

# **ATDT-CIAT/ISAR/IITA-FOODNET And PEARL Project - Rwanda**

Sweetpotato sub-sector market survey

**Rwanda**

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## Acronyms and abbreviations

DRC	Democratic Republic of Congo
DS/MINECOFIN	Statistical Department, Ministry of Economy and Finance
FAO	United Nations Food and Agriculture Organisation
FSRP	Food Security Research Programme
Frw	Rwandan francs
Ha	Hectare
HLCS/EICV	Household Living Condition Survey/Enquête Intégrale sur les conditions de vie des ménages
Kg	Kilogramme
MINAGRI	Ministry of Agriculture, Livestock and Forestry
MINIPLAN	Planning section of MINECOFIN
MT	Metric ton
PASAR	Projet d'Appui à la Sécurité Alimentaire au Rwanda (Food Security Support Project to Rwanda )
US\$	United States dollar

## **Executive Summary**

This report synthesizes a three-phased sub-sector analysis of sweetpotato marketing in Rwanda during 2002, which comprised literature review, qualitative study and quantitative study. The study mainly focused on both demand and supply and covered the major production and marketing sites in the country.

The general objective of the study was to understand the structure and performance of sweetpotato markets in Rwanda and also to identify constraints and opportunities for commercialisation of sweetpotato against a background of trade liberalization, poverty alleviation, food insecurity and competitiveness. It thus highlights the historical and current position of sweetpotato in the country's development process.

The study therefore highlights several findings. It also gives recommendations on formulating reliable strategies that address issues on post harvest utilisation and commercialisation of sweetpotato in Rwanda.

Sweetpotato is an important crop in the country in terms of area planted and contribution to food requirements. It is of strategic importance due to its tolerance to drought and ability to do well in variable environments without a lot of inputs and is receiving greater attention by the farming communities. Consequently its production has been increasing.

Increased production has mainly been market driven. Demand for potatoes has increased due to the increase in population but also due to the position of sweetpotato as a cheaper substitute. Therefore the crop has become important in terms of providing cash to growers.

The study found no novel products and that recipes in which sweetpotato is consumed are very limited. Sweet potato is consumed fresh after boiling the roots. It is also used as a substitute for bread and other foodstuffs normally taken during breakfast.

Consumer preference is in favour of varieties with good taste, high dry matter content and low fiber content. Also the time of cooking is an important parameter. All these imply that the crop is mainly consumed in its fresh form, without processing.

The survey found that sweetpotato processing was lacking. Processing is vital as a means of not only changing the form in which the product is consumed but also to increase the shelf life of the product.

While market prices are being collected, participants along the marketing chain mostly rely on "social networks" and personal observations for marketing information suggesting that there is no formal way of disseminating the available information to the end users.

## **Recommendations**

This study found limited recipes in which sweet potato is prepared at household level. This implies that there is significant room for developing novel or improved products. Research and Development should therefore identify and work with small-scale food processors as a way of exploring alternative ways of increasing utilization and commercialization.

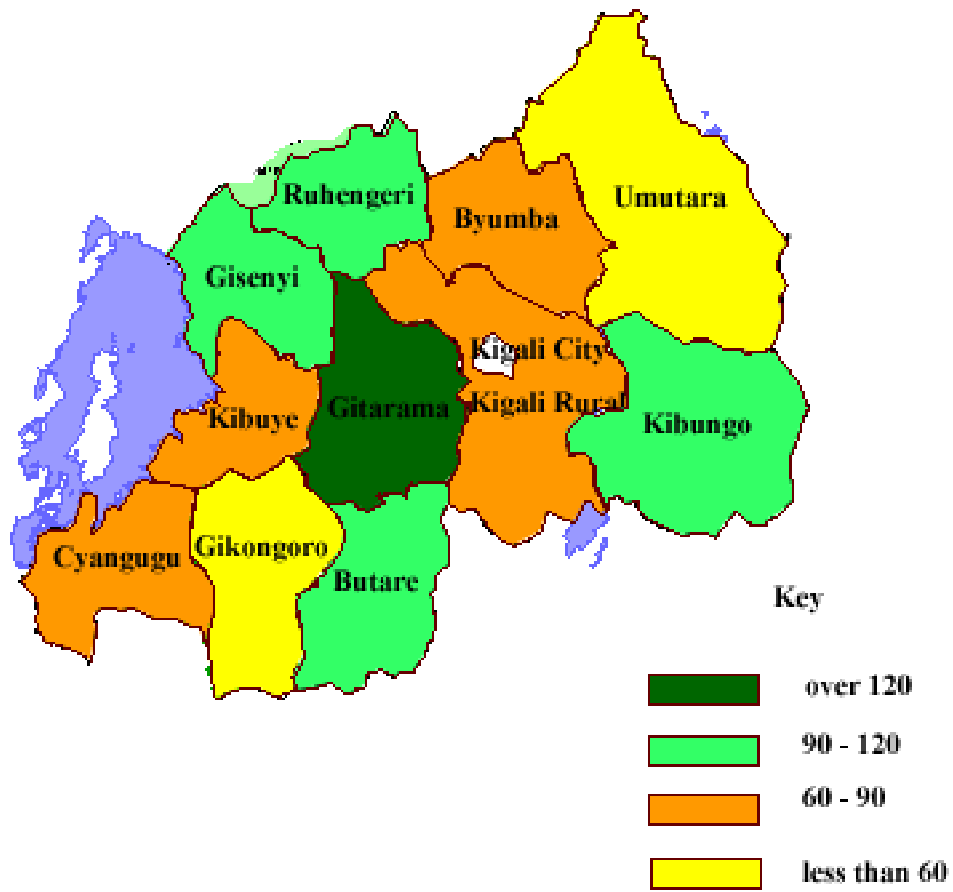
Among others, lack of knowledge on the part of processors is a major constraint to processing. Thus there is a pertinent to start on a program of popularizing available technologies through a farmer-centered approach. Fostering technological advances at rural household level could offer breakthroughs towards increased availability and consumption of sweetpotato.

Research and Development needs to seriously get involved with building new production structures for the optimal use improved processing technologies. In this regard researchers should assist develop viable production communities and should work closely with the farmers to build on the local institutions.

This study also proposes a three-tier integrated development approach that involves Research and Development, farmer's groups/associations and bakeries/industries. Such an approach will assist guarantee a market and also assist in identifying production/processing constraints for further technological advances.

Apart from being consumed as human food, sweetpotato has multiple uses comprising animal feed and starch production. There is need to explore these uses. As such more market surveys/studies need to carried out to assist identify viable economic ventures. Also, such studies should be more focussed and aim to identify sectoral constraints/opportunities for market driven growth.

Figure 1.1: Sweetpotato production by province '000 tonnes, Rwanda, 2000



## **1. Introduction**

### **1.1 Background**

Rwanda relies heavily on agriculture for its income, employment opportunities and the economic well-being of its people of whom about 90% live in the rural areas. In spite of steady economic progress since the genocide, poverty is widespread with Gross National Product currently standing at USD 260 per person.

The economic outlook for Rwanda is in many ways challenging. The country is struggling with several major policy level agendas such as how to compete in a more globalised economy, privatisation, market liberalization, decentralisation, overcoming tribal conflict and at the same time showing real gains in equity, income, education and health of the people.

A major part of the economic reform is the privatisation of the two main income generating sectors, coffee and tea. Unfortunately, at this time coffee, the major foreign exchange earner has fallen from 66 m in 1990 to 22 million in 2000, causing a fall in income of 66%.

At the sametime the country has experienced one of the fastest growing population rates in the world. Rural density is 929 persons per km<sup>2</sup> of arable land reducing the average farm size to approximately 0.71 hectares and per capita arable land to about 0.10 hectares. These are levels which are placing severe strains on the resource and social capacity of the land.

Consequently, food security and poverty alleviation issues have become more critical than ever before with farmers increasingly becoming involved with issues of income generation from their land.

Achieving food security and increased rural incomes will depend on increased productivity in this sector but more so on the proper functioning of agricultural markets in order to improve access by the poorest. As a result, there is a pertinent and ever-growing interest in economic diversification and also in understanding and developing both the internal and new export markets for novel or improved products.

This study aimed to evaluate the market options for sweetpotato, which is a major food crop in the country. It specifically aims to assess the importance of the crop in terms of:

- Food security; economic growth; potential market growth in relation to identified markets;
- Comparative/competitive advantage for Rwanda in developing the sweetpotato crop;
- Key interventions needed in order to transform sweetpotato from subsistence to a more commercially oriented sector; and
- The potential of the commodity or sub-products in regional and overseas markets.

## **1.2 Methodology**

The methodology used for this market review is that developed by Holtzman. This method relies on rapid reconnaissance to conduct a diagnostic study of the bean sub-sector in Rwanda with the objective of identifying possible improvements in existing practices and recommendations on how these might be achieved are also highlighted. It also identifies issues for follow-up research.

Data were collected through informal interviews with key informants (see **Appendix 19**) and through direct observation of critical stages in the production and distribution sequence. In addition sound sources for secondary data were also identified and used during the survey.

The sample was purposively selected to include respondents from each of the following major categories along the production-marketing chain i.e. producers, travelling, traders, transporters, wholesalers and retailers.

## **1.3 Rationale of the method**

From a methodological point of view, this study has several advantages. The broad conceptual framework used to identify key study issues and to organize data collection activities enabled the researchers to distinguish factors that decisively influence market performance.

Flexibility is an important aspect of the informal interview method. Structured informal interviews can generate valuable information about food system participants' behaviour, motivations, intentions, and planned future behaviour.

Apart from providing qualitative data, this approach, if designed properly, can also generate precise quantitative data, albeit from small samples. Structured informal interviews can generate precise, reliable information on marketing costs, purchase and sale prices, transacted volumes, processed output, and other continuous variables over relatively short recall periods.

This approach is practical and in spite of limited time, money and personnel, studies can still be carried out.

## **1.4 Analysis**

Most of the quantitative analysis was conducted using secondary data from Government departments, NGOs and International Development institutions. Primary data on costs and margins was carefully sifted and averaged to create a realistic picture of profitability within the trading chain.

## 2. The Marketing Environment

### 2.1 Rwandan economy status

Rwanda's per capita income is currently US\$ 260. The population living below the poverty line is estimated at 65%. Life expectancy is 49 years while the literacy rate is 48% (*Rwanda Development Indicators, 2000*).

