produce in large volumes. Retailers buy either directly from producers or from wholesalers and sell in small volumes ("mafungu", "plastiki" ranging between 2 to 20 kg) to final consumers. Often times, final retail buyers of produce in volumes of 20 kg would be food vendors selling Sweetpotato and cassava amongst other foods in their stalls.

**Table 10: Types of Traders**

Category	Sweetpotato		Cassava	
	No	%	No	%
Retailer	32	68.1	30	73.2
Middleman	3	6.4	0	0
Wholesaler	4	8.5	2	4.9
Retailer/wholesaler	8	17.0	9	22.0
Total	47	100.0	41	100.0

It is also worth noting that many traders would consider their businesses as marketers of root crops and hence deal with both sweetpotato and cassava. This category constitutes 35 and 40 percent of the interviewed traders. A significant number also indicated that they deal with other agricultural produce beyond sweetpotato and cassava. Seasonality of sweetpotato obliges the traders to concentrate on cassava during off-peak seasons.

### 5.5 Sources of Capital by Traders

Most traders manage small businesses whose capital is small and mainly start such businesses from own savings. Table 11 presents a summary of sources of capital for trading in sweetpotato and cassava. It is interesting to note that Savings and Credit societies have also been a source of capital to establish such a business, but with very low significance, raising a question whether it is a potential avenue to be pursued to resolve trader's finance constraints.

**Table 11: Source of Capital to Start the Trader Business**

Source of capital	Sweetpotato		Cassava	
	No	%	No	%
Bank	0	0	0	0
Savings and credit society	1	4.2	1	2.4
Relative or friend	12	25.5	2	4.9
Own savings	34	72.3	38	92.7
Total	47	100.0	41	100.0

### 5.6 Market Information and Produce Prices

Market information plays a crucial role in the profitability of trading business. It ensures availability of reliable good quality sources of produce and prices. Table 12 presents sources of market information for sweetpotato and cassava traders. Very few, almost none, of the traders relied on established media as the source of market information for sweetpotato and cassava. Greatest reliance is from "social networks", i.e. friends, relatives and fellow businessmen. This accounted for over 51 percent for both produce categories. Personal observations, entailing physical visits to farm areas and also to the market outlets ranked second, accounting for 38 and 36 percent respectively for the two crops. It is clear that, amongst services that need to be developed with the aim of enhancing marketing efficiency of roots and roots, is that of information collation and dissemination.

**Table 12: Sources of Market Information**

Source	Sweetpotato		Cassava	
	No	%	No	%
From established media (radio, newspaper, etc)	0	0	2	4.9
From friends/relatives/business colleagues	24	51.1	22	53.7
From customers	6	12.8	5	12.2
Observations	18	38.3	15	36.6
Other sources	5	10.6	6	14.6
Total	47	100.0	41	100.0

*Responses not mutually exclusive*

Apparently, not many traders complained about the amount of information and they were rather contented that the information is adequate, 83% and 73% for sweetpotato and cassava respectively. This may be accepted considering that the traders are small and operate within markets very well known to them. For example, the factor that determines prices and hence one that can be hedged-on to ensure sufficient margin is mainly the size of the roots – Table 13. The larger the root the better a price it can fetch in the retail market. This is explained as follows. At the field the trader would assess the size of roots available and agree on a price per plot planted with the crop. On the other hand at the market roots are mainly bought by size. This is for both sweetpotato and cassava. Other

attributes being considered vary mildly between the two crops. Whereas for Sweetpotato the grade of roots matters most, other factors such as being void of fibres and good taste are important for cassava. Traders also have to have a clear knowledge of what the ultimate consumers would desire. An analogy of prices for both crops, seasonal and spatial variation is presented in Annex 2. A general observation is that prices are low in areas of production and higher where no production takes place. Seasonal variations are also apparent.

**Table 13: Factors Influencing Prices of Sweetpotato and Cassava**

Attribute	Sweet potato		Cassava	
	No	%	No	%
Size of root	30	63.8	26	63.4
Colour of root	7	14.9	3	7.3
Number of root	13	27.9	15	36.6
Grade of root	12	25.5	9	22.0
Other criteria	11	23.4	12	29.3
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>41</b>	<b>100.0</b>

*Responses not mutually exclusive*

### 5.7 Sources of Produce, Marketing Processes and Costs

Most traders obtain the produce directly from farmers. Such traders normally establish business relationship with farmers who have commercial orientation in production of either sweetpotato or cassava. It is worth mentioning that historically both crops have mainly served for farmer own consumption. Whereas about 20 percent of cassava traders obtain produce from their own farms, a relatively smaller proportion does so for sweetpotato. Middlemen or other wholesalers are of very low importance as suppliers of produce to traders.

**Table 14: Sources of Sweetpotato and Cassava for Traders**

Supplier	Sweet potato		Cassava	
	No	%	No	%
Own farm	4	8.5	8	19.5
Producers	37	78.7	27	65.9
Middlemen	3	6.4	5	12.2
Retailers	1	2.1	1	2.4
Wholesalers	4	8.5	2	4.9
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>41</b>	<b>100.0</b>

*Responses not mutually exclusive*

Amongst problems traders encounter with regard to supplies include erratic availability of produce from small, scattered production entities. Poor quality has also been mentioned. Seasonal and erratic supply is more pronounced as a problem for sweetpotato traders (60 percent pointing it out) whereas poor quality of cassava ranks highest. With regard to cassava the three major reasons (quality, unpredictable prices, and scattered small production entities) each accounts for about 30 percent of the indications of a problem by traders. The nature of problems indicated by traders manifest the predominantly non-commercial nature of the production base for sweetpotato and cassava. Production has continued to be for domestic consumption with small provisions to sell surpluses. In such a situation, demands for commercial markets e.g. quality, reliability of supply etc don't figure strongly in the minds of the producers.

Traders were asked whether they do store sweetpotato and cassava before selling. About 50 percent of traders, both for sweetpotato and cassava indicated to be storing and for varied durations. However, it is important to note that these would do so not necessarily for purposes of selling them when prices are better, or targeting a particular period when demand is high, say to wait for Ramadan. They do so for appreciably short periods, a week or two, before selling. Furthermore storage also entails simply preservation of unsold produce because it moves out slowly considering that consumers buy such products in small amounts. Traders would also prefer the to maintain the crop underground after having bought it as a storage mechanism.

Lack of processing leads to post harvest storage problems. In both cases, sweetpotato and cassava post harvest deterioration is common and reported. Over 53% of Sweetpotato traders and 61 % of cassava traders indicated that the roots would rot in an attempt to store them out of ground. Other constraints of storing the produce include high costs of rented facilities, which further narrows the marketing margin. Table 15 presents a summary of storage constraints.

**Table 15: Constraints of Storing Sweetpotato and Cassava**

Constraint	Sweetpotato		Cassava	
	No	%	No	%
Easily rot/damaged	25	53.2	25	61.0
Rental store expensive	1	2.1	5	12.2
Increased costs	4	5.5	0	0
Other problems	7	14.7	5	12.2
No response	17	36.2	14	34.1
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>41</b>	<b>100.0</b>

*Responses not mutually exclusive*

The high costs of rented storage facilities forces farmers to use substandard alternatives. Table 16 presents the nature of storage facilities used by the traders. In the case of sweetpotato, most traders would store at their home places. The majority of traders who store seemed very uncertain about post harvest storage. In most cases, post harvest storage would be an abrupt, unplanned decision and would take place on transit to markets, hence the easiest and cheapest option would be taken. This information suggests that trade in sweetpotato and cassava is at a rudimentary stage, particularly so in value adding and post-harvest storage which is highly underdeveloped.

**Table 16: Storage Facilities for Sweetpotato and Cassava**

	Sweet potato		Cassava	
	Number	Percent	Number	Percent
Own house	10	21.2	3	7.3
Rent private store	2	6.4	2	4.9
Dug pit	1	2.1	3	7.3
Other storage places	15	31.9	14	34.1
No response	19	40.4	19	46.3
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>41</b>	<b>100.0</b>

Ironically, traders' responses did not indicate there being any trade benefits derivable from storing. In the case of sweetpotato, after storage the price of the produce mainly remained the same as mentioned by 51 percent of respondents or declined. In the case of cassava, produce that is available for longer periods of the year than sweetpotato, the

price of the produce mainly declined with storage, as indicated by 61 percent of the respondents. So, consumer preference of fresh produce prevails and rules out benefits of simple storage. It is clear that simple storage without processing adds no value to the produce.

**Table 17: Effects of storage on Prices**

Effect	Sweetpotato			Cassava		
	Number	Percent	Valid Percent	Number	Percent	Valid Percent
Decreased	10	21.3	37.0	13	31.7	61.9
No Different	14	29.8	51.9	7	17.1	33.3
Not For Sale	2	4.3	7.4		0	0
Depend On Season	1	2.1	3.7	1	2.4	4.8
Total	27	57.4	100.0	21	51.2	100.0
No Response	20	42.6		20	48.8	
Grand Total	47	100.0		41	100.0	

Size of roots ranked highest as the major determinant of prices for sweetpotato and cassava. This was also observed from the farmers' perspective. Other features that determine prices are colour of roots and this is more important in the case of Sweetpotato, number of roots in a heap and size of roots. Table 18.

**Table 18: Factors Influencing Price of Produce**

Attribute	Sweetpotato		Cassava	
	Number	Percent	Number	Percent
Size of root	30	63.8	26	63.4
Colour of root	7	14.9	3	7.3
Number of root	13	27.9	15	36.6
Grade of root	12	25.5	9	22.0
Other criteria	11	23.4	12	29.3
Total	47	100.0	41	100.0

*Responses not mutually exclusive*

We note that grading, an act that can be considered as an attempt to enhance quality contributes significantly in price determination. Observing that the majority of traders do grade their produce, 87% in the case of cassava and 83% in the case of Sweetpotato also supports this fact. The criteria for grading seem to be similar for both the two crops. Size stands out significantly as an attribute considered mostly by traders in their effort to grade sweetpotato and cassava. Quality and smoothness of skin is the second, but more important in the case of sweetpotato than cassava. Other criteria combines a number of minor attributes including a subjective assessments by consumers of things such as freshness, sources of the produce, e.g. people would prefer Sweetpotato grown in a certain locality (up-country than in the coast), etc. so it is important not to combine produce.

Contrary to storage, the effort in grading is lucratively rewarded. Out of interviewed respondents, 72 and 78 percent of Sweetpotato and cassava traders respectively, reckon that they do get better prices and overall increased returns through grading.

Despite the small contributions that each trader makes in the cassava and sweetpotato marketing, most of the traders (68% for sweetpotato and 63% for cassava) felt that the market for the two products is not fully satisfied and there is room to increase the

business. Though not significant, there is some indication that in the case of sweetpotato low production and seasonality of supply compounded by low processing and lacking storage facilities limits the ability to satisfy the demand. In the case of cassava a limited number of traders surfaces as the most recurring.

**Table 19: Reasons Behind Failures to Satisfy Market Demand**

Reason	Sweetpotato		Cassava	
	Number	Percent	Number	Percent
Low production	5	10.6	2	4.9
Seasonal supplies	7	14.9	2	4.9
Demand grows faster than production	2	4.3	4	9.8
Few traders involved	3	6.4	8	19.5
Poor roads and production areas	1	2.1	1	2.4
Poor market information	2	4.3	2	4.9
No response	24	51.1	22	53.7
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>41</b>	<b>100.0</b>

In general therefore there is room to expand sweetpotato and cassava consumption. The major market outlets for sweetpotato and cassava seem to be the open public market. This is indicated by just about 50 percent of traders of both produce. For those traders who own farms, visitors to the farm make up a significant proportion of buyers, i.e. 38% of sweetpotato traders and 24 percent of cassava traders indicated so. It is apparent that processors and other commercial clients don't feature strongly as clients for sweetpotato and cassava traders – Table 20.

**Table 20: Market Outlets for The Traders**

Category	Sweetpotato		Cassava		
	No	%	Category	No	%
Other private traders	7	14.9	Central market	12	29.3
Public market	26	55.2	Mini/open market	27	65.9
Individuals coming to the farm	18	38.2	Wholesaler	4	9.8
Processors	3	6.4			
Other outlets	2	4.3			
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>Total</b>	<b>41</b>	<b>100.0</b>

*Responses not mutually exclusive*

Amongst expectations by consumers with regard to sweetpotato and cassava as expressed by customers and reported by traders include the following quality attributes – Table 21.