Economic growth has declined in the past 1-2 years to 6.0% in real terms, having grown at an average of 12% per annum during the reconstruction period (1995-1998). Although the year 2000 marked the complete economic recovery to the prewar 1990 level, with growth in some sectors surpassing the 1990 level, growth was still below the vision 2020 target of 8.5%. Factors such as the localized drought, high oil prices and low commodity prices explain this situation.

Agriculture contributed the largest share of this growth at 7.7%, industry (mainly mining and construction) 7.2% while the services sector (mainly hotels, restaurants, banking and insurance) accounted for 4.2% (**Table 1.1**)

**Table 1.1: Selected growth rates**

Growth rates (%)	2000	2001(projected)
Agriculture sector	9.1	7.7
Industry sector	3.6	7.2
Service sector	3.5	4.2
GDP	6.0	6.0
GDP price deflator	1.8	4.9
CPI	2.1	4.0

Source: *Rwanda Development Indicators, MINECOFFIN*

The Inflation rate substantially increased to 2.1% in 2000 in response to external shocks (mentioned above) that caused higher food and fuel prices, while the country's parallel market exchange rate stood at Frw 495 to the US\$ at the time of the survey, thereby making imports more expensive.

The balance of payments deficit reduced to US\$ 234 million in 2000 due partly to the depreciation of the currency, which reduced imports and increased the resultant cheaper exports. For the first time the country exported beans and maize to Uganda averaging 20 tonnes per day since December 2000.

The country's international reserves as months of imports (cif) declined from 8.1 months in 1999 to 7.5 months in 2000, which is still high while the fiscal overall deficit (excluding grants) was significantly larger than programmed, amounting to 9.2% of GDP, compared with the programmed 7.8% of GDP. This shortfall was due to a 10% drop in the programmed revenue

performance, which translated into revenue realization of Frw 68 billion instead of the targeted Frw 76 billion.

The country has few exploitable natural resources and suffers from high transport costs due to its landlocked position. Thus, given this particularly narrow economic base, external trade integration is vital for Rwanda in order to reduce its large trade deficit and also decrease reliance on donor funds.

## 2.2 Macro-economic Developments

The new government of Rwanda in December 1994 announced its economic agenda, which is committed to creating a liberal, market-based economy with a reduced role for the state. Macro-economic and structural policies broadly focused on reviving economic activity, restoring macro-economic stability and rebuilding the capacity for macroeconomic and budget management. Several structural reforms to liberalize trade, develop the private sector, privatize public enterprises, and improve public administration and governance have been implemented.

The country's trade regime has been progressively liberalized. Surrender requirements for coffee and tea export receipts were eliminated, and the maximum tariff rates reduced from 100 percent to 40 percent. Consequently, Rwanda's trade restrictiveness index fell from 8 in 1995 ("restrictive") to 3 in early 1998 ("relatively open"). The country continued to pursue trade liberalization, further reducing the maximum tariff rate from 40 to 25 percent. The coffee tax was eliminated in early 1999 and exchange regulations were further simplified and liberalized as were import taxes on fertilizers.

**Table 1.2: Indicators of structural reform**

Indicator	1993	1996	1998	1999
Non zero trade tariff range	(10-100)	(10, 20,40)	(10, 20, 40)	(5, 15, 25)
Average tariff rate	34.8	31.9	18.1	11.3
Tax restrictiveness index	10	8	3	2
Surrender requirements for tea & coffee export proceeds	100	50	0	0
Civil service employment	42,027	34,882	37,353	37,694
Govt. wage bill in percent of GDP	5.7	4.4	4.6	5.3
Cumulative number of public enterprises Privatized or brought under liquidation	0	0	3	25

Source: World Bank, Rwanda data

Formerly state-owned enterprises have been privatised. The state-controlled Chamber of Commerce was abolished while the Rwanda Private Sector Federation was formed as an apex body of various private sector organizations to articulate private sector interests.

In an effort to promote the private sector, business licensing was made easier and the labor code was revised to remove restrictions on the movement of labor and the employment of females. Also, the Rwanda Investment Promotion Agency was set up to facilitate investment and business development.

The key fiscal measures for increasing revenues included improved tax administration by the Rwanda Revenue Authority (established at end of 1997 with technical and financial support from the UK-DFID). Import duty exemptions were progressively eliminated while the turnover tax was increased from 10% to 15%. Excise tax rates were also increased.

In response to the revenue shortfalls, the Government implemented significant expenditure reductions in both 1998 and 1999 (and with the mid-2000 budget review), but could not avoid the resort to large domestic bank financing in late 1999.

Within the financial sector, the foreign exchange market was liberalized. But, efforts to build a leaner civil service were hampered by new recruitment to replace those lost in the genocide.

Currently the government is endorsing the Vision 2020 document. This focuses on the aim to exit the category of the “least developed countries” by the year 2020 through the eradication of widespread poverty and assurance of equitable growth. Vision 2020 aims to average a GDP growth rate of 8.5% per annum which will enable the country to attain Vision 2020 targets of:

- A GDP per capita increase to US\$ 960 at the present value (currently US\$ 260);
- Reducing population living below the poverty line to 25% (currently 65%);
- Increasing life expectancy to 65 years (currently 49 years); and
- Increasing literacy rate to 90% (currently 48%).

To achieve 8.5% GDP growth per annum requires high investment rates, which can be realized in the context of social, political and macroeconomic stability.

### **2.3 Trade and Export Competitiveness: Recent Reforms, Performance and Market Access**

Rwanda still faces an unfavourable trade balance, relying on imports for most of her needs. It has mainly relied on two primary products i.e. coffee and tea for export earnings.

Rwanda has been heavily reliant on coffee for most of its export earnings and the recent collapse in international coffee prices has cost the country more than 30% of its terms of trade. In 1990 coffee earnings were worth US\$ 66 million but are now worth less than US\$ 20 million, (see **Table 1.3**). This major loss in revenue is having a catastrophic effect on the economy making it ever more reliant on donor support.

While the tea market has been less affected by the current problem of oversupply in the key commodities, growth has also been negligible with income increasing from US\$ 20 million to US\$ 24 million over the past decade.

Trade or export of products is virtually non-existent due mainly to high costs of production and poor quality of locally manufactured goods. Essentially the country is a net importer of consumer goods. **Table 1.3** below indicates trends in the country's trade balance.

**Table 1.3: Balance of payments (trade competitiveness) million of US\$**

Item	1990	1995	1996	1997	1998	1999	2000(est)
Exports (fob)	103	51.2	61.7	93	64.1	62	66.2
Coffee	65.7	38.2	43	45.3	28.1	26.5	22.5
Tea	21	3.8	9.3	20.6	22.9	17.5	24.3
Imports (fob)	227.7	198.1	218.7	277.4	232.6	202	195.7
<b>Trade balance</b>	<b>-124.7</b>	<b>-146.9</b>	<b>-156.9</b>	<b>-184.4</b>	<b>-168.5</b>	<b>-140</b>	<b>-129.5</b>
Services (net)	-104.6	-118.4	-143.1	-160	-148.3	-116.8	-135.6
Non factor services	-93.4	-123.8	-128.5	-145.6	-141.5	-106.3	-119.3
Credit	42.5	16.2	21.5	51	46.9	51.1	61.7
Debit	135.9	140	150	196.6	188.4	157.4	181
Factor service	-11.2	5.4	-14.6	-14.4	-6.8	-10.5	-16.3
Credit	4.1	21.9	5.5	9.2	9.9	7.8	11
Debit	15.3	16.5	20.1	23.6	16.7	18.3	27.3
Private transfers(net)	5.9	15.8	26.5	25	18.3	18.1	11
Credit	23.9	15.8	28.9	48.8	33.7	29.7	27.3
Debit	18	0	2.4	23.8	15.4	11.6	16.3
<b>Current account balance (excl.official transfers)</b>	<b>-223.4</b>	<b>-249.5</b>	<b>-273.5</b>	<b>-319.4</b>	<b>-298.5</b>	<b>-238.7</b>	<b>-254.1</b>

Source: Rwanda Development Indicators, 2001, MINECOFIN

In the past 5 years the country has made persistent efforts to promote trade competitiveness through macro-economic reforms (**Table 1.2**) aimed at opening up the economy, increasing efficiency and promoting private entrepreneurship. Liberalization of the exchange rate regime has made the country more competitive by reducing the price of its exports.

As a result the country has made positive developments in its trade balance position, reducing the deficit to an estimated 129 million US\$.

### 3. Overview of the sweetpotato sub-sector

#### 3.1 Importance of the sub-sector to earnings, rural livelihoods, poverty alleviation and economic growth

Sweetpotato plays a crucial role in the country's production system offering potential benefits to poor farm households and urban consumers. Sweet potato is grown throughout the country and is a major staple food crop in the densely populated mid-elevation and highland regions. Sweet potato comes second to banana in terms of production and is among the five most important food crops produced on an annual basis.

Sweetpotato is an important crop in terms of food security, assisting to reduce hunger periods in years when other crops fail or in specific seasons before the main harvest. It is a flexible source of food as it can be grown on soils of limited fertility and is relatively drought tolerant. Also, planting and harvest periods are more flexible than those of maize and other grains. Sweet potato has become even more important where production of other food staples like banana and cassava is hindered by disease.

Sweetpotato is prized as a fresh nutritious product, contributing to improved nutrition, through provision of vitamin A and other micronutrients and energy. It is also an important source of calories (152 MJ/ha per day of edible energy). Sweet potato produces more edible energy per hectare per day than any other major food crop (**Appendix 1**). It is consumed by all age-groups and is particularly liked by young children, the most vulnerable to the vitamin A deficiency. In addition, sweetpotato provides ascorbic acid (17 mg/10g of edible portion of food) and contains important amino acid lysine, which is deficient in common foods such as rice.

Data in **Appendix 2** summarizes the economic importance and shows the national mean yield estimates of major crops during the six seasons of 1989-1991. All yields are expressed per six-month seasons so as to have cross-crop comparability. This data shows that sweet potato was third in providing household income. Sweetpotato provides both on-farm and off-farm employment to the youths and women. It is also a flexible source of income to poor households as production for the market is by small, diversified farmers. Sweetpotato is sold by small-scale farmers and frequently in small quantities in local markets.

Although at the moment there is a noticeable lack of processing, sweetpotato offers value addition benefits through processing opportunities into several products for human, animal and industrial use. There is significant potential for new uses of sweetpotato flour as an ingredient in the production of a large number of products (*mandazi*, cakes, *kabalagala*, *chapati* etc), which are usually made from imported wheat. It thus offers import substitution opportunities and foreign exchange savings.

The crop therefore offers both forward and backward linkages in the economy through processing. This provides raw materials for use by other industries while at the same time providing a market for processing equipment. It is thus important in the development of agro-processing, rural industrialization and employment creation.

Sweetpotato is usually cultivated without fertilizer or pesticide. It provides good ground cover and plays an important role in the natural resource management through soil conservation.

### **3.2 Principle production and marketing constraints limiting the sub-sector export expansion**

Sweetpotato production is faced with several production and marketing constraints, which are limiting its benefits to producers and consumers alike.

There is lack of a sustainable system of multiplication and distribution. Consequently this has led to less spread of improved planting material amongst the rural farming communities.

Pests and diseases are still a constraint. There is lack of new varieties, which are tolerant to pests and diseases.

Agronomic practices are still inadequate thereby contributing to low yields. There is poor crop-husbandry, harvesting and post-harvest technology.

Roots are highly perishable while in-ground storage is limited. There are limited methods of processing and utilization. Knowledge of commodity-specific processing techniques, products, and equipment is less spread.

There is the problem of low market prices and hence low income. Farmers are risk-averse and will not produce a more commercial potato without a guaranteed market. Most peasant farmers are very poor, always in need of cash, and have weak market power.

Also, sweetpotato is not accorded high priority by the Ministry of Agriculture implying reduced investment compared to other crops. On the other hand, farmers generally lack the financial capacity to invest in inputs; innovation in Rwandan agriculture is traditionally introduced by development projects and requires seasonal credit

There is still lack of clearly differentiated market segments for quality potatoes of commercial varieties. And consumers are not used to grading. There is lack of sweet export varieties in the country.

Farmers typically grow a mixture of varieties with the sector still largely being farmer-driven from a food-security perspective and not consumer-driven with commercial perspective.

## 4. Demand analysis

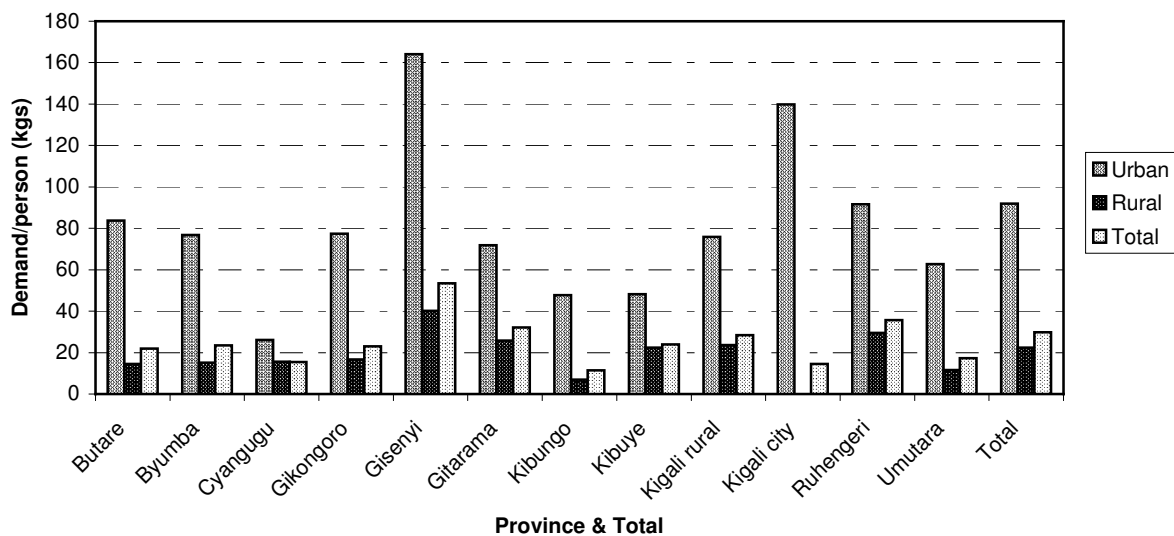
### 4.1 Current demand

Sweetpotato is a major crop in the household food basket in Rwanda. The crop provides high energy (216 MJ/ha per day) and protein (1.4 kg/ha per day), making it an attractive source of food and improved nutrition. Consumption of the fresh roots is estimated at about 130 kg per person per year (2000), which is higher than the estimated per capita consumption in Africa (9 kilograms (FAO)). Similarly, consumption exceeds annual national averages in centers of peak production and at times of the year when the seasonal supply of traditional staples is depleted. Sweetpotato is consumed fresh after boiling and is also used as a snack

This survey made a serious effort to estimate market size and growth using both data from the household expenditure survey and results of the market study across the production zones of Rwanda. The household survey targeted both urban households during the period October 1999 to 2000 while rural surveys covered the period July 2000 to July 2001. These figures indicate the volume traded or consumed through purchases (demanded). They therefore exclude subsistence output and are thus a good indication of the market size.

Per capita demand for potatoes is estimated to be about 30 kg. This national figure however, masks differences in the quantity bought per person within the country. Generally, the quantity purchased per person is much higher in urban areas than rural areas.

**Figure 1.2: Per capita demand (kgs) by province, rural, urban and total – 2000**



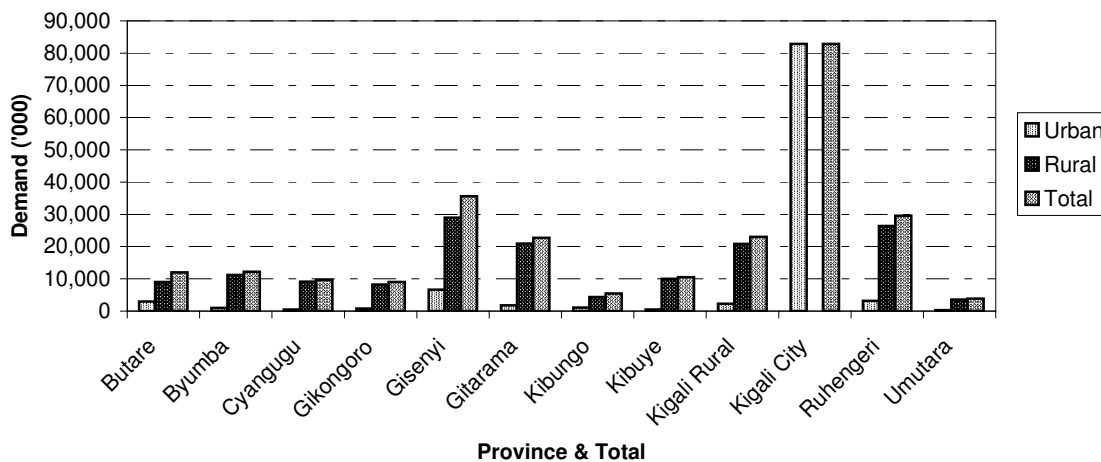
Source: Survey Calculations

The quantity bought per person ranges from about 90 kg in urban areas to about 22 kg in rural areas.

As can be seen in **Figure 1.2** above Gisenyi, Kigali City and Ruhengeri show the highest urban per capita demand of about 160 kg, 140 kg and 90 kg respectively. Within the rural areas, Gisenyi has the highest per capita demand of about 40 kgs per year. It is followed by Ruhengeri, which has about 30 kgs per person while both Kigali Rural and Kibuye have a demand level of about 20 kgs per person per year. Such differences reflect differences in the economic growth and the production potential across the country.

The current survey estimates total demand to be in the order of 240,000 tonnes annually (**Figure 1.3**). Given the demographic structure of the country, rural areas account for about 160,000 tonnes. This represents about 70 % of total demand in 2000.

**Figure 1.3: Demand ('000) by province, rural, urban and total in Rwanda, 2000**



Source: Own calculations using data from HLCS 2000

Kigali City accounts for the highest demand estimated at about 80,000 tonnes. It is followed by Gisenyi (40,000 tonnes), Ruhengeri (30,000 tonnes) and Kigali Rural (20,000 tonnes).

Quantity marketed has been increasing, implying potato markets are assuming greater importance in terms of food security and household incomes. According to an earlier survey by the DS/MINAGRI (1990), per capita demand in rural areas was about 8 kgs per person. This survey estimated this figure to have increased to about 20kgs per person, representing an increase of about 150 %. This translates into an increase in total demand of slightly over 100,000 tonnes, with demand increasing from about 48,000 tonnes in 1990 to about 160,000 tonnes in 2000.

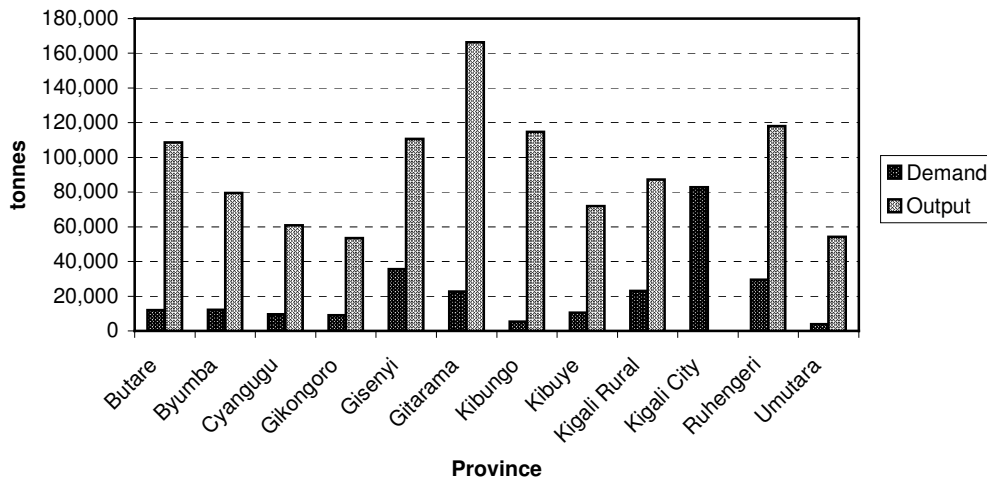
Increased demand has generally been due to population increase. However related to this phenomenon is the increase in the number of returnees who came from areas where potato is a major staple food.

On the other hand too, this increase in demand could be explained by the substitution effect. This substitution of bread for sweet potato is taking place mainly within low or middle-income households, an indication that the relative prices between the two factors and the income constraint are the major determinants of this trend. Sweetpotato is a cheaper substitute and hence more attracting to urban populations as poverty levels remain high.