**Table 21: Preferred Attributes by Consumers**

Sweetpotato	Cassava
Red Colour	Low fibre content

Increase Amount	High dry matter content
Size Of Roots	Freshness
No Fibre	Easy to cook
Matured Product	Sweetness
Absence Of Pest Damage	Palatability
More Starch	Size
Whiteness	Absence of damage
Packaging And Cleanliness	Enough maturity
Don't Mind	Colour
Freshness	Good quality
Sweetness	Not bitter
Yellowness	More starch
Easily Cooked	Whiteness

Sweetpotato and cassava marketing is generally underdeveloped, managed by small-scale traders, it has relatively shorter history compared to grain marketing and is therefore faced by many problems. Table 22 summarises a list of problems identified by the respondents. The interpretation of the table ought to be done carefully. Numbers and percentages indicate those who mentioned a factor as being a problem. Each respondent had an opportunity to indicate more than one factor. Overall many respondents felt that low prices and lack of lucrative markets were the most pressing constraints. It is understandable, considering that minimum processing takes place and also very few traders store for purposes of winning higher prices during off-season periods. This is also reflected by responses regarding storage facility, 40% and 50% of Sweetpotato and cassava traders respectively, felt that storage was a constraint. Lack of transport compounded by poor road infrastructure from the remote areas where the crops are grown was also mentioned. However, more cassava traders felt that transportation is a serious constraint compared to Sweetpotato traders. When asked about views on how Sweetpotato and cassava marketing could be improved, traders concentrated on the same issues, rural road network improvement, storage facilities and organised markets including information.

**Table 22: Major Sweetpotato and Cassava Marketing Problems**

Constraint	Sweet potato		Cassava	
	No	%	No	%
Transport facility constraints	17	36.2	15	36.6
Lack of proper storage facility	19	40.3	23	56.1
Low prices	24	51.1	27	65.9
Poor road infrastructure	12	25.5	17	41.5
Lack of markets	25	53.3	20	48.8
Other problems	9	19	11	26.8
No response	1	2.1	0	0
<b>Total</b>	<b>47</b>	<b>100.0</b>	<b>41</b>	<b>100.0</b>

*Responses not mutually exclusive*

### **5.8 Marketing Margins Obtainable by Sweetpotato Traders**

Tables 23(a&b) present results of Marketing Gross Margin analyses. Traders were grouped into those who trade from village to village (V-V), purely aiming at availing sweetpotato and cassava produced by up-country producers to non-growing rural dwellers. The second category of traders was of those who would transfer the produce to relatively longer distances from villages to district headquarters' markets, i.e. village to district market chain (V-D). The last is the longest marketing chain, whose trader would

aim at selling remote village produced Sweetpotato and cassava to either a regional headquarters market or the major market in Dar-es-Salaam. The tables elucidate differing prices and marketing costs (harvesting, packing, assembly, loading and unloading, transport and brokers commissions) experienced by the three categories of traders. In general, traders manage to make a net mark-up of about 36% for Sweetpotato and 60% for cassava, after accounting for marketing costs. This margin is obtained purely from transferring and grading functions, with no processing at all. In both cases of sweetpotato and cassava, it is the longest marketing chain that generates the highest marketing margin, followed by the village to district chain for cassava and village-to-village chain in the case of Sweetpotato. One would hypothesise that where as cassava trade eyes urban centres as the major ultimate disposal point, Sweetpotato marketing entails a significant proportion of rural based marketing chains, where the produce ends-up in rural households. It is worth noting that the most important marketing costs in both crops is related to the transfer function, i.e. transport, accounting for 70 and 65 percent of the total marketing costs for the two crops respectively. According to traders, the bad roads aggravate the cost. Furthermore the remoteness of areas where good quality and low price produce can be obtained also adds to this cost.<sup>6</sup>

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<sup>6</sup>Ndunguru *et al*, (1994) observed the significance of transport costs in view of consumer prices and pointed out that transportation constitutes the largest proportion of marketing costs. For example, the transport cost for fresh cassava produced in Kisarawe (Coast region) and marketed in Dar es Salaam (100km away) accounts for over half of marketing cost.

**Table 23a Marketing margins for alternative marketing channels**

Market channel		Buying price Sh./Bag	Selling price Sh./bag	Harvesting cost Sh/bag	Packing materials Sh./bag	Assembly/ Loading and unloading Sh./bag	Transport cost Sh./bag	Broker's commission Sh./bag	Total Marketing Coast	Gross Margin
V-V Reporting	<b>Mean</b>	<b>6,266.6</b>	<b>10,200.0</b>	<b>416.6</b>	<b>422.2</b>	<b>333.3</b>	<b>1750.0</b>		<b>2,366.6</b>	<b>1,972.7</b>
	N	12	11	6	9	3	8		9	11
	StD	2,057.9	2,675.8	213.6	109.2	115.4	1133.8		1,236.9	1,511.3
V-D Reporting	<b>Mean</b>	<b>3,500.0</b>	<b>6,068.4</b>	<b>790.0</b>	<b>269.2</b>	<b>633.3</b>	<b>1060.0</b>		<b>1,622.2</b>	<b>847.3</b>
	N	20	19	10	13	3	15		18	19
	StD	1,502.6	1,817.5	872.3	125.0	152.7	462.6		1,152.7	1,522.1
VI/DSM Reporting	<b>Mean</b>	<b>7,541.6</b>	<b>14,250.0</b>	<b>660.0</b>	<b>264.2</b>	<b>1000.0</b>	<b>2070.0</b>	<b>750.0</b>	<b>2,945.8</b>	<b>3,762.5</b>
	N	12	12	5	7	8	10	2	12	12
	StD	4,965.6	5,722.7	343.5	179.6	696.9	1579.0	353.5	2,687.6	2,975.1
Total	<b>Mean</b>	<b>5,356.8</b>	<b>9,488.0</b>	<b>652.3</b>	<b>315.5</b>	<b>778.5</b>	<b>1533.3</b>	<b>750.0</b>	<b>2,201.2</b>	<b>1,975.0</b>
	N	44	42	21	29	14	33	2	39	42
	StD	3,399.3	4,916.8	635.3	149.4	589.8	1132.6	353.5	1,829.7	2,339.5

**Table 23b Marketing Margins Obtainable By Cassava Traders**

Market channel		Buying price Sh./Bag	Selling price Sh./bag	Harvest cost Sh./bag	Packing in materials Sh./bag	Assembly Loading costs Sh./bag	Transport cost Sh./bag	Broker's commission in Sh./bag	TMKTCOST	GMARGIN
<b>V-V</b>	Mean	3300.0	6518.1	475.0	341.6	350.0	1300.0			
	N	11	11	4	6	4	5		1692.8	2140.9
	StD	2484.3	3255.7	359.3	135.7	100.0	670.8		7	11
<b>V-D</b>	Mean	3605.2	6968.4	700.0	220.0	508.3	876.9			
	N	19	19	4	10	6	13		1496.1	2339.4
	StD	1541.8	2544.9	559.7	85.6	732.4	456.7		13	19
<b>V-Dar</b>	Mean	5772.7	11254.5	866.6	200.0	637.5	1720.0	1000.0		
	N	11	11	3	4	8	10	1	10	11
	StD	4221.1	6320.0	230.9	81.6	450.1	1427.3		2263.7	3173.1
<b>Total</b>	Mean	4104.8	7997.5	663.6	252.5	530.5	1253.5	1000.0		
	N	41	41	11	20	18	28	1	30	41
	StD	2851.1	4424.0	412.9	114.1	506.1	993.8		1628.8	2514.3

## 6.A Profile of Sweetpotato and Cassava Transporters

Transportation of produce from production sites to points of sale is the most costly marketing component. Thirteen transporters were interviewed with the aim of getting information regarding the nature of the business. Eight came from Dar-es-Salaam and 5 from Morogoro – Table 24.

**Table 24: Base Stations for Transporters**

Region	District	Number	Percent
Dar-es-Salaam	Kinondoni	2	15.4
	Temeke	2	15.4
	Ilala	4	30.8
Morogoro	Morogoro	5	38.5
Total		13	100.0

Seventy six percent (76%) of the interviewed transporters had primary education (Standard 7) where as 23% had obtained secondary education. Means of transportation were mainly trucks (31%), pick-up vehicles (62%) and buses (7%). The sources of initial capital to start transportation business mainly comes from own savings, over 75 percent of the respondents indicated so. A few acknowledged to have made use of a loan. Besides sweetpotato and cassava, transporters also ferried maize, groundnuts and horticultural products. Transporters reckoned that the major sources for Sweetpotato for their business were from Gairo in Morogoro, Kisarawe, Gezaulole in Dar-es-Salaam whose major destination was mainly Kariakoo, Buguruni and Tandale wholesale markets in Dar-es-Salaam. Transportation of cassava from coast region and rural peri-urban outskirts of Dar-es-Salaam was also noted. The major clients of the transporters are wholesalers, who buy and sell in bulk. Their produce is mainly packed in sacks and often over-filled because the transport cost is set per bag, irrespective of the weight. Table 25 presents summary statistics for various costs encountered in transportation. We draw minimal inference from the table due to the small sample size. However, this together with responses from traders, suffices to indicate the most costly component of marketing Sweetpotato and cassava.

**Table 25: Summary statistics for Sweetpotato and Cassava Traders**

Variable	N	Minimum	Maximum	Mean	Std. Dev
Age of respondent	13	25	45	32.2	5.8
Number of years in business	13	1	15	5.2	3.8
Size of bags packed that you transport (Kgs)	10	50.0	300.0	157.5	93.7
Kilometers you make per trip	5	200.0	380.0	252.0	77.2
Fixed cost for loading cassava per bag	8	150.0	700.0	300.0	171.1
Fixed cost for unloading cassava per bag	8	150.0	700.0	300.0	171.13
Fixed cost for levy for cassava	6	50.0	9000.0	2591.6	3207.8
Fixed cost for driver for Cassava	7	1000.0	45000.0	14071.4	19511.5
Variable cost of tax for cassava	1	300.0	300.0	300.0	
Fixed cost of loading Sweetpotato	8	150.0	700.0	300.0	171.13
Fixed cost for unloading Sweetpotato	8	150.0	700.0	300.0	171.13
Fixed cost for levy Sweetpotato	3	1500.0	2000.0	1666.6	288.6
Fixed cost for driver Sweetpotato	3	1000.0	3000.0	2000.0	1000.0
Variable cost for tax Sweetpotato	1	300.0	300.0	300.0	

## 7. A Profile of Sweetpotato and Cassava Consumers

### 7.1 Consumers Sample Profile

A total of 229 respondents were interviewed for purposes of seeking information regarding the characteristics of Sweetpotato consumers, their locations, whether they also grow the crop, their well-being rank and other socio-economic characteristics including their tribal origins and whether this had a link to their consumption patterns. Sources of either Sweetpotato or cassava and the preferred attributes of the produce were also of interest. Table 26 and 27 presents the sample profile and the regions and districts of domicile of the respondents.

**Table 26 Interviewed Sweetpotato and Cassava Consumers**

Location	Sweetpotato		Cassava	
	No	%	No	%
Dar es Salaam	24	21.2	24	20.7
Coast	26	23.0	29	25.0
Morogoro	22	19.5	22	19.0
Dodoma	41	36.3	41	35.3
Total	113	100.0	116	100.0

**Table 27 Interviewed Sweetpotato and Cassava Consumers by Districts**

Region	District	Sweetpotato		Cassava	
		No	%	No	%
Dar es Salaam	Kinondoni	6	5.3	6	5.2
	Temeke	11	9.7	10	8.6
	Ilala	7	6.2	8	6.9
Coast	Kibaha	8	7.1	11	9.5
	Bagamoyo	9	8.0	9	7.8
	Kisarawe	9	8.0	9	7.8
Morogoro	Morogoro	17	15.0	17	14.7
	Kilosa	5	4.4	5	4.3
Dodoma	Dodoma	21	18.6	21	18.1
	Kondoa	20	17.7	20	17.2
	Total	113	100.0	116	100.0

### 7.2 Social Well-being of Sweetpotato and Cassava Consumers

It is important to note that the sample captured consumers who are also producers, 52 and 53 percent were also producers of the same crop, sweetpotato and cassava respectively. A few producers were interviewed as consumers of whose proportions are indicated further below. Non-producing consumers were identified through retail traders and then traced for interviews. This implies that in rural areas of Tanzania it is not only producing farmers who consume sweetpotato and cassava. Non-growing rural households, Table 28, consume a good proportion of the produce. However, trade along the rural-to-rural marketing chain is more pronounced in the case of sweetpotato than cassava.