According to field data interviews with traders, consumption of sweetpotato varies with more sales being realized during the dry season while quantities consumed show a decline in the wet season. The implication of this is that sweetpotato is significant in terms of food security. It is used as a substitute in times of scarcity of other staples.

The total quantity of sweetpotatos marketed is less than internal supply, making Rwanda self-sufficient in the consumption of the product (**Figure 1.4**). The estimated overall quantity of potatoes marketed in Rwanda is in the order of 230,000 tonnes per annum. Given an estimated production of about 1,000,000 tonnes, it implies that about 30 % of internal production is being marketed at the moment, leaving a big subsistence sector.

**Figure 1.4: Demand and output of potato by province, 2000 - Rwanda**



Source: Own calculations using data from HLCS 2000

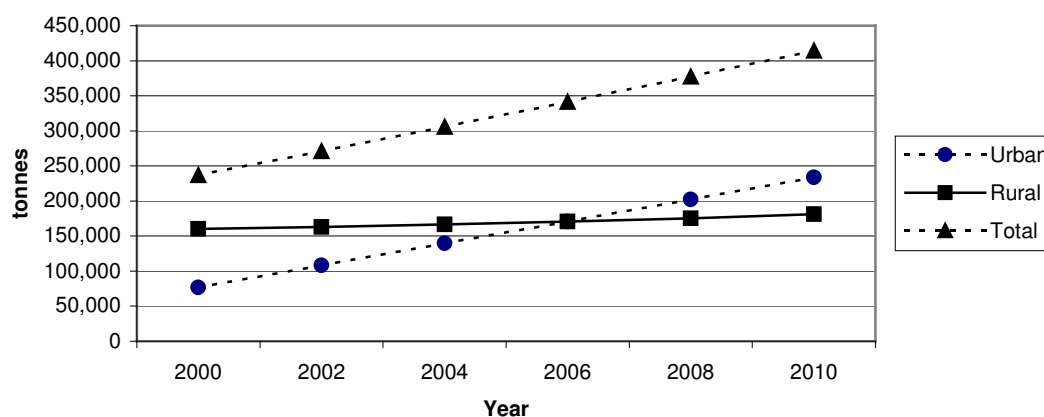
### 4.3 Future demand

Domestic demand for potato is largely driven by the evolution of traditional market for human consumption. The demand for potato is expected to continue growing as total population, urbanisation and disposable incomes increase (**Figure 1.5**). Over half the developing world's population will reside in cities by the year 2025 (Bongarts 1995). For Rwanda urban population is expected to reach 30% by the year 2020 up from the current level of about 10% of total population. Mushrooming urban areas, particularly in Sub-Saharan Africa, mean that more and more consumers will depend on agricultural markets for their daily food requirements rather than on food from their farms.

Also, the importance of sweetpotato is likely to increase in the future given the efforts of regional research networks/programs, desire for rural incomes and the search for value addition to Africa's primary products.

As already explained, this market is expected to grow at about the same rate as population, given the small income elasticity. The table below gives some projections based on current population and urbanisation growth rates. Urbanisation is a major contributory factor to market demand. The demand in urban areas is expected to grow at a much faster rate than that for rural areas. About the period 2006, total quantity purchased in urban areas is expected to equal that bought in rural areas.

**Figure 1.5: Demand growth by rural, urban and total 2000-2015 (tonnes)**



*Source: Own calculations from HLCS, 2000 data*

In 2010 an estimated 400,000 tonnes will be purchased. Of this figure urban demand will account for about 56%

#### 4.4 Demand for quality

Several varieties are being produced and marketed. These include, Rukubinkoko, Mageresa (Seruna), Ruhacoka (which is white), Rusitaza, Kyebandure, Ntuntumura, Nyiragukari, Nyiragiteke, Murigande (Tura), Kamamanzi, Bigambo.

Serura is the most preferred variety although it is in short supply. However, there is no price differential between these varieties. Magande is the next preferred variety. Big tubers are preferred though other traders mentioned medium sized tubers. The shelf-life is 2-3 days.

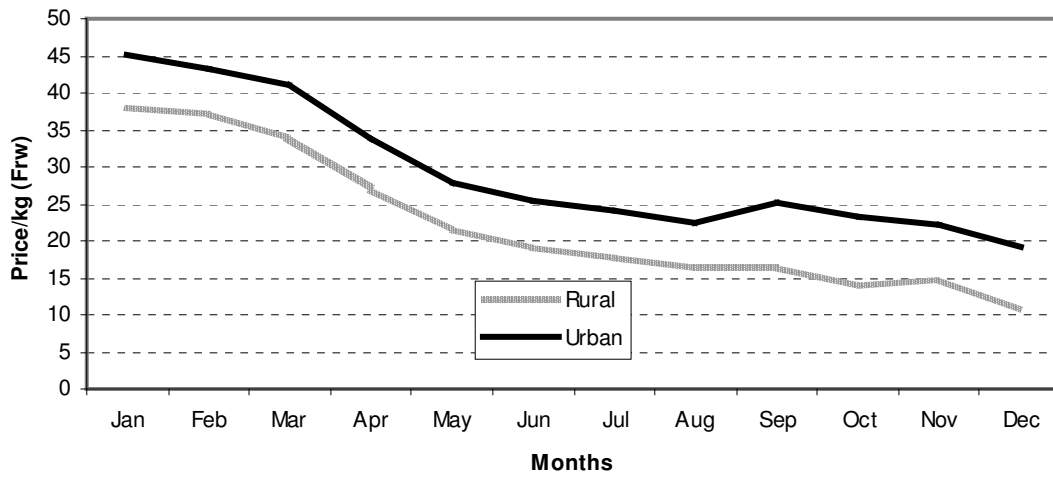
It has also been found out that consumers prefer sweet varieties with high dry matter content and low fiber content. This indicates that consumers buy sweet potato mainly for fresh produce consumption.

Also, sweet potato is mainly consumed fresh and storage is underground. There is lack of any unique recipes and also lack of processing.

#### 4.5 Price

During the rainy season the buying price is about 4 or 5 frw, while in the dry season it increases to about 10 frw. The selling price is about 10-15 frw/kg in rainy season while in the dry season it increases to about 20-25 frw/kg. **Figure 1.6** below shows annual price movements.

**Figure 1.6: Urban and rural consumer price trend 2001**



*Source: Pasar data*

## 5. Supply Analysis

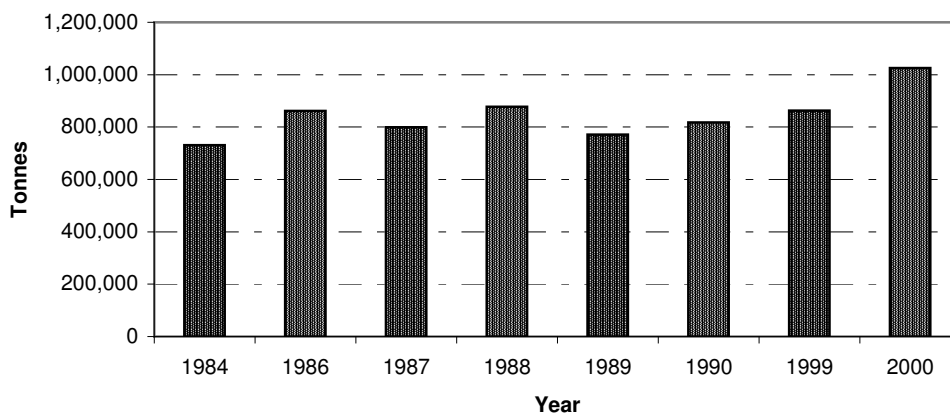
### 5.1 Production

Sweetpotato is ideally suited to African agriculture in several respects. It requires no heavy doses of chemical inputs. Planting material can easily be rapidly reproduced locally and cultural management practices are basic. The crop is particularly suited to the land-scarce farm households at higher elevations and it provides high yields in a short growing season (90- 120) days. These factors, combined with a mushrooming demand for food, particularly in densely populated rural areas, have provided a strong impetus for the increase in production and area planted.

Thus, progressively sweetpotato has become an important food and cash crop for a large number of households. Over the last decade, the country has experienced a very rapid increase in the production of sweetpotato.

According to data from DS/MINAGRI total production was estimated at about 1,000,000 tonnes in 2000, making Rwanda one of the biggest producers in East and Southern Africa. This shows an increase of about 200,000 tonnes over the period 1990-2000 from a figure of about 800,000 tonnes in 1990 (**Figure 2.1**). This represents an increase of about 25 % over the period this period.

**Figure 2.1: Production trends 1984 - 2000**



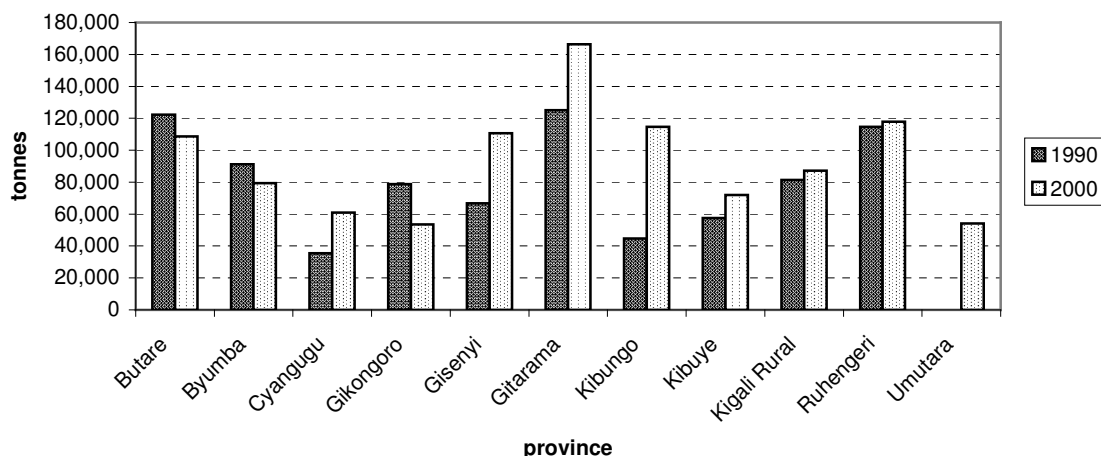
*Source: MINAGRI, FAO data*

Efforts by PRAPACE, in collaboration with the country's research system (ISAR) and the Government of Rwanda plus other collaborators in promoting this crop has contributed significantly to this positive change.

Furthermore, the majority of smallholder farmers are facing a number of constraints in managing the declining soil fertility. On the other hand, there is low inorganic fertiliser application generally due to the fact that the majority of farmers are cash constrained and hardly have access to any formal credit facility. All this therefore has favoured the increased production of sweetpotato, which does not require a lot of external inputs such as inorganic fertilisers.

**Figure 2.2** below shows the production by province. Gitarama stands out as the major producer contributing about 170,000 tonnes per annum. Other major producers include the provinces of Gisenyi and Ruhengeri. Gitarama is also the main supplier of the major urban market of Kigali City.

**Figure 2.2: Production of sweetpotato ('000) by province and total – 1990, 2000**

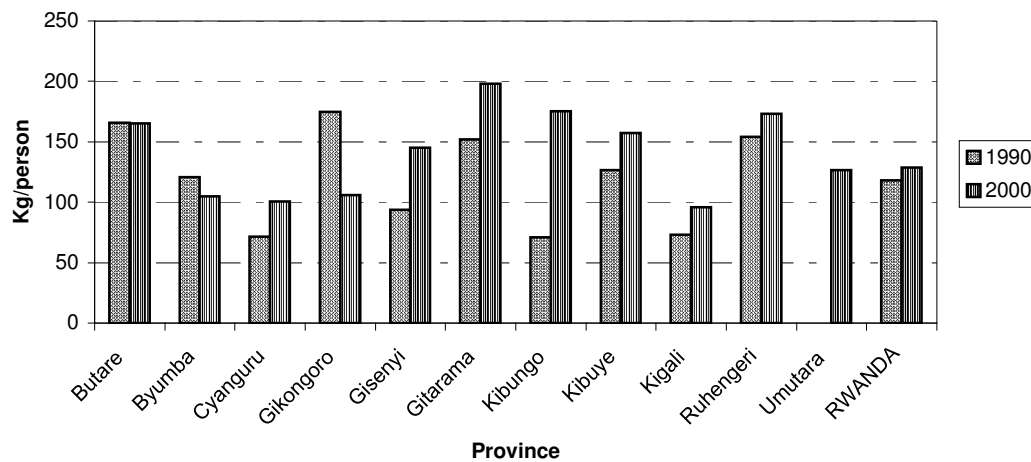


Source: MINAGRI

On average, production has been growing at a rate of around 2.5% per year over the period 1990-2000. Per capita production has correspondingly increased from about 120 kg per person in 1990 to about 130 kg per person (2000). This is in marked contrast to other staples like beans and maize whose per capita production shows a remarkable decline.

Gitarama province shows the highest per capita production amounting to about 200 kg per person per year (2000). It is followed by Ruhengeri province with a figure of about 170 kg per person per year.

**Figure 2.3: Per capita production by province and total 1990 and 2000**

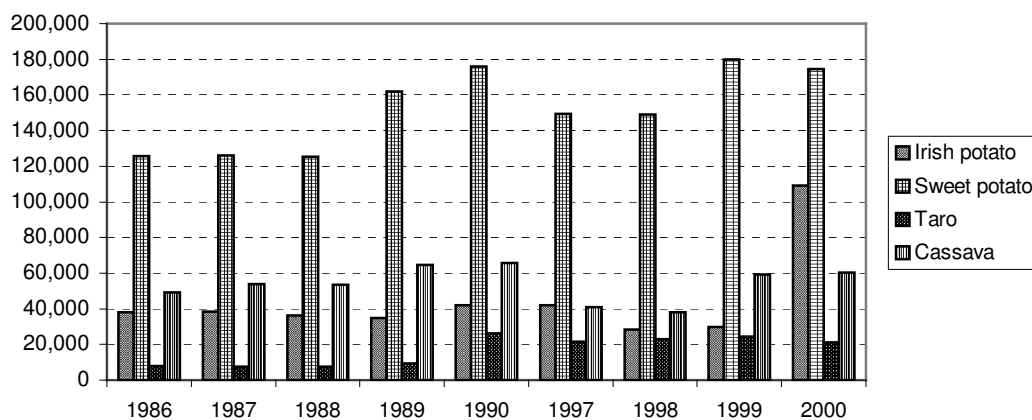


Source: MINAGRI Data

As pointed out earlier in this report, sweetpotato occupies the largest area allocated to root crops in the country, reflecting its importance in the rural production system. In 2000 the area planted to sweetpotato stood at about 40% compared to about 30% for irish potato, which comes second.

This figure was much higher in 1986, standing at about 60% to the total area devoted to roots and tubers. However, although this implies a decline in the percentage of land occupied by sweet potato, there have been substantial increases in land allocated to the crop of about 40%. While the area planted to sweetpotato stood at about 125,000 ha in 1986, this figure increased to about 170,000 ha in 2000.

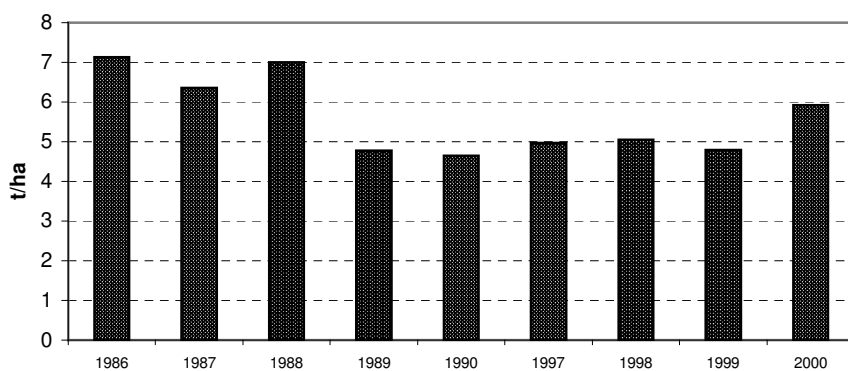
**Figure 2.4: Hectareage planted to the major root crops over time**



Source: MINAGRI Data

Available data from DS/MINAGRI indicates that the yield for sweetpotato has generally declined over the long term by about 17% (Table 2.5). This decline in yield could be attributed to poor husbandry practices.

**Figure 2.5: Yield trends in sweetpotato production, Rwanda**



Source: MIAGRI Data

According to this study there has been a significant increase in production in all the provinces and the crop is increasingly becoming important in terms of food security. This expansion in both production and supply on the market has mainly been demand driven and this demand is for the fresh market as no processing was found out.

Also, drought and problems in soil fertility management have affected other crops more than sweetpotato. This has forced farmers to increasingly substitute sweetpotato for these crops as a way of achieving food security.

### **5.3 Principle production constraints**

#### **5.3.1 Agronomic**

There is limited use of manure or mulches due to limited number of livestock and the poor resource base for most of the farmers. This has contributed to a decline in the soil fertility and the natural resource base and hence low yields. Also, declining soil fertility levels has resulted from continuous cultivation, without fallowing or crop rotation due to demographic pressure. This has further depleted soil fertility.

#### **5.3.2 Disease and pests**

Weevils and viruses are a challenge, contributing to low productivity. These include stem blight and other diseases that attack its roots. Sweetpotato weevils ((*Cyclas* spp)) are a major insect pest especially during the dry season and in dry areas. These cause severe damage to storage roots in the ground.

#### **5.3.4 Inputs (fertilizer, pesticides)**

In general application of inputs is minimal and the hoe is the main equipment used for tillage. Use of fertilizer and chemical spray is minimal while pesticides are used only on higher value crops such as irish potatoes with. Its use on sweetpotato is minimal.

Rwanda imports about 7,000 tonnes of fertilizer. This is one of the lowest in the world. Recent policy changes to stimulate higher fertilizer imports and usage have been to give all fertilizers a zero import tax rating. Development of this sector depends on progress in sales via the output markets and whether donors continue to dump free or highly subsidized fertilizer on the market.

There is lack of policy for the production and supply of planting material. Also, good quality planting material of improved varieties and timely availability are lacking.

#### **5.3.5 Finance / credit**

Access to credit is limited. Few institutions are willing to lend to small holders as they do not have collateral and farming is viewed as a long-term high-risk activity.

### **5.3.6 Technical skills of labour force**

Generally, labor is unskilled. Production is mostly carried using family labor. Lack of capital implies that labor does not require high skills to carry out most of the farm operations.

## **6. Trading**

Potato trading is dynamic and displays a very characteristic flow of the product from the farm to markets. This marketing organization traverses the entire country. The major agents include the farmers, traveling traders/wholesalers, retailers and consumers. In some cases, there is vertical integration. This is aimed at maximizing returns with retailers taking on the role of traveling traders. The marketing chain linked producers to consumers is presented in **Figure 4.1**

### **6.1 Description of marketing chain**

There are two main marketing channels for sweetpotato existing within the marketing structure prevailing in the country. One covers the rural markets, which occur once or twice a week in a given area. The other channel serves mainly the major urban markets, which are daily. These involve longer distances connecting the farms to urban consumers.

Major supply areas include Gitarama, Kibungo-Bugesera with traders buying directly from producers. Others are Rukoma and Rukoba in Kamonyi district

During the wet season/harvest time, farmers take the produce to urban markets but in the dry season or times of scarcity traders go out to look for the product in areas of Nyamata, Gashona and Mwogo.

#### **6.1.1 Farmers**

These are the first link in the marketing chain. They are both producers and consumers. They sell as and when they need cash and also store for food security. Transactions are either carried out on the farms (households) or at market. At market farmers transact with consumers, as they take on the added function of transporting produce to market. They usually sell smaller quantities and enjoy little bargaining power, as they need cash. Farmers who live near the main road, have better market information though they too mainly rely on “socio-networks”

Farmers generally have limited market power. They lack credit and often sell when they need cash and their bargaining position is weak. They typically sell smaller amounts as individuals and are essentially price takers.

Farmers at times act as retailers, harvesting crop, transporting it and selling it in the local markets.

### **6.1.2 Traveling traders**

These procure the fresh product usually directly from farmers and supply it on the fresh market in urban areas. It was found out that most of these also act as retailers, selling from open markets in the major urban centers.

Within producing areas traveling traders purchase sweet potato from farmers and there after organize transport to major urban centers. They provide growers with direct payment in cash.