**Table 28: Farmers and Non Farmers Consumers**

Category	Sweetpotato		Cassava	
	No	%	No	%
Farmers	59	52.2	62	53.4
Not Farmers	54	47.8	54	46.6
Total	113	100.0	116	100.0

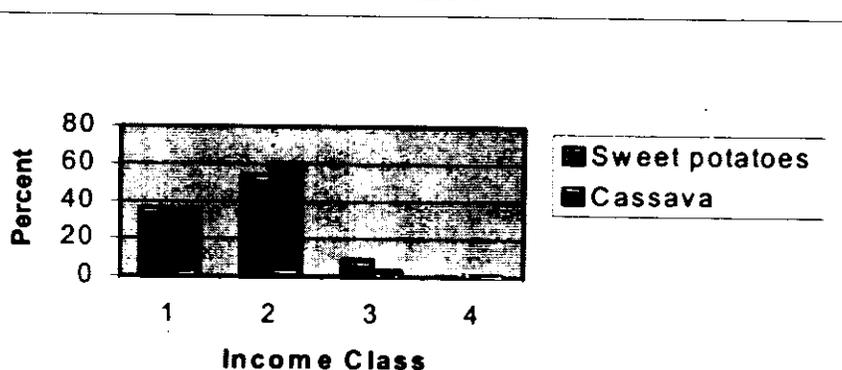
Men headed the majority of the interviewed households and this is the major source of information. Only about 10 percent of the households were female headed. The overall marital status, however, indicates that households are made of both male and female (married) members. In such situations, under African tradition, the spouse makes significant decisions regarding diets and preparation of foods eaten in a household. However this research did not target women for this purpose.

Both sweetpotato and cassava are predominantly low and middle-income earners' foods – Table 29. This phenomenon is equally true for both urban and rural dwellers. For both crops, out of the total consumers, 20 (sweetpotato) to 23 (cassava) percent are rural and low-income earners respectively. Between 28 and 31 percent (respectively for the two crops) of the whole sample, constitute middle-income earners. A very small proportion of consumers is a high-income earner. This is not only limited to the case whether one consumes or not, but is also reflected in terms of the significance that the two crops, (sweetpotato and cassava) play in the diets of such households. Considering that they are both relatively cheaper than cereals, and are available during drier years, they inevitably constitute an important energy source for the low-income households. The mind-set of any intervener intending to enhance consumption of cassava and sweetpotato ought to articulate (a) how to attract non-consuming low-income earners to include cassava and Sweetpotato in the diet and (b) raise the quality of produce and promote it to appeal to high-income earners.

**Table 29: Consumers Income Categories**

Income Category	Sweetpotato		Cassava	
	No	%	No	%
Rural low income	22	19.5	27	23.3
Rural middle income	34	30.1	36	31.0
Rural high income	8	7.1	3	2.6
Urban low income	19	16.8	14	12.1
Urban middle income	27	23.9	34	29.3
Urban high income	2	1.8	1	.9
Total	112	99.1	115	99.1
Un-categorized	1	.9	1	.9
Grand Total	113	100.0	116	100.0

**Figure 8 Income Classes of Consumers**



1=Low Income, 2=Medium Income, 3=High Income, 4=Uncategorised

The majority of consumers had formal education of between standard five and eight, i.e. 58 percent in the case of Sweetpotato and 52 percent for cassava. Very few respondents had education levels of above secondary school. It is possible to hypothesise that households whose household elders have low education correspond to the low-income households. If this is the case, there is a possible link between low education, low income and further down to the consumption of cassava and sweetpotato. However it is difficult to justify causality purely between low education and consumption of root and roots. Low education could only be one of the factors leading to low income. An appealing argument would be that low income, irrespective of what is the major cause, links the household to consumption of low cost foods, including sweetpotato and cassava.

### **7.3 Consumers' Sources of Sweetpotato and Cassava**

Amongst several sources of sweetpotato and cassava, for both urban and rural consumers, "retailers" entailing vendors (*magenge*) and hawkers ranked highest, i.e. 50 percent in the case sweetpotato consumers and 40 percent for cassava consumers obtained their products from these sources. Although a small proportion, it is notable that a number of consumers obtain their Sweetpotato and cassava directly from producers, i.e. 23 and 30 percent respectively for the two crops – Table 30. It is logical that for rural consumers, a direct link with producers would allow them to buy the produce at low, farm gate prices. Other reasons for obtaining from the farmer is the assurance that the produce is still fresh, avoiding loss of taste and nutritive value, considering the underdeveloped storage and processing facilities.

**Table 30 Sources of Sweetpotato and Cassava for consumers**

Category	Sweetpotato		Cassava	
	No	%	No	%
Producers	26	23	35	30.1
Retailers	57	50.4	47	40.5
Other sources	35	31	35	30.1
Total	112	99.1	113	97.4
System	1	.9	3	2.6

### **7.4 Sweetpotato: Consumer Preferred Varieties and Reasons for Choice**

The best preferred sweetpotato variety is "Red" (34.5 %), followed by Gairo (21.2%), then White (12.4%) and Yellow (18.6%). A number of other varieties as identified by the consumers had low preferences, ranging from 1 to 2 percent of the respondents for each. So, in total 99 percent of respondents preferred amongst the four varieties – Table 31. This is an aggregate of all sampled regions and districts. There was great consistency across the districts. The only desegregating factor would be the availability in the local market of either of the varieties.

**Table 31 Sweetpotato: Preferred Varieties**

Variety	No	%
Yellow	21	18.6
White	14	12.4
Gairo	24	21.2
Kasimia	2	1.8
Canada	1	.9
Red	39	34.5
Violet	1	.9
Carrot	3	2.7
Ukerewe	1	.9
Italiano	1	.9
Kabaroho	1	.9
Suguti	1	.9
Ingondi	1	.9
Mantuluwima	1	.9
System	2	1.8
Total	113	100.0

Besides colour, which is apparently also notable from the naming of the varieties, other attributes that consumers lookout for and hence determine the preference include size of roots, the bigger the preferred. Others are fibre content, the lower the better, sweetness, the sweeter the better and dry matter content. Amongst the above listed reasons, taste and particularly the degree of sweetness of the Sweetpotato ranked highest as an attribute determining preference. Attributes that follow are dry matter content (by 57.6% of respondents), size of roots (43.4%) and fibre content, where the lower it is the better (43%). A clear picture emanates from the data that size of roots is not the major attribute. It is the net dry matter obtainable from the root and taste that matters most- Table 32. Where as size was so important for traders, we see that consumers prefer modest sizes and accept sliced roots from retail stalls. Traders hence attempt to make most, in terms of price margins, out of large roots through slicing.

**Table 32: Sweetpotato: Reasons for Preference of Variety**

Reason for preference	Number	Percent
Big roots	49	43.4
Low fibre content	40	35.5
Sweetness	86	76.3
High dry matter content	65	57.6
Colour of the root	11	9.8
Other reasons	21	18.7
No response	2	1.8
	113	100.0

*Responses not mutually exclusive*

Table 33 presents some of the characteristics of the varieties ranking highest in consumers' preference. The second column reflects attributes expressed by the growers. There is great degree of conformity between attributes identified by the growers and those expressed by the consumers as being important, where as traders are the only ones who emphasised on the size.

**Table 33: Preferred varieties attributes by producers during pre-survey**

Variety	Attributes	Harvesting
Ukerewe	Not susceptible to pests & diseases, low fibre, sweet, starchy, early maturing & high rooting ability	Oct-Dec. & March-May Harvested 3-4 months after planting
Yellow Njano	Yellow in colour, very sweet, starchy, less susceptible to pests and diseases, high yielding, easier to turn watery and longer in-ground storage.	Oct-Dec. & March-May Harvested 3-4 months after planting
White Nyeupe	Sweet, early maturing, does not easily turn watery and starchy. Less susceptible to pests and diseases	Oct-Dec. & March-May Harvested 3-4 months after planting
Red Nyekundu/ Mkombozi	Susceptible to pests and diseases, starchy, not as sweet as the rest of the varieties.	Oct-Dec. & March-May Harvested 3-4 months after planting
Gairo	Early maturing, high yielding, big roots, poor in-ground storage, sweet, susceptible to weevils if harvesting is delayed.	Oct-Dec. & March-May Harvested 3-4 months after planting
Karoti	High yield potential, early maturing	Dec.-Jan. & June-July* Harvested 4-12 months after planting

### 7.5 Cassava: Consumer Preferred Varieties and Reasons for Choice

The list of varieties based on local names is more diverse in the case of cassava compared to sweetpotato. Notably, the varieties trace more the origins of the produce, or where they are predominantly grown rather than colour or appearance.

**Table 34: Cassava: Preferred varieties**

Variety	No	%
Kibangameno	12	10.3
Kigorimaziwa	1	.9
Shew	1	.9
Ufaransa	3	2.6
Mzungu	2	1.7
Kigoma	15	12.9
Edible Part Yellow	1	.9
Edible Part White	14	12.1
Kilusungu	1	.9
Agriculture	2	1.7
Kilokote	2	1.7
Sweet	5	4.3
Cheusi/Kaniki	14	12.1
Redish	6	5.2
Mkiwa	1	.9
Dihanga	2	1.7
Mbuyu	3	2.6
Kalolo	1	.9
Local Variety	19	16.4
Mshumali	1	.9
No response	10	8.6
Total	116	100.0

Furthermore, the preference is wider, with none of the varieties attracting more than 16 percent of the respondents. It is notable, however, that varieties called Kingameno, Kigoma, Edible part white, Cheusi/kaniki, and Local, are indicated to be the best varieties by at least 10 percent of the respondents – Table 34. It is clear that, with respect to cassava, more important are the characteristics that lead to ranking of preference. Three key attributes that lead to a variety preference are the dry matter content, the higher the more preferred; low fibre content and sweetness, Table 36. Though to a lesser extent than in Sweetpotato, consumers also wish to have big roots. It is worth noting that, in general, size of cassava roots is generally big and hence relative size is less important. It is interesting to note that storability is not an attribute ranked high as a factor that would lead to preference, particularly so for Sweetpotato consumers. However, in the case of cassava this was mentioned and 18 percent of respondents, who felt it was important compared to its apparent total absence in the attributes considered for sweetpotato.

**Table 35: Cassava: Reasons and Attributes for Preference**

Attribute	Number	Percent
Big roots	39	33.8
Low fibre content	58	49.9
Sweetness	56	48.6
High dry matter content	64	55.4
Good storability	16	13.9
Colour of skin	4	3.5
Other reasons	21	18.2
No response	10	8.6
Total	116	100.0

*Responses not mutually exclusive*

**Table 36: Preferred attributes expressed by producers during pre-survey**

Kibangameno	Sweet, longer in-ground storage (up to 2 years), starchy, early maturity.	Oct-Dec & March-May. Harvested 8 to 9 months after planting
Mfaransa	Sweet, long in-ground storage, Early maturity (6 months), big roots. Not turn watery, resistant to pests attacks	Oct-Dec & March-May, Harvested 8 months after planting
Kigoma	Sweet, late maturing (9months), susceptible to pests and disease infestation.	Oct-Dec & March-May, harvested 9 months after planting
Kaniki	Sweet, early maturing, starchy	Oct-Jan, 12 months after harvesting

### **7.6 Ways of Cooking and Eating Sweetpotato and Cassava**

There are various ways by which people consume sweetpotato and cassava, and none of the modes is the most prominent. Neither was it a case that a household consumed the produce in only one form. In the case of Sweetpotato, fresh boiled roots were the most preferred and all respondents expressed to be consuming potatoes in this way.

**Table 37: Mode of Eating Sweetpotato and Cassava**

Mode of Eating	Sweetpotato		Mode of Eating	Cassava	
	No	%		No	%
Fresh Boiled	113	100.0	Fresh Boiled	111	95.8
Fried/Roasted	30	26.6	Futali/Mseto	43	37.2
Futali	44	39.0	Chips(Chips Dume)	35	30.3
Porridge	1	.9	Ugali	28	24.2
Raw	22	19.6	Raw	13	11.3
	-	-	Porridge (Togwa)	8	7.0
	-	-	Other Forms	2	1.8
	-	-	No response	1	.9
Total	113	100.0	Total	116	100.0

*Responses not mutually exclusive*

For the best recipe, fresh boiled sweetpotato ought to be sweet, starchy and fast cooking. These features correspond and are found in the attributes of preferred varieties indicated above, e.g. yellow, ukerewe, white and red. Other forms in which Sweetpotato is consumed include fried and roasted roots, "futali" (mashed, stiff porridge form) and raw. There is apparently no processing of sweetpotato. None of the respondents indicated that they do process flour out of sweetpotato. There is a clear room for innovation in the area of sweetpotato processing. However, any processing has to aim at resolving a pre-observed/identified shortfall and should be demand driven. Post harvest losses incurred, competition with cereal grains etc. could be the driving force for sweetpotato processing.