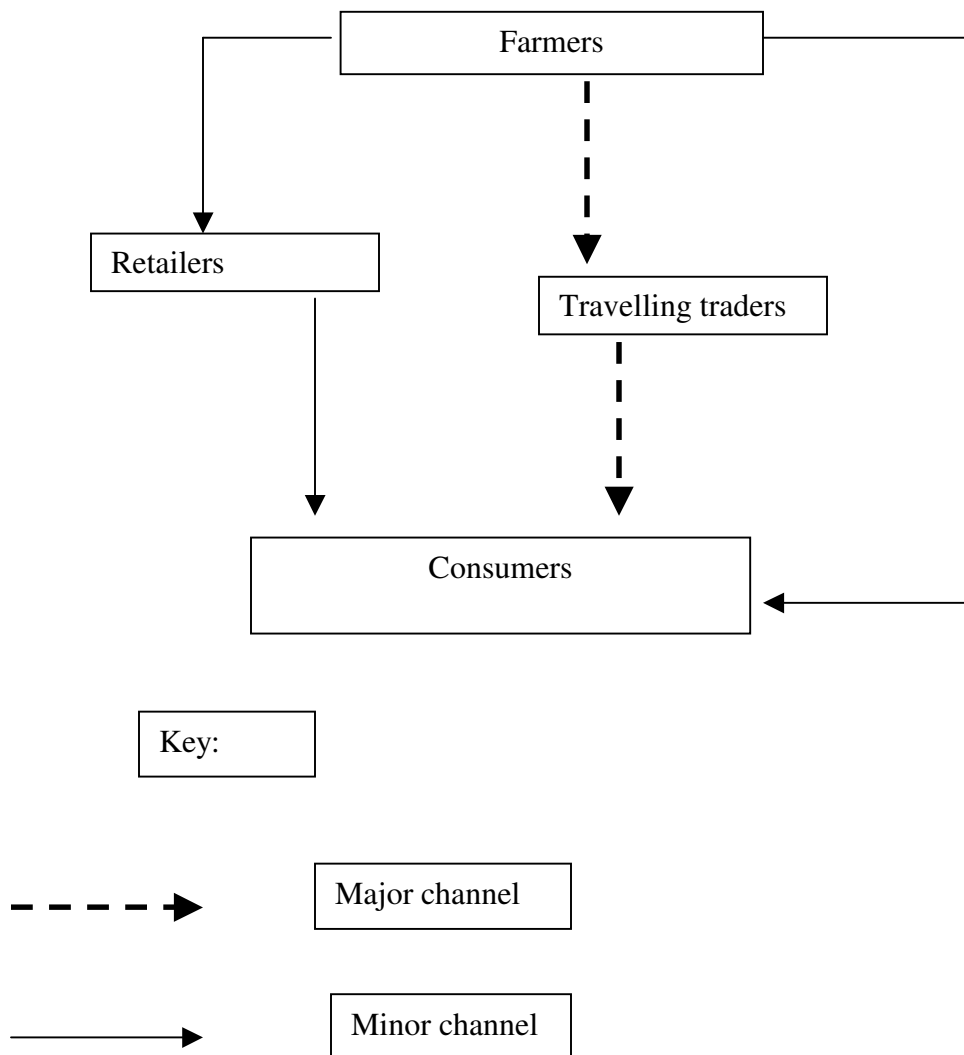
Transport is a major constraint and traders try to minimize this cost by increasing the weight of the bag. As bags are not weighed during transportation, traders tend to reduce costs by moving largest sized bags of more than 100 kgs. Consequently this cost is passed on to the transporter in form high rates of vehicle depreciation and maintainance.

### **6.1.3 Retail markets**

Distribution in urban areas is through retailing which is mostly carried out in open places. These retailers often buy sweet potato from either producers or wholesalers. They resell in the various urban markets, on the road-sides or in enclosed market places in small volumes. Most of these retailers are women or young men and lack big capital

One of the major activities of retailers is breaking bulk and selling smaller quantities to consumers. However, they also sell in bulk as and when is necessary depending on the needs of their customers.

**Figure 2.6: The Sweet potato trading Chain**



## 6.2 Marketing margins

**Table 1.4** was constructed using data collected during fieldwork. The margins are averages, giving a rough indication of the relative importance of the different cost components of marketing functions.

It was quite difficult to obtain thorough data on market margins as they touch on the incomes of the traders who may not wish to divulge more accurate data. However, an attempt was made to try and obtain realistic estimates.

**Table 1.4: Costs and margins within the trading chain**

Marketing agent	Frw/kg	US\$/tonne	% of selling price
<hr/> <i>Farmer</i>			
Sells	20	40.4	
<hr/> <i>Travelling trader/retailer</i>			
Buys	20	40.4	
Sells	45	90.9	
Gross margin	25	50.5	55.6
Costs			
Loading	2	4.0	
Unloading	2	4.0	
Transport	6.6	13.3	
Parking fee	0.53	1.1	
Taxes	0.27	0.5	
Net margin	13.6	27.5	30.2

*Source: Field data*

Margins change according to season, with farm gate prices increasing towards harvest time/dry season. Apart from seasonal fluctuations, margins are also affected by short-term fluctuations in trading activities in terms of supply, depending on the quantities coming on the market.

Although data in the table reveals that travelling traders enjoy a large net margin of 30%, profitability is smaller, once their fixed costs have been deducted. In addition, their net returns should be put in the context of the high risk they face, especially in terms of uncertain market

prices and perishability. According to the travelling traders, market prices are highly volatile and may change on a daily basis.

## **7. Institutional and market barriers**

### **7.1 Marketing barriers**

The potato is a substantial, perishable product of low intrinsic cost and high transport expense, which limits its commercialization and export possibilities.

Marketing barriers mentioned by traders include the various trading taxes being charged. Most of the traders felt these are high compared to their level of trading. The other problems that traders mentioned are lack of information and high transport charges.

#### **7.1.1 Finance**

This is still a major problem in the production and marketing of sweetpotato in Rwanda. Production is financed by the small-scale producers who are mostly resource constrained. Also, marketing is carried out by small traders who lack the necessary finance to carry out more efficient larger scale operations, that could enable them reduce the unit cost per output.

#### **7.1.2 Price information**

Price information is done through traders. There is a project that is collecting market prices but this is not disseminated to traders. Also, farmers do not receive market information and hence do not take advantage of market premiums.

Although there is a project collecting marketing information in terms of prices (PASAR), there is no formal supply of market information to traders. Hence marketing agents usually rely on “social networks” i.e. friends, relatives and fellow businessmen as the major source of market apart from personal observations.

#### **7.1.3 Poor quality control measures**

Quality control measures are still weak and this problem is exacerbated by the small amounts that farmers bring on the market. Methods for post harvest handling are still largely traditional and labor intensive.

#### **7.1.4 Grading**

Grading is minimal. Farmers grow different varieties mainly for food security reasons. However, differentiated market classes are slowly emerging in the urban areas and there is need

for farmers to take advantage of these as well. This development is viewed as an important process in improving the marketing of sweetpotatos.

### **7.1.5 Infrastructure**

Sweetpotato is a perishable commodity and hence the state of infrastructure has a major bearing on the performance of their markets. Production is on many millions of scattered small-holdings most of which have limited access to roads, communications and storage facilities. Also, many farms are far from markets. Consequently the costs of marketing the produce from rural areas to urban consumers are relatively high compared with areas that enjoy easy access to roads and stores.

Within the rural communities distances are covered on foot or by bicycle. As such volumes transported to these rural markets are usually small while a lot of time is taken trying to get the produce to the market.

## **7.2 Institutional and policy constraints**

### **7.2.1 Private sector organization / institutional set-up along the production / marketing chain**

While the private sector is increasingly becoming the main driving force behind sub-sector growth in terms of market provision and production, there is no strong linkage between the private associations, Government and research networks to address the socio-economic constraints at the along the production/marketing chain. Developing private sector associations may therefore be one way to start a process of developing partnerships between the private and public sectors through a body that can represent the needs of the trades and negotiate with the public offices of research and government. Also, there is poor linkage between research and extension and private sector

### **7.2.2 Government barriers**

Barriers from the government are mainly in form of the tax regime from different levels of government and the indirect macro-economic impacts like poor infrastructure and the high costs of transport. There is lack of policy for the production and supply of planting material to farmers.

### **7.2.3 Trade barriers**

There has been lack of deeper market studies to identify constraints and opportunities for market led growth. Also, there is lack of organized groups that can carry out marketing functions more efficiently and institutions to link such groups to available and new markets.

## **8. The way forward: Production and export growth strategies for the sub-sector**

Development programs should focus on identifying marketing opportunities, in addition to addressing the traditional production constraints. Farmers are interested not only in high yields but also in high incomes. Hence varietal development should aim to meet market trends

### **8.1 Priority requirements (changes in production, processing and quality control and enhancement, product differentiation, technology and investment.**

Introducing various value recipes especially through value addition can assist in the commercialization of sweetpotato. A broad range of processed products are available and only need to be introduced to the private sector partners and Research and Development partners in the country. Such products include flour, feed, starch and other value-added snack foods.

Agronomy practices are still poor and hence there is a pertinent need to increase the adoption rate of improved technology for increased yields to meet the need of a rapidly increasing population against a background of reducing farm sizes. Extension services need to be strengthened in this regard.

More policy and market studies should be undertaken to address the low rate of utilization through product development and processing techniques. Also, new structures of production should be devised to enable small-scattered resource constrained rural producers benefit from economies of scale.

### **8.2 Priority Government Intervention to support the production and export development strategy**

Areas where government assistance will have greatest impact on production and growth from this sub-sector include the following:

#### **8.2.1 Infrastructure development**

Appraisal and investment in mainly feeder but also a few main roads is vital in lowering transport costs and ensure that sweetpotato, which is perishable, gets to the consumer especially in times of rain when roads become impassable. The high cost of transport is one of the major factors causing high market prices.

Increasing population pressure, which is leading to the opening up new areas with poorer access further points to the need for opening up these feeder roads.

### **8.2.2 Improved planting material / product improvement**

Population increases and the resultant reduction in cropland have in recent times partly been responsible for the ever-widening disparity between food production and demand. This therefore makes investments in high yielding planting material one of the best options to combat the poor yields.

A lot of progress has been made in this direction but what is still pertinent is to increase the adoption rate of these improved technologies.

ISAR and PRAPACE have been successful in developing several improved varieties. These varieties need to be selected by farmer groups through extension providers.