Cassava is also mainly consumed fresh. Almost all respondents indicated that they eat boiled cassava. This is mainly for breakfast and is eaten together with tea. Tea was mentioned as the most prominent companion for fresh boiled cassava and sweetpotato. Other forms in which cassava is eaten include "futali" (mashed, stiff porridge) was mentioned by 37 percent of the respondents. "Futali" is a very common meal during "Ramadan", a holy fasting month for Moslems, and at times it entails a combination of cassava and sweetpotato. Respondents also mentioned fried chips (Chips Dume), roasted roots mainly as snacks. Cassava "ugali", i.e. a stiff porridge made out of cassava flour, is also a common meal both in the coast and up-country regions.

Of recent, many households do mix maize meal with cassava flour to enhance acceptability. Few respondents mentioned chewing of raw roots and preparation of porridge from cassava flour as other ways that they consume. It is therefore discernible that boiled roots, in both cases of cassava and sweetpotato, remain the major forms by which people consume sweetpotato and cassava.

Table 38 presents the complements with which Sweetpotato and cassava are eaten. Apparently very few respondents indicated having specific recipes for Sweetpotato and cassava, 20 and 16 percent respectively. This shows that there is also room for improving consumption through development of various recipes to enhance acceptability, remove monotony and broaden the use to which the produce can be put.

**Table 38: Compliments with which Sweetpotato and Cassava are eaten**

Sweetpotato	Cassava
Tea (Mentioned By Nearly All Respondent)	Tea (Mentioned by all respondents)
Porridge	Beans
Beans (Second Important)	Salads
Meat	Porridge
Fish	Meat
Groundnut	Fish
Milk	Groundnut
Pumpkin	Milk
Cowpeas	Cowpeas
Banana	Coconut
Salads	Banana
Maize	Maize
Coconut	Coconut
Pawpaw	Pawpaw
Cassava Leaves	Sweetpotato
Water	Pumpkin Leaves
Pigeon Peas	Honey
Juice	Soup
Pumpkin Leaves	
Honey	
Soup	

### 7.7 Domestic Processing and Storage

Considering that there is minimal commercial processing of sweetpotato and cassava, it is worth assessing the extent to which households try to preserve and process the products. First, any attempt to process a crop produce would emanate from some constraint experienced by the consumer. Table 39 presents responses by consumers regarding problems that they encounter in acquisition and consumption of the two crops. Seasonal supply ranks highest and was mentioned as the most pressing problem by 80% of Sweetpotato consumers and 40% of cassava consumers. This is understandable because cassava can be harvested and is available at the retail market for extended periods of the year. In the case of sweetpotato, other important constraints or problems were the price (expensive) and low quality of the produce. However, it is worth noting that relatively few respondents mentioned these as problems i.e. only about 10 percent. Cassava consumers did not feel prices are a problem (only 8 percent felt so), but the results indicate dissatisfaction with quality.

**Table 39: Problems Expressed by Sweetpotato and Cassava Consumers**

Problem	Sweetpotato		Cassava	
	No	%	No	%
Seasonal supply	88	77.9	48	41.4
Expensive	10	8.9	10	8.6
Poor quality produce	8	7.1	33	28.4
Other problems	14	12.4	29	25.0
No response	9	8.0	18	15.5
	113	100.0	116	100.0

*Responses not mutually exclusive*

Having noted that seasonality of supply, prices and quality of produce are problems raised by consumers, it is logical to deduce that domestic processing and storage would

be potential strategies to contend with them. Table 40 presents responses by consumers with regard to whether they do store the produce for future consumption, i.e. in an effort to address the problem of seasonality of supply. Apparently, few consumers store either sweetpotato or cassava. In both cases the numbers who do so is far below 50 %. It means that the majority of consumers buy sweetpotato and cassava for fresh produce consumption.

**Table 40: Domestic Storage of Sweetpotato and Cassava**

Whether they store	Sweetpotato		Cassava	
	Number	Percent	Number	Percent
Those who store	38	33.6	50	43.1
Don't store	75	66.4	66	56.9
Total	113	100.0	116	100.0

Furthermore, those who indicated that they do attempt to store roots for off-season consumption expressed some problems in storage. Table 41 presents methods used by consumers to store produce. It is quite clear that the approaches are very traditional, with very minimal processing or adding value to the farm produce. Attempts are simply to keep it as it is for extended periods. Note the large number of respondents who could not even indicate the method used.

**Table 41 Consumers' Storage Methods for Sweetpotato and Cassava**

Storage Method	Sweetpotato		Cassava	
	No	%	No	%
In dug pits	1	.9	11	9.5
In sacks	13	11.5	22	19
Other methods	26	23.0	20	17.2
No response	75	66.4	66	56.9
Total	113	100.0	116	100.0

*Responses not mutually exclusive*

Poor storage methods, facilities and structures lead to substantial losses in terms of quality of the produce. Consumers indicated that the major consequences of poor storage were rotting of roots and loss of taste. Seventy and 53 percent of those who store Sweetpotato and cassava respectively indicated that rotting was the major consequence of the rudimentary storage methods, where as 18 and 34 percent indicated that loss of taste was their major concern, for 2 crops respectively.

Fresh produce storage is definitely challenging and one would imagine that consumers would process sweetpotato and cassava prior to storage. Table 42 shows responses to a question on whether consumers undertook domestic processing of the produce.

**Table 42 Whether Consumers undertake Domestic Processing**

Whether processes	Sweetpotato		Cassava	
	Number	Percent	Number	Percent
Domestic processing done	34	30.1	69	59.5
No domestic processing	77	68.1	44	37.9
No response	2	1.8	3	2.6
Total	113	100.0	116	100.0

Whereas only a small number of respondents indicated to be processing sweetpotato (30%), many of the cassava consumers process it (60%). However the kind of processing done is simple, mainly peeling and boiling before preserving or processing to form “Makopa”, of which in the case of cassava can be further pounded to flour. In summary therefore, common processing is simply boiling to increase shelf life or processing to Makopa by drying.

The respondents reckon that processing enables them to diversify the form in which they consume the produce. Table 43 presents the various food products that result from processed Sweetpotato and cassava. Whereas “Ugali” is the major ultimate product from processed cassava (after being converted to flour), the diversity of products seems to be wider in the case of sweetpotato, i.e. futali, boiled processed and dried potatoes, porridge and flour.<sup>7</sup>

**Table 43: Sweetpotato and Cassava Products from Processing**

Processed Product	Sweetpotato		Processed Product	Cassava	
	No	%		No	%
Futali	3	2.7	Ugali	67	57.9
Chips	1	.9	Local Brew	1	0.9
Boiling	22	19.5	Porridge	7	6
Porridge	5	4.4	Futali	2	1.8
Flour	5	4.5	Chips	1	0.9
No response	79	69.9	No response	46	39.7
Total	113	100.0		116	100.0

*Responses not mutually exclusive*

Following the positive element that sweetpotato and cassava processing does allow for changing the form in which the produce is eaten and offer a possibility for storage to maintain quality, it was necessary to draw information about the extent to which people process the produce and reasons why they don't do so.

Table 44 presents reasons for not processing. Although a few expressed the reason for not processing to be related to costs (expensive), it is worth noting that this proportion of respondents is very small, 2 and 3 percent for Sweetpotato and cassava respectively. The major reason seems to be centred on lack of technology. Crude methods currently in use are labour intensive and require much time. Time consuming seems to be the major hindrance to domestic sweetpotato processing. Understandably peeling and slicing of the soft, and relatively small size roots (compared to cassava) requires more time. In the case of cassava, the majority of those who expressed reasons for not processing cassava anchored on the lack of technology, followed by time. Interventions in this area to foster technological advances in form of means and ways by which households could

<sup>7</sup> An Impact assessment study on the acceptance of introduced cassava products in the Lake Zone showed that cassava doughnuts and cakes were highly marketable in Mwanza and Mara regions – Kapinga et al 1996 cited by Kapinga et. al (2000). An argument here is that processing of cassava and Sweetpotato is a factor that may increase the crops utilisation and demand.

Nweke, et.al. (1998), also observed that farmers in remote villages who had access to mechanized processing facilities planted relatively more cassava for sale than farmers who had easy access to market centres. The study also indicated that 75% of villages reported that bitter varieties of cassava produced the best quality for various processed cassava products relative to sweet cassava landraces.

domestically process the roots, may shed light and a breakthrough towards significant increases in consumption of Sweetpotato and cassava.

No evidence and information was obtained during the survey with regard to industrial processing or procurement of sweetpotato and cassava for purposes of exporting. However, history shows that these two (industrial demand and export) are potential avenues to the development of the two roots' markets. In the past cassava has been used to manufacture animal feed and industrial starch. For example it is reported that in 1985 The Tanzania Animal Feeds company used dry cassava to prepare poultry and pigs feed (Msabaha,1986, MALD, 1987). It is also reported that industrial starch can be produced as was the case with the Tanzania Starch Company in Sengerma, Mwanza before it was closed down in 1990 due to shortage of roots (Kapinga et. al., 2000). There is therefore room for improving and enhancing cassava utilisation through both frontiers, i.e. processing for both domestic consumption and industrial use.

Processing of roots has other benefits such as the reduction of cyanide in cassava and as mentioned elsewhere changes in the forms the produce is eaten/used in the case of sweetpotato.

**Table 44: Reasons for not processing the two crop's produce**

Reasons	Sweetpotato		Reason	Cassava	
	Number	Percent		Number	Percent
Expensive	2	1.8	Expensive	3	2.6
Time consuming	15	13.3	Time consuming	18	15.5
Lack of technology	12	10.7	Lack of technology	25	21.6
Other problems	9	8.0	Other problems	22	19
No response	79	69.9	No response	56	48.3
	113	100.0		116	100.0

*Responses not mutually exclusive*

Sweetpotato and cassava happen to be substitutes for each other. When respondents were asked on whether they have clear substitutes for either cassava or sweetpotato, the responses were significantly striking. In the case of sweetpotato, all respondents said "yes" they had substitute foods. The list was long, however the majority indicated cassava. Others included bread, "chapatti", buns, rice, banana and "tambi". Further down the list with less significance were beans, Irish potatoes and maize/beans mix. An important thing to note is that besides cassava, the closest substitutes (bread, chapatti, and buns) are all foods prepared from wheat, and apparently require substantial processing and complex cooking methods. Cassava substitutes mentioned by respondents were sweetpotato, rice, maize, Irish potatoes and further below wheat products. A contrasting feature between substitutes for sweetpotato and cassava is that sweetpotato substitutes are mainly snacks or breakfast items, commonly companions of tea or porridge. The latter, cassava, seem to be substituted by main meal foods. This fact was also observed in preliminary surveys and was discussed in the pre-survey report.

Interestingly the major reason why a consumer would switch to the substitute is simply taste and unavailability of produce in the market. Table 45 presents reasons for opting for substitutes of sweetpotato and cassava. One could hypothesise that because Sweetpotato is more seasonally available, whenever they are available, cassava consumers would switch to sweetpotato, and particularly so for breakfast. Note that, for this purpose, it is

the sweet taste that appeals more to the consumers. Taste, i.e. sweetness accounts for 63% (in the case sweetpotato) and 75% (cassava) as reasons why the consumer would switch to the substitute.

**Table 45 Reasons for Resorting to Substitutes**

Reason	Sweetpotato		Cassava	
	Number	Percent	Number	Percent
Price difference	7	6.2	10	8.6
Availability in the market	62	54.9	40	34.6
Taste	71	62.8	87	75
Other reasons	4	3.6	5	4.4
No response	-	-	5	4.3
Total	113	100.0	116	100.0

*Responses not mutually exclusive*

Respondents were also asked for their opinion on whether prices were a constraint in consuming sweetpotato and cassava. Apparently most consumers were indifferent and could not express their opinion with regard to the role prices play in decisions concerning consumption of sweetpotato and cassava. Only 15 and 17 percent expressed prices as a concern for the two produce respectively.