Planting material of the most promising variety needs to be bulked and supplied to recognized farmers associations through a system that is sustainable. This task may be initiated by public service providers but should rapidly shift into the private sector. Support schemes should aim to build private sector capacity in this area rather than building capacity in free distribution schemes through NGOs. Under the current circumstances in Rwanda, i.e. of many millions of very poor farmers the transition from a system of free distribution to a financially based system will not be simple. However to avoid this will continue to undermine the process of market reform.

### **8.2.3 Processing efficiency**

The survey found virtually no processing to produce value added products. The main reason for this is lack of a market for processed products at the moment and or poor information dissemination. Also, there is need to create structures for processing at farm level and the necessary investments. Of great significance is the need to conduct an economic feasibility study for such ventures in Rwanda.

### **8.2.4 Market information**

Market information is vital for increased production and investments in the sub-sector. At the moment price information is being collected but its use by the traders and other stakeholders needs to be improved. Also, there is no information about niche markets, their requirements and penetration. There is thus need to collect and provide this vital information to the users.

### **8.2.5 Attracting investment and technology**

Technology adoption is poor. Virtually all operations rely heavily on labor whose output is not only low but also of a poor quality and untimely. Attracting technology both for production and processing is vital to increase utilization and stimulate demand. Also, improved technology will lower the costs per unit of output and hence increase the level of investments. However, there is need to avail credit to rural producers in order to increase the adoption rate of technologies.

### **8.3 Areas where donor assistance might be best applied.**

Although there are biological constraints where donor assistance has helped a lot, there are other major constraints to increased production and commercialization of sweetpotato in Rwanda. Socio-economic factors also affect farmer adoption of new technologies and distribution of planting material. Also, poor marketing and lack of market requirements may also restrict the commercialization of the crop.

The development and use of new technology is limited by the degree of organization, resources, and the number of trained personnel within national programs. Donor countries could play a great role in assisting national governments/programs to address some of these issues.

Networks have proved to be most efficient in introducing new technologies. They include international organizations, national research institutions, state and private universities, ministries of agriculture, and nongovernmental organizations. However, donor communities need to bigger role to assist national research systems with setting up systems that will improve the distribution and adoption of technologies. The small-scale farmer's main cost and biggest problem is accessing and using improved planting materials. Network members have supported small holders by supplying improved planting material. But there is an urgent need to develop strategies for its production, distribution and adoption as still many farmers rely on poor planting material.

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## Appendices

**Appendix 1: Characteristics of main crops (National Average)**

Crop	Caloric cost (Frw/1000 kcal)	Yield per hectare per season				Index of crop cover (c-value) (%)	Sales price (Frw/kg)
		Weight (kg)	Value ('000 Frw)	Energy (mill.kcal)	Protein (kg)		
Beans	13	838	29	2.50	164	19	31
Peas	19	272	16	.90	56	15	62
Sorghum	9	1016	23	3.10	73	40	19
Maize	9	1010	23	3.30	86	35	19
Sweet Potato	9	4527	40	4.20	65	23	8
Cassava	7	2185	17	2.20	11	26	9
White potato	26	6102	78	3.50	73	22	10
Taro	15	1580	20	1.30	22	35	12
Cooking banana	10	6788	51	5.40	48	4	7
Beer banana	6	6788	31	5.40	48	4	4
Banana beer	41	6788	47	1.30	9	4	27
Coffee	n.a.	256	21	n.a	n.a.	2	83

Note: Mean banana yield used for all bananas

Source: yields: 1989-1991 means computed from DSA/MINAGRI farm survey data

C-values: Lewis (1986) ; Prices: 1990 means computed from DSA/MINAGRI data

**Appendix 2: Average Kcalories per capita per day for 1984, 1986-1990 by province and total, Rwanda**

Province	BanaC	BanaB	BanaF	Bean	Sorghum	maize	Sweet P	Cass	Irish P	Peas	TOTAL	+SEASON C
Butare	97	151	44	332	267	42	549	264	13	12	1772	1985
Byumba	241	143	80	422	403	101	419	62	25	27	1923	2153
Cyagungu	218	128	72	178	20	147	229	153	11	13	1170	1310
Gikongoro	26	66	15	159	142	102	700	102	16	33	1359	1523
Gisenyi	66	128	21	207	24	345	284	53	130	22	1279	1432
Gitarama	149	201	90	310	165	46	379	309	14	13	1675	1876
Kibungo	984	274	150	394	232	55	204	129	8	15	2443	2736
Kibuye	61	70	19	210	84	606	483	76	56	59	1723	1930
Kigali	221	186	61	377	318	66	243	222	9	8	1712	1917
Ruhengeri	121	100	40	306	143	251	469	26	279	27	1762	1973
<b>Rwanda</b>	<b>221</b>	<b>153</b>	<b>62</b>	<b>306</b>	<b>198</b>	<b>156</b>	<b>381</b>	<b>150</b>	<b>57</b>	<b>21</b>	<b>1703</b>	<b>1908</b>

Source: *Joint Crop Assessment Report/MSU/MINAGRI*

Key: BanaC = Cooking banana; BanaB = Brewing banana; BanaF = Banana fruit; Cass = Cassava  
Irish P = Irish potato; Sweet P = Sweet potato

**Appendix 3: Per capita demand (kgs) by rural, urban and total -2000**

<b>Province</b>	<b>Urban</b>	<b>Rural</b>	<b>Total</b>
Butare	83.8	14.6	21.9
Byumba	76.8	15.1	23.5
Cyangugu	26.1	15.6	15.4
Gikongoro	77.4	16.7	23.0
Gisenyi	164.1	40.1	53.4
Gitarama	71.8	25.8	32.1
Kibungo	47.8	6.9	11.5
Kibuye	48.2	22.4	24.0
Kigali rural	75.9	23.7	28.4
Kigali city	139.8		14.6
Ruhengeri	91.6	29.5	35.7
Umutara	62.8	11.6	17.3
<b>Total</b>	<b>92.0</b>	<b>22.4</b>	<b>29.8</b>

*Source: Survey Calculations*

**Appendix 4: Demand (tonnes) by rural, urban and total in Rwanda and estimated volume traded, 2000**

<b>Province</b>	<b>Urban</b>	<b>Rural</b>	<b>Total</b>	<b>Output</b>	<b>% traded</b>
Butare	2,951	9,060	12,011	108,710	11.0
Byumba	962	11,241	12,203	79,443	15.4
Cyangugu	476	9,128	9,605	60,900	15.8
Gikongoro	796	8,278	9,073	53,550	16.9
Gisenyi	6,647	28,943	35,591	110,600	32.2
Gitarama	1,792	20,960	22,752	166,310	13.7
Kibungo	1,071	4,357	5,428	114,750	4.7
Kibuye	480	10,007	10,488	72,000	14.6
Kigali Rural	2,255	20,796	23,051	87,200	26.4
Kigali City	82,824		82,824		
Ruhengeri	3,130	26,409	29,538	117,960	25.0
Umutara	300	3,580	3,881	54,150	7.2
<b>Total</b>	<b>76,830</b>	<b>159,786</b>	<b>236,616</b>	<b>1,025,573</b>	<b>23.1</b>

*Source: Own calculations using data from HLCS 2000*

**Appendix 5: Demand growth by rural, urban and total 2000-2015 (tonnes)**

<b>Year</b>	<b>Urban</b>	<b>Rural</b>	<b>Total</b>
2000	76,845	160,040	236,885
2002	108,174	162,930	271,104
2004	139,503	166,439	305,942
2006	170,832	170,603	341,436
2008	202,162	175,461	377,623
2010	233,491	181,054	414,544

*Source: Own calculations from HLCS, 2000 data*

**Appendix 6: Production of sweetpotato by province and total ('000)**

<b>Year/ Season</b>	<b>Butare</b>	<b>Byumba</b>	<b>Cyangugu</b>	<b>Gikongoro</b>	<b>Gisenyi</b>	<b>Gitarama</b>	<b>Kibungo</b>	<b>Kibuye</b>	<b>Kigali Rural</b>	<b>Ruhengeri</b>	<b>Umutara</b>	<b>Total</b>
1984	115,173	97,453	22,426	92,249	55,090	87,301	31,184	79,375	82,748	67,927		730,926
1986	152,322	89,220	37,209	103,847	62,073	98,612	52,567	67,523	91,017	107,481		861,871
1987	126,604	82,310	33,668	100,516	65,664	88,497	33,797	61,405	71,543	135,281		799,285
1988	121,307	106,483	45,647	125,236	65,681	89,696	35,319	78,331	90,434	119,196		877,330
1989	108,636	118,291	37,127	79,487	58,014	88,099	40,068	58,209	80,083	103,445		771,459
1990	122,332	91,173	35,562	78,787	66,664	124,979	44,772	57,498	81,307	114,654		817,739
1999	115,532	90,796	33,843	67,860	66,914	147,418	53,270	59,878	99,662	87,517	39,877	862,567
2000	108,710	79,443	60,900	53,550	110,600	166,310	114,750	72,000	87,200	117,960	54,150	1,025,573

Source: MINAGRI

**Appendix 7: Area planted over time (ha)**

<b>Roots &amp; tubers</b>	<b>1986</b>	<b>1987</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
Irish potato	38,096	38,520	36,307	34,972	42,055	42,000	28,264	29,770	108,983
Sweet potato	125,824	125,905	125,201	161,789	175,893	149,342	148,858	179,941	174,663
Taro	7,901	7,397	7,436	9,445	26,069	21,457	23,079	24,525	21,320
Cassava	49,191	53,745	53,459	64,629	65,884	41,094	38,157	59,246	60,232
Total.	221,012	225,567	222,403	270,835	401,853	316,444	299,594	377,252	425,429
% of sweet potato	56.9	55.8	56.3	59.7	43.8	47.2	49.7	48	41

Source: MINAGRI

**Appendix 8: Major potato producers 1992-1994**

Country	Production					
	1992-94			Average annual growth rate		
	Production (000 t)	Area (000 ha)	Yield (t/ha)	Production (%)	Area (%)	Yield (%)
<b>Africa</b>	6,730	1,352	5	2.2	2.4	-0.2
Uganda	2,011	460	4	4.2	3.5	0.7
Rwanda	1,021	161	6	2.2	2.5	-0.3
Burundi	629	103	6	1.6	1.8	-0.1
Kenya	627	64	10	4.6	2.9	1.7
Madagascar	504	90	6	1.6	1.4	0.1
Zaire	384	82	5	0.9	1.6	-0.7
Tanzania	261	201	1	0.7	6.1	-5.4
Angola	181	20	9	1.8	0.8	1.0
Cameroon	165	31	5	1.3	-1.0	2.3
Ethiopia	154	19	8	2.1	2.1	0.0
Guinea	127	22	6	1.4	2.6	-1.2
Egypt	124	5	27	1.3	0.2	1.1