## 8. A Profile of Sweet Potato and Cassava Producers

### 8.1. Producers' Sample Profile

A total of 147 sweet potatoes and cassava farmers were interviewed during the main cropping season of July-August 2001. The survey followed the sample established during pre survey conducted in months of January and February 2001, that covered the catchments area for urban markets along the central-east marketing channel extending from Dodoma to Dar Es Salaam. A multi-stage sampling technique was applied to form a sample from four regions namely, Dar es Salaam, Coast, Morogoro and Dodoma. From each region at least 2 districts were selected for inclusion into the sample and from each district 2 villages were selected. Table 46 summarizes sample distribution by region and by district.

**Table 46. Sample Distribution by Region and by District**

Region	District	Sweet Potatoes		Cassava	
		Number	Percent	Number	Percent
Dar es Salaam	Temeke	8	11.0	8	10.8
Coast	Kibaha	8	11.0	9	12.2
	Bagamoyo	8	11.0	8	10.8
	Kisarawe	8	11.0	8	10.8
Morogoro	Morogoro	10	13.7	10	13.5
	Kilosa	10	13.7	10	13.5
Dodoma	Dodoma	11	15.1	10	13.5
	Kondoa	10	13.7	11	14.9
	Total	73	100.0	74	100.0

## 8.2. Socio-economic Characteristics of Respondents

Respondents in the survey were heads of households and the majority were males although some female-headed households were also captured in the sample (Table 47 and Table 48). It was observed during the survey that female participate more in sweet potatoes production than in cassava and this fact is reflected in the random sample. It is common knowledge in East African rural economies that crops inclined towards domestic consumption happen to be the women's domain. This is observable in our case where historically sweet potatoes were for domestic consumption. Apparently this feature is changing very fast and will be shown further below, where the majority of women who grow sweet potatoes reckon to do so for commercial purposes.

**Table 47. Gender of respondents**

Sex	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Male	55	75.3	68	91.9
Female	18	24.7	6	8.1
Total	73	100.0	74	100.0

**Table 48. Household type**

Household Type	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Male headed	66	90.4	73	98.6
Female headed	6	8.2	1	1.4
No response	1	1.4	0	0
Total	73	100.0	74	100.0

There is not much difference among sweet potatoes and cassava farmers in terms of literacy levels and off-farm employment, although sweet potato farmers are slightly better educated and more diversified in off-farm employment.

**Table 49. Literacy**

Education	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Primary	51	69.9	51	68.9
Secondary	4	5.5	3	4.1
Adult education	0	0	2	2.7
None	18	24.7	18	24.3
Total	73	100.0	74	100.0

**Table 50. Off-farm employment**

Employment	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Taylor	1	1.4	1	1.4
Carpenter	2	2.7	3	4.1
Grocery	2	2.7	3	4.1
None	26	35.6	30	40.5
Other employment	41	56.2	36	48.6
No response	2	2.7	1	1.4
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

### 8.3. Production

#### 8.3.1 Cropping Patterns

There is more mono cropping of sweet potatoes than cassava, (Table 51). Some households own more than one plot of crops with different cropping patterns. The common inter-crop for cassava and sweet potatoes are maize, legumes, cashew and coconut trees.

The most important consideration when deciding on the kind of cropping pattern (Table 52) is drudgery. One always aims at ensuring it has a modest demand on labor. However, for farmers practicing either intercropping and or mixed cropping, labor saving is an important consideration and justifies that decision. As will be shown later, labor is the most costly input in sweet potatoes and cassava farming. The decision to practice either mono cropping or inter-cropping further depends on expected rains. Inter-cropping is a risk-averse strategy opted for in years of uncertain rains.

**Table 51 Cropping pattern**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Mono-cropping	54	73.9	43	58.1
Intercropping	12	16.4	13	17.6
Mixed cropping	9	12.3	23	31.1
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

**Table 52. Why does the household employ the mentioned cropping pattern?**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Lack of land	7	9.6	8	10.8
Labor saving	14	19.2	17	23.0
Soil fertility improvement	9	12.3	7	9.5
Easy management	35	47.9	53	71.6
Other reasons	19	26.0	10	13.5
System	1	1.4	1	1.4
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

### 8.3.2 Crop Area, Yields and Varieties

The mean crop areas for sweet potatoes and cassava are less than 2 acres (Table 53). It is also apparent that more land is allocated to maize than sweet potatoes and cassava. The sub-urban villages of Dar es Salaam are an exception to this observation, possibly due to the unfavourable condition for maize growth (Low Ph and sandy soil) and easy access to the consumer market for sweet potatoes and cassava. In this area the two crops are mainly grown commercially for the nearby urban markets.

Yields for cassava are much higher than for sweet potatoes. However, yields do not vary much with location (except for cassava in Dar es Salaam), which suggest equal productivity potentials. Decisions on scales of production therefore mainly depend on the availability of produce markets. This observation is contrary to pre-survey results that indicated higher yields in Morogoro and Dodoma. It will be remembered that the pre-survey results were obtained from rapid appraisal observations and discussions with very few farmers.

**Table 53. Crop area (acres) and yields (bags/acre) by region\***

Region	Sweet Potato Farmers				Cassava Farmers			
	Sweet Potatoes		Maize		Cassava		Maize	
	Farm Size	Yield	Farm Size	Yield	Farm Size	Yield	Farm Size	Yield
Dar es Salaam	4.87	16.68	1.79	4.46	3.75	43.8	1.15	5.00
Coast	1.56	14.76	3.40	4.30	2.46	28.18	1.97	6.43
Morogoro	1.43	19.35	4.35	7.00	1.27	23.30	2.01	12.21
Dodoma	1.78	15.68	5.18	6.26	1.48	26.36	3.01	6.13
Total	1.96	16.64	4.12	5.90	2.00	28.19	2.24	8.27

\*A bag of sweet potatoes/cassava weighs 90-120 kg

With regard to preferred varieties, interviewed farmers mentioned many local names that might require a professional botanist to identify their scientific versions. However, characteristics of the preferred cassava varieties are sweetness, storability, high yield, tolerance to diseases and early maturity. Local names mentioned by respondents include Mzungu, Kibanga meno and Kigoma. In the case of sweet potatoes, preferred varieties are mentioned to be sweet, starchy, high yield, storable and fast cooking with local names such as Gairo, Nyekundu (Red) grown by over 50%. It will be observed further below, that the same features and characteristics figure strongly amongst attributes preferred by consumers.

### 8.3.3 Input Usage, Crops Choice and Production Decisions

Few farmers reported to have used inputs. Planting materials seem to be the major input sought by both sweet potato and cassava farmers (Table 54). In cases where inputs were used, one observes that the cases involve intercropping and it is the sister crop that called for the input use. In some few cases crop residues from one season are left to grow as cuttings so that farmers do not need to replant new cassava or sweet potatoes.

**Table 54. Inputs used**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Cuttings	72	98.6	69	93.2
Fertilizer	0	0	3	4.1
Pesticides	0	0	2	2.7
Manure	6	8.2	2	2.7
No response	1	1.4	3	4.1
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

In most households, the decisions on the type of crops and acreage to grow under each are made jointly by wives and husbands (Table 55). However, more women are involved in making decisions regarding sweet potatoes production than cassava. Earlier on, it was indicated that females have more preference for sweet potatoes than cassava. Also it was noted that where there is inter-cropping and sweet potatoes is not the primary crop, women (wives) were more free to plant sweet potatoes and make other decisions regarding the crop.

**Table 55. Decision maker regarding the type of crops to grow**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Husband	13	17.8	21	28.4
Wife	9	12.3	3	4.1
Both (joint decision)	48	65.8	48	64.9
Children	0	0	1	1.4
No response	3	4.1	1	1.4
Total	73	100.0	74	100.0

Food seems to take precedence over income as the key reason for growing sweet potatoes or cassava (Table 56). Further evidence to this point is the smaller proportion of produce that is sold relative to that consumed. Proportionally, more sweet potato farmers produce primarily for the market than cassava farmers. Besides income and food there are other important reasons for growing sweet potatoes and cassava such as crop diversification to reduce risks from crop failure, fallow crop, minimization of production cost of other crops by inter-cropping, etc.

**Table 56 Reasons why the household chose to grow sweet potatoes**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Food	14	19.2	25	33.8
Income	9	12.3	1	1.4
Other reasons	50	68.5	48	64.9
Total	73	100.0	74	100.0

Most sweet potatoes (79.5%) and cassava (90.5%) farmers encounter no problems in finding desired planting material. Only few farmers think planting materials are scarce

and the percentage of them is higher for sweet potatoes than cassava. Such relative scarcity of sweet potatoes planting materials is reflected in the slightly higher percentage of sweet potato farmers buying planting materials than cassava farmers (Table 57). This observation strengthens the hypothesis that sweet potatoes production is currently more market oriented than cassava production. In the Gezaulole village of Temeke district, nurseries for sweet potato planting materials were observed.

**Table 57. Source of planting material**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Own	49	67.1	53	71.6
Buy	23	31.5	8	10.8
Free	6	8.2	8	10.8
Relative	3	4.1	17	23.0
No response	1	1.4	0	0
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

About half of sweet potatoes and cassava farmers think bought planting materials are affordable. However, more cassava than sweet potato farmers face the problem of low viability of the planting materials (Table 58).

**Table 58. Quality of planting materials**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Viable	67	91.8	54	73.0
Non-viable	1	1.4	0	0
Fair	4	5.5	7	9.5
No response	1	1.4	13	17.6
Total	73	100.0	74	100.0

When farmers were asked about important problems that hinder crop production lack of markets and pests and diseases<sup>8</sup>, were the most frequently mentioned, (Table 59). Most of the listed problems are common to the two crops.

<sup>8</sup> Pests and diseases is a serious problem. Appendix 4 presents a citation of an account about cassava pests and diseases in Tanzania to highlight on the severity of the situation.

**Table 59 Hindrances to sweet potato and cassava production**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Lack of planting material	27	36.9	8	10.8
High labor demanding task	18	24.7	15	20.3
Land shortage	14	19.2	10	13.5
Lack of markets for produce	48	65.8	62	83.8
Low producer prices	42	57.5	49	66.2
Inadequate knowledge on processing/utilization	27	37.0	37	50.0
High pest and disease incidence	53	72.6	60	81.1
Lack of capital/credit facilities	43	58.9	33	44.6
Poor roads	26	35.6	22	29.7
Poor soils	16	21.9	1	1.4
No response	2	2.7	1	1.4
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

#### **8.4. Marketing**

##### **8.4.1 Marketing Channels and Selling Decisions**

Slightly more sweet potatoes than cassava farmers sell part of their produce to the market (Table 60). When asked about who makes marketing decisions; most respondents indicated that both male and female are involved (Table 61). The responses might be biased since this question was asked to heads of households of whom the majority were male.

**Table 60. whether one sells the produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Yes	65	89.0	63	85.1
No	8	11.0	11	14.9
Total	73	100.0	74	100.0

**Table 61. The Decision maker for marketing of produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Husband	11	15.1	12	16.2
Wife	6	8.2	2	2.7
Both	44	60.3	48	64.9
Others	1	1.4	3	4.1
No response	11	15.1	9	12.2
Total	73	100.0	74	100.0

Traders and households are important outlets for produce sold by farmers. But the number of farmers who sell their produce to traders is higher for sweet potatoes than cassava (Table 62). In most cases transaction is done in the farm (80% households for both crops) and usually it is the responsibility of the buyer to harvest the produce, so they normally buy stands of either sweet potato or cassava. This is done to ensure that buyers have the provision for on-farm storage where the produce is less perishable relative to post harvest storage.

**Table 62 Major buyers of produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Individuals/households	26	35.6	34	41.9
Traders	39	54.4	33	44.6
Others	3	4.1	1	1.4
No response	9	12.3	10	13.5
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

It is clearly seen from the table 62 that the producers captured by the survey are a good starting point for the marketing chain as the produce mainly end up in the hands of traders, who would move them varied distances before disposal.

#### 8.4.2 Pricing and Price Seasonality

Size of tubers is the most important criteria in setting sweet potatoes and cassava price, while color is the least considered attribute (Table 63).

**Table 63 Price determination**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Size of tuber	52	71.2	48	64.9
Color of tuber	6	8.2	5	6.8
Number of tubers	17	23.3	23	31.1
Grade of tubers	13	17.8	19	25.7
Other	19	26.0	20	27.0
No response	1	1.4	3	4.1
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

While most sweet potato farmers sell their produce within a short period of time after maturity (6 months) cassava is marketed over an extended period of time, up to 18 months. Most sweet potato farmers mentioned early maturity was as a reason why they sold their produce within 6 months. For those who sold later (both cassava and sweet potatoes) "timing of high price periods" was an important factor under consideration. Selling at a latter period is a marketing strategy used by some sweet potatoes (34.2%) and cassava (36.6) farmers to obtain a higher price.

**Table 64 Durations when farmers sell their produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Within 6 months	62	84.9	21	28.4
Between 7-12 months	6	8.2	32	43.2
Between 12-18 months	0	0	11	14.9
After growing season (over 24 months)	0	0	1	1.4
Non-response	7	9.6	9	12.2
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive.

The majority of farmers are of the opinion that highest prices exist at the beginning and towards the end of the harvest season while lowest prices are in the middle of the season (Table 65 and Table 66). These responses are consistent with the expected price behavior for agricultural products. However, slightly more cassava than sweet potato farmers are less knowledgeable about the seasonal price behavior, which re-enforces the fact that cassava farmers are less market oriented.

**Table 65. Periods of Highest Producer Price**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
At the beginning of harvest	44	60.3	32	43.2
In the middle of the season	1	1.37	8	10.8
At the end of harvest	42	57.5	30	40.5
No response	9	12.3	10	13.5
Total	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

**Table 66. Periods of Lowest Producer Price**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
At the beginning of harvest	13	17.8	21	28.4
In the middle of the season	48	65.8	35	47.3
At the end of the season	3	4.1	8	10.8
No response	9	12.3	11	14.9
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

Problems that farmers encounter in disposing their produce seem to be similar for both sweet potatoes and cassava where lack of market and low prices are given the highest rating. These problems were previously mentioned as hindrances to increased production and were also reported in the pre-survey report.

**Table 67. Produce Disposal Problems**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Long distance to the market	12	16.4	16	21.6
Low prices	38	52.1	49	66.2
Lack of market	24	32.9	39	52.7
Poor roads	7	9.6	19	25.7
Lack of storage	13	17.8	22	29.7
Other problems	7	9.6	4	5.4
Total	56	76.7	65	87.8
No response	17	23.3	9	12.2
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

#### 8.4.3 Transportation

Common means of transporting cassava and sweet potatoes by farmers and their buyers are bicycles, ox-carts and hired vehicles. Other means of transport include portage, i.e. head loads.

**Table 68. Common means of transporting sweet potatoes**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Own vehicle	1	1.4	1	1.4
Hired vehicle	10	13.7	8	10.8
Railway	0	0	1	1.4
Bicycle	28	38.4	40	54.1
Ox-cart	12	16.4	3	4.1
Public transport e.g. buses, etc.	3	4.1	0	0
Other means	28	38.4	20	27.0
No response	9	12.3	11	14.9
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

#### 8.4.4 Production Trend

Mixed responses were received when farmers were asked as to whether production of cassava and sweet potatoes were increasing, decreasing or stagnant (Table 69).

Despite inclusiveness of results, there is no strong evidence that production of cassava and sweet potatoes is increasing (reported by less than 50% of farmers). Interviewed farmers indicated that production especially for cassava increases when there is not enough rain for maize production.

**Table 69 Farmer Perceived Trend of Production**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Increasing	28	38.4	33	44.6
Decreasing	24	32.9	22	29.7
Stagnant	14	19.2	9	12.2
Don't know	1	1.4	0	0
No response	6	8.2	10	13.5
Total	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

### 8.5. Storage, Processing and Grading

#### 8.5.1 Storage

About 34.2% of sweet potato farmers and 37.8% cassava farmers store their produce before sale. More sweet potato than cassava farmers store their produce in the farm, which is a reflection of their relative perishability in post harvest storage (Table 70). The responses as to whether price is increasing or decreasing after storage are very low partly due to low proportion of farmers storing their produce, lack of sufficient knowledge on price trends and lack of farm records. The most common storage problem for cassava and sweet potatoes experienced by farmers is rotting (Table 71). Perishability, immediate need for cash and lack of storage facilities are the most limiting factors to storage of cassava and sweet potatoes (Table 72).

**Table 70. Where Farmers Store their Produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
In the soil (late harvest)	14	18.9	10	13.5
Own house	11	15.0	13	17.6
Dug pit	0	0	4	5.4
Other places	2	2.7	1	1.4
No response	48	65.8	46	62.5
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

**Table 71. Storage problems**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Easily rot/damaged	26	35.6	20	27.1
Increase costs products	1	1.4	0	0
Other problems	6	8.2	10	13.6
Other problems	1	1.4	0	0
No response	40	54.8	47	63.5
Total	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

**Table 72. Why Some Farmers Do not Store Their Produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Immediate need for cash	13	17.8	18	24.3
Demand so high	7	9.6	7	9.5
Lack of proper storage facilities	14	19.2	15	20.3
Doesn't see the importance	10	13.7	6	8.1
Expensive to store as prices do not change much	1	1.4	0	0
Highly perishable products	22	30.1	17	23.0
System	19	26.0	24	32.4
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

### 8.5.2 Processing

More of cassava farmers process the produce at the household level (77%) compared with sweet potatoes (28.8%). Most of processed products are for home consumption with only a small amount of processed cassava getting its way into the market (Table 73). Home processing involves peeling the tubers, slicing, soaking/fermentation, drying and sometimes pounding into flour. Some farmers use public milling machines to produce flour. Factors that limit the processing of sweet potatoes and cassava are lack of processing technology and knowledge (Table 74). Demand of fresh produce is also an important reason behind low levels of processing.

**Table 73. Forms in which processed product is used**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Use for home consumption only	19	26.0	44	59.5
Use for home consumption and sell some	2	2.7	12	16.2
No response/do not process	52	71.2	18	24.3
Total	73	100.0	74	100.0

**Table 74. Reasons why Farmers Don't Process the Produce**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Customers demand fresh products	13	17.8	13	17.6
Lack proper technology	26	35.6	7	9.5
Costly to process	1	1.4	0	0
Price does not change much	2	2.7	0	0
Lack knowledge on processing	22	30.1	4	5.4
Low production	9	12.3	1	1.4
No response	22	30.1	54	73.0
Total*	73	100.0	74	100.0

\*Totals exceed 100% because responses are not mutually exclusive

### 8.5.3 Grading

About half of sweet potatoes (52.1%) and cassava (55.4%) farmers grade their products. Grading involves sorting of tubers into groups with similar characteristics. Important grading criteria are size and degrees of damage. Color, taste and variety are additional criteria used in grading (Table 75). Nearly half of sweet potatoes (42.5%) and cassava (43.2%) farmers think that the price improves following a grading exercise.

**Table 75. Most Important Grading criteria**

	Sweet Potatoes		Cassava	
	Number	Percent	Number	Percent
Size	34	46.5	39	52.7
Color	4	5.4	1	1.4
Amount of damage	12	16.4	12	16.2
Taste	2	2.7	10	13.5
Other criteria	2	2.7	4	5.4
No response	35	47.9	32	43.2
Total	73	100.0	74	100.0

### 8.6. Utilization of Sweet Potatoes and Cassava

The most common preparation method for sweet potatoes and cassava meals at home is by boiling. Fresh sweet potatoes/cassava are peeled and soaked in water and then boiled. Some households particularly in the coast mix cassava or sweet potatoes with other ingredients to make 'futali' a popular recipe during Ramadan, Moslems holy fasting month. Frying fresh sweet potatoes or cassava chips is an alternative meal preparation preferred for breakfast or snack. Such preparation is popular amongst food vendors

### 8.7. Training, Farmers' Associations and Access to Credit

The percentages of sweet potatoes and cassava farmers that have received training in processing of their produce are 4.1 and 5.4 percent respectively. Only few farmers are aware that extension services for cassava (17.6%) and sweet potatoes (13.7%) exist. Membership to credit associations is also low (Sweet potatoes 9.6%, Cassava 6.8%). However, more sweet potatoes (8.2%) than cassava (1.4%) farmers had access to credit service during the last season. Despite low membership into farmers associations (less than 5%) willingness to join the associations is very high (Sweet potatoes 89%, Cassava 95.9%). Perceived or expected benefit for joining farmers association is to increase price bargaining power, easy to market and acquire inputs.

### 8.8 Yields, Production Costs and Margins for Sweet Potatoes

Results of the analysis of prices, production costs and margins for cassava and sweet potatoes are summarized in Table 76 and Table 77. Gross margins for each farmer were calculated as the difference between revenue per acre and total variable costs. Family labor was also priced using the equivalent market value. Some households have negative margins; which is explained by the fact that farmers do not price family labor. Negative gross margins could also be attributed to intercropping where labor costs such as those for weeding are shared between two or more inter-crops.

In general, results indicate high variability in price, costs and yields. Coastal regions of Dar es Salaam and Coast have relatively higher produce prices, explained by high demand derived from close-by large urban markets. The labor cost in these areas is also high due to high opportunity cost for labor. Prices and labor cost in the central regions of Morogoro and Dodoma are relatively lower. However, access to markets seems to favor Morogoro and Dar es Salaam more (highest gross margins) in spite of their high production cost. Morogoro region seems to strike the best balance between yields, price and production cost.

**Table 76. Yields, Production Costs and Margins for Sweet Potatoes**

Region		Yields (bags/acre)	Price (Sh./bag)	Revenue	Plough1	Ridgec1	Nurse1	Plantc1	Weedc1	Totalc1	G/Margin
Dar	Mean	16.6	<b>8,375.0</b>	139812.5	17750.0	19583.3	1900.0	7187.5	9000.0	47,975.0	<b>91,837.5</b>
	StD	8.2	2,150.5	81920.2	9794.3	12587.3	1555.6	1998.8	4320.4	26,182.1	85,579.6
Coast	Mean	14.7	<b>5,038.0</b>	75866.6	9865.3	13730.7	1900.0	4980.7	9909.0	37,326.9	<b>23,950.0</b>
	StD	9.7	1,621.8	59280.1	9155.9	9859.2	1140.1	4405.6	3923.7	19,623.9	61,007.4
Morogoro	Mean	19.3	<b>3,244.4</b>	56827.7	10666.6	17500.0		3250.0	6700.0	23,633.3	<b>44,055.0</b>
	StD	8.5	2,210.1	29689.5	1154.7	9983.3		1500.0	2600.0	12,283.5	27,557.5
Dodoma	Mean	15.6	<b>3,742.1</b>	51093.7	13444.4	6871.4		7722.2	1950.0	20,533.3	<b>30,057.8</b>
	StD	15.0	1,778.6	47922.5	18206.1	4690.3		9324.4	900.0	17,423.5	47,162.5
Total	Mean	16.6	<b>4,580.3</b>	72255.5	11989.1	13781.3	1900.0	5734.0	8529.7	33,509.6	<b>38,487.6</b>
	StD	10.7	2,449.6	58877.6	11381.0	10053.3	1126.9	5331.2	4371.6	21,318.5	56,398.3

**Table 77. Yields, Production Costs and Margins for Cassava**

Region		Yields (bags/acre)	Price (Sh./bag)	Revenue	Plough1	Nurse1	Plantc1	Weedc1	Totalc1	G/Margin
Dar	Mean	43.8	<b>3,000.0</b>	112,500.0	11,500.0	10,000.0	9,500.0	9,250.0	34,000.0	<b>22,250.0</b>
	StD	27.9	707.1	87,702.1	4,803.2	.0	2,563.4	2,434.8	8,084.3	81,068.7
Coast	Mean	28.1	<b>3,962.5</b>	110,828.1	19,347.8	84,700.0	9,180.9	14,456.5	44,230.4	<b>52,141.8</b>
	StD	22.4	2,218.7	84,512.2	15,347.0	5,498.4	3,932.8	11,769.4	26,647.3	90,085.4
Morogoro	Mean	23.4	<b>3,505.2</b>	83,263.1	19,666.6			6,166.6	19,375.0	<b>79,184.2</b>
	StD	12.1	2,582.7	73,881.0	8,962.8			2,753.7	14,407.0	72,841.2
Dodoma	Mean	26.3	<b>1,636.8</b>	36,318.1	6,076.9		3,500.0	4,807.6	11,107.1	<b>16,266.6</b>
	StD	46.3	1,296.2	47,002.2	3,904.3		1,000.0	2,868.9	6,811.1	40,888.7
Total	Mean	27.6	<b>3,047.5</b>	86,075.2	14,361.7	5,923.0	8,569.6	10,372.3	31,067.3	<b>48,088.6</b>
	StD	26.6	2,232.0	77,891.2	12,598.1	15,298.7	3,856.5	9,385.7	23,928.5	77,332.0

## 9. Conclusion and Recommendations

### 9.1 Production Patterns, Trends, Costs and Income

Cassava is one of the staple foods in the surveyed regions but more popular in the rural areas of the coastal regions of Dar-es-Salaam and Coast. Though there is a clear indication that the cassava marketing chain starts from up-country and disposals are at regional towns and cities, major supplies to consumption areas do not move very long distances in the case of cassava. Commercial producers of cassava, therefore, are found at production sites closer to markets compared to sweetpotato.

Sweetpotato are grown in both zones but for the coastal regions the crop is grown mainly by farmers with a background and origins from central or more upcountry regions around Lake Victoria, especially the "Sukumus". Production of sweetpotato is less dispersed compared to cassava, and is concentrated in the areas with greatest production potential.

In relative terms, more rural dwellers grow some amounts (often small amounts) of cassava, and there is less specialisation in this crop. Amongst the two crops' growers, a larger proportion of those growing sweetpotato indicated to be doing so for commercial purposes. Or more appropriately, very few sweetpotato growers plant them as a fallow, catch crop or a casual inter-crop in their field, a phenomenon common for cassava.

Whereas the percentages of farmers selling produce is similar for cassava and sweetpotato (85 and 89 % respectively), sweetpotato farmers are more specialised and market oriented than cassava farmers. This is evidenced by higher rates of monocropping (74% compared to 58% for cassava)<sup>9</sup>, marketable surplus, more risk taking and incidences of production in leased land.

Based on the survey there is only slight evidence that the area under cassava and sweetpotato is increasing very slowly. Production costs of both cassava and Sweetpotato are much lower in the central regions, ranging between TSh 10,000 and 20,000 per ha. In the coastal regions the costs range between TSh 30,000 to 40,000 per ha, mainly because labour is the most important and costly item, and it is relatively more expensive in the latter areas. Apparently, the opportunity cost of labour is lower in the central regions. One would expect that the lower production costs coupled with higher yields particularly for Sweetpotato in the central regions (compared with coastal regions) would result in higher producer income margins per hectare in these areas. This is not the case and mainly because of the low producer prices fetched up-country. For example the price per 100 kg bag of cassava and Sweetpotato in Dodoma is TSh 1,600 and 3,700 respectively. The prices for the same produce in Dar-es-Salaam are TSh 3,000 and TSh 8,300; about 100% difference.

Coast and rural areas of Dar-es-Salaam are the major suppliers of cassava to the city. However, urbanisation and acquisition of large pieces of land by farmers from urban centres, land speculators and non-agricultural investors from Dar-es-Salaam are increasingly reducing the land available for cassava production in the coastal regions, especially along the Bagamoyo road. One would conclude that, whereas urbanisation is desirable as it expands the market for the two products, this could be counterintuitive in the case of Dar-es-Salaam because the very reason pushes the crop out of the land. However, one may derive inspiration from the fact that former cassava land is not going into construction or other physical development, but is being allocated to higher value crops such as citrus, cashew, pineapple, passion and watermelon. A point here is that effort to enhance the quality and post-harvest processing and hence the value of cassava may enable it to compete and maintain its land.

Where as farmers do not view planting material and other inputs to be a major constraint, there were clear indications that pests and diseases are a major problem. Efforts to address cassava and Sweetpotato pests and diseases problems, either through breeding or husbandry practices are yet to yield fruits.

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<sup>9</sup> The fact that cassava is planted as a cover crop, during fallowing and also sparsely intercropped indicates low levels of specialization and rating as major income source.

### **9.2 Traders: Market Orientation and Operations**

Mainly small-scale traders market Sweetpotato and cassava. Their capital base comes from own savings, only a few (between 2 and 4%) managed to borrow from Savings and Credit Societies. One could therefore question whether this is an avenue to be explored in view of addressing financial constraints that may face traders if they are to increase their volumes of business. Transfer function is the major task undertaken by such traders whereby they buy stands of crops and harvest them at a rate suiting them, avoiding excessive extraction at any time to minimise post-harvest deterioration. Traders would then transfer produce to market areas. Traders accessing rural areas for produce are mainly wholesalers, who would often also operate retail selling of the same produce.

Both cassava and sweetpotato prices seem to be more supply driven than demand driven except during the Islamic month of Ramadan when they are a delicacy. Besides Ramadan, early and late season prices are the highest for both cassava and sweetpotato. More sweetpotato than cassava from central regions are delivered to Dar-es-Salaam market. The Dar-es-Salaam market therefore receives sweetpotato from both central and coastal regions; however, the two sources are not perfectly competitive due to alternating production seasons except for some few months when there is an overlap.

Sweet cassava varieties are more preferred by market-oriented farmers. There is a convincing correlation that suggests this is derived from traders' demands. Other preferred features include early maturity and fast turn over. As noted in the pre-survey, Sweetpotato from the coast is said to be salty and given a choice, consumers would opt for sweetpotato from the central regions.

An interesting finding here is that sweetpotato is significantly traded in all three identified marketing channels i.e. village-to-village (a rural-to-rural chain), village-to-district headquarters (again an upcountry chain) and rural-to-region headquarters including the Dar-es-Salaam city (significantly rural to urban chain). Cassava trade is more pronounced in the case of the last chain, rural to urban. This phenomenon has significant implications for developing the markets. The pronounced diversity of marketing channels for sweetpotato compared to cassava augurs well with the fact that it is a relatively high value crop compared to cassava. Secondly, the dichotomy between sweetpotato producers and consumers is more pronounced than in the case of cassava. Many rural dwellers would have cassava plants casually grown in their farms, and hence need not buy for domestic consumption. The number of rural dwellers, who consume but don't grow sweetpotato, implying that they are obliged to buy, enhances the rural-to-rural and rural to district/regional headquarters marketing chains for this produce.

From the traders' perspective, transportation is the major constraints to marketing. It accounts for over 50% percent of the marketing costs. Poor and inaccessible roads, long distance to large markets lead to high costs and have thus reduced marketable surplus and market margins, particularly so for the produce from the central zone.

### **9.3 Consumers: Food Chains, Domestic Consumption and Food Vendors**

It is the low-income earners, both in rural and urban areas, who mainly consume sweetpotato and cassava. They are a cheap food and figure prominently in their household's budgets. No significant processing of sweetpotato and cassava i.e. drying,

making chips and pounding into flour takes place at farmer, trader or consumer level. Much of the consumers reported simple processing in the form of boiling and drying. The major form in which cassava and sweetpotato are consumed is boiled fresh roots. There is significant room for exploring various ways and means to process sweetpotato and cassava. This is seen as the avenue through which cassava and sweetpotato can be commercialised and its trade and utilisation increased.

Urban markets for sweetpotato and cassava are segmented by income where the low-income strata eat cassava more frequently. However, unlike cassava for home consumption, snack cassava sold by vendors, as would be expected, might be less income segmented especially during Ramadan. Unlike cassava, the Sweetpotato market is more segmented by ethnicity than income – this was observed in the pre-survey.

There are also clearer indications now that sweetpotato and cassava pose as substitutes for other foods. Responses from consumers showed contrasting features on the role that each plays in the daily meal of a household. Where as cassava features strongly as a main meal (lunch and or dinner), Sweetpotato surfaced more prominently as a breakfast item. Cassava competes and acts as a potential substitute for maize, sorghum, millet (prepared as various types of “ugali”) or rice meal, where as sweetpotato competes with wheat products like pancakes “chapatti”, doughnuts and buns “maandazi” etc. Any intervener who aims to enhance domestic utilisation of cassava and sweetpotato may wish to consider seriously the fact that it is the low cost nature of the product that matters, augmented with the particular purposes that it plays in the daily meal of a low-income earner. In general, processing for low-income earners domestic consumption can foster major strides in the effort to enhance utilisation of cassava and sweetpotato in Tanzania.

The survey did not capture cassava or sweetpotato production and marketing that aimed at industrial processing or export markets. However, records show that industrial starch production was once undertaken in Sengerema, central Tanzania and was abandoned in the early 1990s due to low supply of raw material, i.e. cassava roots. It is also documented that Tanzania once exported dry cassava to animal feed producing factories in Europe. These are also areas worth exploring with the goal of enhancing utilisation.

It was observed that, unlike round (Irish) potatoes, sweetpotato and cassava have not yet penetrated the international fast food chains. However, there is a potential for promoting cassava and sweetpotato to local food vendors popularly those known as ‘Mama Lishe’. Although not an explicit target of this study but such food service establishments are privately or co-operatively operated by women in most urban centres in the country, catering mainly for ‘blue collar’ job and manual labour workers e.g. in factories and construction sites. Vendors in urban, residential estates and roadside markets currently sell cassava and Sweetpotato snacks.

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## Annexes

## Annex 1

## 1(a) Area Harvested and Production Trends for Cassava and Sweetpotato

## Data available on cassava production in Tanzania

	1995	1996	1997	1998	1999	2000	2001
<b>Area under production (Ha)</b>							
FAO GIEWS	584,800	579,000	563,531	693,190	655,700	848,126	761,100
Marketing Development Bureau	588,200	663,500	745,400	655,700			
<b>Yield (Mt/Ha)</b>							
FAO GIEWS	10.20	10.30	10.10	8.83	10.90	6.78	7.42
Marketing Development Bureau	2.55	2.14	2.27	2.70			
<b>Baseline Survey SARRNET (Sep-Nov 2001)</b>							
					Zanzibar		20.2
					Rufiji District		18.5
					Lake Victoria Zone		14.2
<b>Production in Million MT</b>							
	1995	1996	1997	1998	1999	2000	2001
FAO GIEWS	5,968,800	5,992,000	5,700,000	6,128,000	7,181,500	5,757,968	5,650,000
Crop Monitoring & Early Warning Unit	1,802,000	1,498,000	1,426,000	1,758,000			
Statistics Unit	1,992,000	1,498,000	1,426,000	1,758,000			
National Accounts (Min. Finance)	1,789,000	1,857,000	1,941,000	2,036,000			
Marketing Development Bureau	1,498,400	1,426,000	1,758,300	1,795,400			

Source: Various

**1(b) Number of Holdings and Planted Area of Major Food Crops 1997/98**

Type of Crop	Long Rain Season (Masika)		Short Rain Season (Vuli)	
	Number of Holdings	Planted Area (Hectares)	Number of Holdings	Planted Area (Hectares)
<b>Cereal crops</b>				
Maize	2,929,048	2,765,541	2,049,324	833,176
Paddy	910,628	602,896	257,412	188,066
Sorghum	860,881	640,089	219,422	101,101
Bulrush	270,854	280,447	6,197	3,625
Millet				
Finger Millet	190,629	81,567	35,711	11,634
Wheat	62,245	38,512	7,574	3,680
<b>Roots and Roots</b>				
Cassava	1,316,140	773,117	1,220,426	433,297
Sweetpotato	1,087,352	275,559	674,097	136,504
Irish Potato	67,804	39,243	55,119	10,413
Yam	36,235	4,684	39,044	4,919
Cocoyams	43,698	7,620	41,466	6,596
<b>Oil Crops</b>				
Sunflower	156,756	86,428	25,703	3,794
Simsim	52,882	22,277	2,629	427
Groundnut	586,865	216,769	133,266	31,065
Palm oil	6,930	2,253	13,007	5,924
Coconuts	33,499	35,819	36,463	30,795
Cashewnut	113,096	168,734	18,130	16,284
Soya bean	6,340	2,164	-	-
<b>TOTAL</b>	<b>4,568,099</b>	<b>7,694,544</b>		

Source: Integrated Agricultural Survey 1997/98

**1(c) Number of Holdings and Total Planted Area for Cassava by Season**

	Planted Area				Number of Holdings			
	Long Rain Season (Masika)		Short Rain Season (Vuli)		Long Rain Season (Masika)		Short Rain Season (Vuli)	
	Area (ha)	%	Area (ha)	%	Number	%	Number	%
Dodoma	199	0.11	-	-	1752	0.25	-	-
Arusha	-	-	-	-	-	-	-	-
Kilimanjaro	111	0.06	632	0.68	2093	0.30	4614	1.14
Tanga	2699	1.43	3123	3.37	1841	4.50	25578	6.33
Morogoro	601	0.32	1108	1.20	5213	0.74	7596	1.88
Coast/DSM	799	0.42	1664	1.80	2159	0.30	9792	2.42
Lindi	19459	10.34	-	-	49485	6.99	-	-
Mtwara	38402	20.40	-	-	125866	17.78	-	-
Ruvuma	23904	12.70	-	-	85308	12.05	-	-
Iringa	1251	0.67	-	-	10157	1.43	-	-
Mbeya	1072	0.57	192	0.21	6238	0.88	3742	0.93
Singida	1532	0.81	-	-	8312	1.17	-	-
Tabora	4640	2.47	-	-	31543	4.45	-	-
Rukwa	12434	6.61	-	-	35609	5.03	-	-
Kigoma	11620	6.17	11346	12.25	62667	8.85	57918	14.33
Shinyanga	3957	2.10	-	-	15484	2.19	-	-
Kagera	14201	7.54	7168	7.74	61678	8.71	39182	9.69
Mwanza	12468	6.62	27089	29.26	70912	10.01	136015	33.64
Mara	38886	20.66	40263	43.49	101784	14.37	119865	29.65
<b>TOTAL</b>	<b>188243</b>	<b>100.00</b>	<b>92590</b>	<b>100.00</b>	<b>708101</b>	<b>100.00</b>	<b>404302</b>	<b>100.00</b>

Source: National Sample Census of Agriculture 1994/95

**1(d) Number of Holdings and Total of Planted Area for Sweetpotato By Season and Region**

	Planted Area				Number of Holdings			
	Long Rain Season (Masika)		Short Rain Season (Vuli)		Long Rain Season (Masika)		Short Rain Season (Vuli)	
	Area (Ha)	%	Area (Ha)	%	Number	%	Number	%
Dodoma	-	-	-	-	-	-	-	-
Arusha	121	0.20	80	0.60	564	0.14	3729	3.15
Kilimanjaro	-	-	35	0.26	-	-	788	0.67
Tanga	135	0.23	129	0.97	3622	0.88	3242	2.74
Morogoro	45	0.08	47	0.36	843	0.20	1589	1.34
Coast/DSM	851	1.43	49	0.37	1799	0.44	1116	0.94
Lindi	3	0.01	-	-	351	0.09	-	-
Mtwara	13	0.02	-	-	654	0.16	-	-
Ruvuma	3387	5.69	-	-	34531	8.39	-	-
Iringa	711	1.19	-	-	7083	1.72	-	-
Mbeya	656	1.10	-	-	6439	1.56	-	-
Singida	2121	3.56	-	-	12122	2.95	-	-
Tabora	4137	6.94	-	-	26458	6.43	-	-
Rukwa	941	1.58	-	-	6013	1.46	-	-
Kigoma	625	1.05	686	5.13	10473	2.54	10088	8.51
Shinyanga	22086	37.08	-	-	112161	27.26	-	-
Kagera	2919	4.90	699	5.23	29574	7.19	4397	3.71
Mwanza	15166	25.46	8546	63.89	119522	29.04	71278	60.16
Mara	5646	9.48	3102	23.19	39311	9.55	22247	18.78
<b>TOTAL</b>	<b>59571</b>	<b>100.00</b>	<b>13376</b>	<b>100.00</b>	<b>411520</b>	<b>100.00</b>	<b>118474</b>	<b>100.00</b>

Source: National Sample Census of Agriculture 1994/95

Annex 2: Geographical (spatial) Consumer Prices - Cassava and Sweetpotato

Box 1: Average Monthly Price for Fresh and Dried Cassava, August 1999-July 2000

Market	Fresh Cassava		Dried Cassava	
	Mean Price, TSh/kg	N	Mean Price, TSh/kg	N
			123.39	
Northern Zone	204.69			0
Arusha	332.25	10		0
Mbulu	110.00	3		0
Moshi	188.33	9		9
Gonja (Same)	110.89	9	123.39	
Northern Coast	154.98		110.99	0
Dar Es Salaam	235.00	10		5
Mafia	113.00	10	182.60	4
Bagamoyo	92.50	4	114.38	10
Kisarawe	159.00	10	97.00	0
Morogoro	203.13	8		8
Tanga	108.25	12	113.25	10
Lushoto	155.56	9	86.00	
Lake Victoria	179.06		108.26	4
Bukoba	80.50	9	95.25	0
Mwanza	262.50	12		11
Geita	73.86	11	54.82	12
Ukerewe		0	58.83	10
Magu	162.92	6	164.00	6
Kwimba	200.00	8	214.58	12
Sengerema	93.96	12	57.92	3
Musoma	136.50	3	118.17	8
Tarime	454.00	8	184.75	0
Shinyanga	161.25	10		0
Maswa	200.00	2		0
Kahama	190.70	5		
Western Zone	122.95		122.22	12
Kigoma	132.71	12	124.79	7
Kasulu	97.86	7	80.93	11
Kibondo	147.05	11	101.36	9
Mpanda	100.00	9	176.39	0
Central Zone	143.39		166.09	0
Mpwapwa	116.67	3		0
Dodoma	225.00	1		0
Singida	180.00	4		11
Tabora	138.64	11	198.64	12
Urambo	135.42	12	136.25	
South Highlands	245.42		144.00	0
Sumbawanga	150.00	1		0
Mbeya		0		0
Njombe	234.72	9		2
Iringa	208.33	3	225.00	0
Mafinga	300.00	2		0
Songea	346.25	10		3
Mbinga	84.38	4	90.00	0
Tunduru	221.07	7		
Southern Coast	204.81		105.00	8
Mtwara	252.00	12	84.69	5
Lindi	183.75	8	122.50	8
Newala	176.25	8	114.38	0
Masasi	162.50	4		

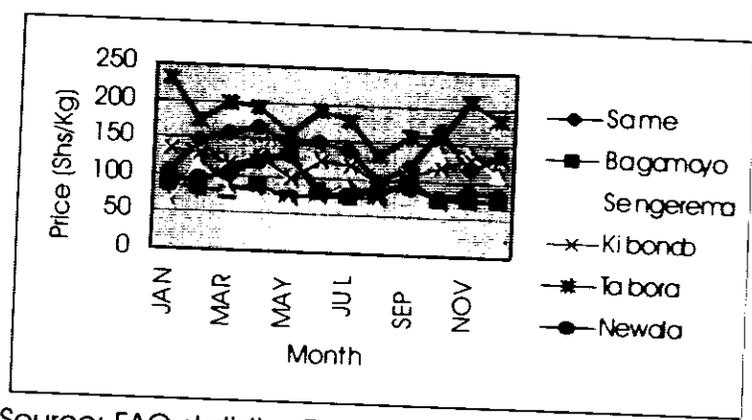
Source: Agricultural Information Service Database (MAC)

Box 2. Average Monthly Price for Dry Cassava, TSh kg August 1999-July 2000

Month	Same NZ	Bagamoyo NC	Sengerema LV	Kibondo WZ	Tabora CZ	Newala SC	Mean
JAN	104.83	88.75	62.15	136	230	90.83	118.76
FEB	147.78	84.17	116.63	132	175	96.25	125.30
MAR	158.9	76.67	82.25	117.5	198	101.88	122.53
APR	165.33	90	72.5	125.63	192.5	122	127.99
MAY	145	72.5	70.25	98.33	159	128.33	112.23
JUN	146.52	75	73.25	124	191	81.25	115.17
JUL	137.03	75	89.2	119.17	178.33	76.67	112.56
AUG	97.72	76.5	70.9	93.2	132.4	83.4	92.35
SEP	119.5	100.63	97.4	108.13	158.75	87.5	111.98
OCT	167	73.75	136.08	119.5	159	74.67	121.66
NOV	116.63	73.75	137.08	130	207	83.33	124.63
DEC	133.33	73.33	110.23	131.25	182	80	118.35
n (=60)	40	44	49	51	52	42	

Source: Agricultural Information Service Database (MAC)

Average Monthly Prices for Dry Cassava, August 1999-July 2000



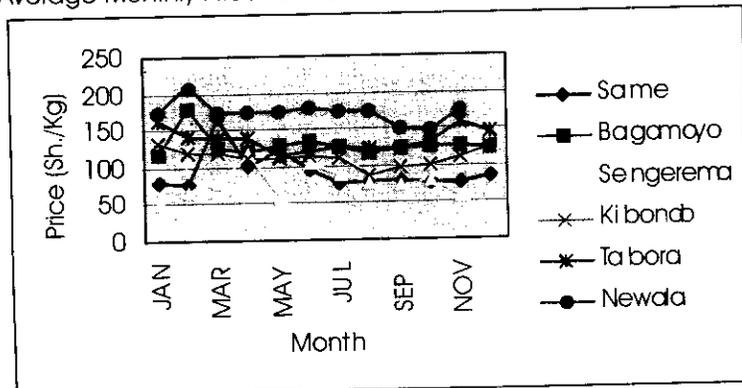
Source: FAO statistics Database, 2000

Box 3. 4: Average Monthly Price for Fresh Cassava, August 1999-July 2000

	Same	Bagamoyo	Sengerema	Kibondo	Tabora	Newala	Mean
JAN	79.33	117.5	50.13	133.5	165	175	120.07
FEB	78.5	179.17	68.13	121.3	143.75	212.5	133.89
MAR	167.98	126.67	79.75	120	140	175	134.9
APR	102	122	118	112	140	175	128.16
MAY	123.33	128.75	59.38	113	115	175	119.07
JUN	97.72	135	105.75	114.6	120	180	125.51
JUL	79.15	127.5	87.54	113.92	126.67	175	118.29
AUG	80.06	117.5	79.19	88.56	125	175	110.88
SEP	80.33	123.75	75.2	99.38	125	150	108.94
OCT	77	126.88	81.25	101.65	132	147.5	111.04
NOV	78.13	127.5	59.7	113.25	159	175	118.76
DEC	86.67	125	66.49	127.5	146		110.33
n	40	44	49	51	55	20	

Source: Agricultural Information Service Database (MAC)

Average Monthly Price for Fresh Cassava, August 1999-July 2000



Source: FAO statistics Database, 2000

Geographical (spatial) variation of Sweetpotato prices

Box 4. Average Monthly Price for Sweetpotato, August 1999-July 2000

Market	Mean	Number of Months
Northern Zone	171.86	
Arusha	169.75	10
Mbulu	214.77	11
Moshi	205.75	10
Gonja (Same)	73.13	8
Northern Coast	138.23	
Dar es Salaam	227.00	10
Mafia	92.86	7
Bagamoyo	92.50	4
Kisarawe	118.57	7
Morogoro	80.63	8
Tanga	153.13	8
Lushoto	146.59	11
Lake Victoria	172.47	
Bukoba	106.79	7
Mwanza	238.54	12
Geita	95.73	11
Ukerewe	142.71	12
Magu	99.29	7
Kwimba	209.38	8
Sengerema	90.00	12
Musoma	144.50	3
Tarime	455.00	8
Shinyanga	184.17	6
Maswa	196.88	8
Kahama	99.10	5
Western Zone	93.61	
Kigoma	92.50	10
Kasulu	111.43	7
Kibondo	76.36	11
Mpanda	102.06	9
Central Zone	135.60	
Mpwapwa	120.00	5
Dodoma	142.00	5
Singida	123.41	11
Tabora	150.00	9
Urambo	139.79	12
South Highlands	185.22	
Sumbawanga	83.75	10
Mbeya	150.00	3
Njombe	337.50	6
Iringa	148.75	4
Mafinga	215.28	9
Songea	236.11	9
Mbinga	61.30	5
Tunduru	225.83	6
Southern Coast	208.30	
Mtwara	285.42	6
Lindi	158.92	6
Newala	155.00	5
Masasi	225.00	6

Source: Agricultural Information Service Database (MAC)

Box 5. Average Monthly Price for Sweetpotatoes, August 1999-July 2000

	Arusha	Lushoto	Sengerema	Kibondo	Tabora	Mafinga	Mtwara
JAN	123.8	113.1	69	117.6	250	175	337.5
FEB	147.5	145.5	107	116.5	233.3	225	356.3
MAR	140.3	150.5	79.88	110.5	175	213.1	366.7
APR	142.8	143.8	80.88	113	160	178.8	225
MAY	145	150.8	43.63	68.83	110	203	275
JUN	152.5	153.8	48.63	82.5	115	185	270.8
JUL	125.5	117.5	45.7	61.44	97	139.8	193.2
AUG	137.5	153.8	88.56	75.63	162.5	146.3	239
SEP	134.5	120	65.1	79.5	175	120	253.1
OCT	130.3	101.9	71.5	100.3	162.5	174.4	283.3
NOV	139.3	101.7	65.75	106.9	200	152.5	321.3
DEC	138.1	123.8	103.1	125	200	117.5	300.8
N	52	50	50	52	41	44	41

Source: Agricultural Information Service Database (MAC)

Average Monthly Price for Sweetpotatoes, August 1999-July 2000