Source: CIP

**Appendix 9: Agricultural production forecasts ('000 tonnes)**

<b>Crop</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Cereals	235	257	280	305	362	573	923	1584
Pulses	252	290	300	330	399	643	1036	1692
Bananas	2,150	2,279	2,415	2,530	2,877	3,720	5,400	6,961
Tea	15	17	18	20	24	37	60	101
Coffee	18	20	21	23	28	43	71	119
Roots/Tubers	2,881	3,097	3,286	3,479	4,136	5,938	7,845	11,003
Fruit/Veg	205	227	249	273	319	468	688	1011
<b>Total</b>	<b>5,772</b>	<b>6,185</b>	<b>6,569</b>	<b>6,953</b>	<b>8,145</b>	<b>11,423</b>	<b>16,022</b>	<b>22,471</b>

Source: Rwanda Development Indicators 2001, MINECOFIN

**Appendix 10 : Cultivated land area for seasons A & B 1990, 1998-2000**

<b>Crops</b>	<b>1990A</b>	<b>1990B</b>	<b>1998A</b>	<b>1998B</b>	<b>1999A</b>	<b>1999B</b>	<b>2000A</b>	<b>2000B</b>	<b>%00A/90A</b>	<b>%00B/90B</b>
<b>Cereals</b>	<b>93637</b>	<b>154403</b>	<b>74492</b>	<b>121204</b>	<b>63485</b>	<b>148541</b>	<b>83297</b>	<b>194260</b>	<b>89.0</b>	<b>125.8</b>
Sorghum	17742	115679	15199	99440	10650	118613	9292	164903	52.4	142.6
Maize	68168	30354	54549	16663	48074	24598	67600	21453	99.2	70.7
Wheat	4013	5300	2333	3367	2196	2977	4300	5743	107.2	108.4
Paddy	3714	3070	2411	1733	2565	2353	2105	2161	56.7	70.4
<b>Pulses</b>	<b>210633</b>	<b>134058</b>	<b>180069</b>	<b>108507</b>	<b>155212</b>	<b>126270</b>	<b>237820</b>	<b>168384</b>	<b>112.9</b>	<b>125.6</b>
Beans	169657	92906	150957	83966	129134	99081	195300	137905	115.1	148.4
Peas	25396	20500	18803	9947	15563	11232	19130	10863	75.3	53.0
Groundnuts	5482	3883	4397	2648	4307	3091	8720	4743	159.1	122.1
Soya	10098	16769	5912	11946	6208	12866	14670	14873	145.3	88.7
<b>Bananas</b>	<b>202448</b>	<b>202448</b>	<b>213195</b>	<b>213195</b>	<b>206082</b>	<b>204241</b>	<b>171250</b>	<b>189220</b>	<b>84.6</b>	<b>93.5</b>
<b>Roots &amp; tubers</b>	<b>187375</b>	<b>214478</b>	<b>133354</b>	<b>166239</b>	<b>176391</b>	<b>200862</b>	<b>228360</b>	<b>197069</b>	<b>121.9</b>	<b>91.9</b>
Irish potatoes	19595	22460	16347	11917	11813	17957	56420	52563	287.9	234.0
Sweet potatoes	74511	101382	55268	93590	79518	100424	92020	82643	123.5	81.5
Taro	25122	27015	25110	21048	22757	26292	12000	9320	47.8	34.5
Cassava	68147	63621	36630	39684	62303	56188	67920	52543	99.7	82.6
<b>Veg. &amp; fruits</b>	<b>10325</b>	<b>8049</b>	<b>12327</b>	<b>6983</b>	<b>12678</b>	<b>8210</b>	<b>24675</b>	<b>17017</b>	<b>239.0</b>	<b>211.4</b>
<b>Total</b>	<b>704418</b>	<b>713436</b>	<b>613437</b>	<b>616127</b>	<b>613848</b>	<b>688124</b>	<b>745402</b>	<b>765950</b>	<b>105.8</b>	<b>107.4</b>

Source: Rwanda Development Indicators



**Appendix 11: Area cultivated by crop and prefecture-seasons A & B, 1999 (ha)**

Season A	Butare	Byumba	Cyangugu	Gikongoro	Gisenyi	Gitarama	Kibungo	Kibuye	Kigali R	Ruhengeri	Umutara	Total
Sorghum	-	4127	74		1172	216	717	49	459	2345	1491	10650
Maize	645	3879	3351	1514	7276	2296	3277	14598	4967	4160	2111	48074
Wheat	-	925	-	457	360	-	-	231	-	223	-	2196
Rice	723	39	683	-	-	210	343	-	363	-	204	2565
Beans	9094	22797	6132	5235	4113	14676	24366	9736	18093	7408	7484	129134
Peas	700	3037	587	4245	1016	803	1217	790	1248	773	1147	15563
Groundnuts	225	639	-	-	63	169	2151	-	665	-	395	4307
Soya	1765	90	776	1177	70	946	337	463	508	21	55	6208
Bananas	20777	25257	9423	8489	9287	36269	41779	5041	32136	6877	10747	206082
Irish potato	435	1061	745	433	2180	1434	1233	1111	803	1712	666	11813
Sweet potato	8835	10231	4153	9479	3851	13376	4437	7873	9323	3511	4449	79518
Taro	1833	763	3401	1324	771	4337	1110	4825	3266	611	516	22757
Cassava	5741	2445	5186	2073	1250	16421	7562	3763	14072	1424	2366	62303
Veg. & fruits	495	549	393	1225	234	3475	552	504	4678	341	232	12678
<b>Total</b>	<b>51268</b>	<b>75839</b>	<b>34904</b>	<b>35651</b>	<b>31643</b>	<b>94628</b>	<b>89081</b>	<b>48984</b>	<b>90581</b>	<b>29406</b>	<b>31863</b>	<b>613848</b>
<b>Season B</b>												
Sorghum	13251	22054	260	7024	252	7652	17902	3889	28975	2573	14781	118613
Maize	801	3276	692	240	6184	937	3407	1277	4415	993	2376	24598
Wheat	-	988	-	586	112	-	-	399	-	892	-	2977
Rice	526	-	702	-	-	45	160	-	453	-	467	2353
Beans	6308	11566	4255	562	4147	8430	15697	4085	21790	12178	10063	99081
Peas	381	1237	1054	492	864	947	285	3714	711	1019	528	11232
Groundnuts	326	541	101	7	15	182	352	-	1494	-	73	3091
Soya	3451	184	1809	1728	302	4094	242	98	621	293	44	12866
Bananas	17147	19804	9494	6999	10077	29146	33902	5556	37340	19829	14947	204241
Irish potato	346	847	505	2625	3283	340	870	982	1029	6386	745	17958
Sweet potato	11998	12191	4043	10711	6055	13518	4260	9749	10675	12126	5098	100424
Taro	2293	849	4535	2041	842	5447	2487	2085	3809	1405	499	26292
Cassava	7628	3481	5534	1816	1858	11716	3449	2760	13935	1938	2073	56188
Veg. & fruits	470	612	243	461	186	2109	1078	538	1710	326	477	8210
<b>Total</b>	<b>64926</b>	<b>77630</b>	<b>33227</b>	<b>35292</b>	<b>34177</b>	<b>84563</b>	<b>84091</b>	<b>35132</b>	<b>126957</b>	<b>59958</b>	<b>52171</b>	<b>688124</b>

Source: FSRP, MINAGRI

**Appendix 12: Crop production, all seasons (tonnes)**

<b>Crops</b>	<b>1990</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<b>Cereals</b>	254569	141000	182081	221433	191226	175006	235415
<b>Sorghum</b>	142603	77300	102076	122204	120533	107566	155106
<b>Maize</b>	95685	55600	66595	83427	58618	54912	62502
<b>Wheat</b>	6976	6000	6814	5997	4140	3607	6444
<b>Paddy</b>	9305	2100	6596	9805	7935	8921	11363
<b>Pulses</b>	242027	134000	189219	156221	177193	162142	251561
<b>Beans</b>	204707	126300	178697	141815	153917	140425	215347
<b>Groundnuts</b>	8276	7700	10522	7549	4882	8113	15341
<b>Soya</b>	18096	0	0	4279	9831	4707	7034
<b>Peas</b>	10948	0	0	2578	8563	8897	13839
<b>Roots&amp;tubers</b>	1448214	881000	1143004	1245959	1204203	1445637	2880668
<b>Irish potato</b>	283673	137700	195381	229625	181138	175889	954418
<b>Sweet potato</b>	817738	550500	664601	741624	751141	862567	1025573
<b>Taro</b>	81613	44800	62384	71716	83743	90247	88235
<b>Cassava</b>	265190	148000	220638	202994	188182	316934	812442
<b>Banana</b>	2776764	2001400	2105397	2248419	2625485	2897435	2150501
<b>Vegetables &amp; fruits</b>	73496				78350	82983	204625
<b>Total</b>	4795070	3157400	3619701	3872032	4276458	4763203	5722770
<b>Annual % change</b>		-34.2	14.6	7.0	10.4	11.4	20.1

Source: FAO, MINAGRI (PASAR)

**Appendix 13: Average production, 1984,1986-90, MT**

<b>Prefecture</b>	<b>BANAC</b>	<b>BANAB</b>	<b>BANAF</b>	<b>Bean</b>	<b>Sorghum</b>	<b>maize</b>	<b>S.potato</b>	<b>Cassava</b>	<b>Irish</b>	<b>Peas</b>	<b>TOTAL</b>
BUTARE	29,182	189,317	20,611	26,286	21,075	3,158	124,395	63,072	5,485	950	483,531
BYUMBA	75,024	183,761	38,462	34,948	33,178	7,842	97,489	15,271	10,923	2,192	499,088
CYANGUGU	44,391	107,212	22,682	9,510	1,091	7,465	35,274	24,556	3,259	677	256,117
GIKONGORO	4,779	50,137	4,121	7,657	6,865	4,696	96,688	14,648	4,169	1,588	195,346
GISENYI	19,268	153,603	9,286	15,884	1,799	25,277	62,199	11,873	53,012	1,597	353,797
GITARAMA	50,268	282,387	47,176	27,648	14,676	3,830	96,197	82,314	6,547	1,118	612,160
KIBUNGO	257,397	294,022	60,000	27,243	16,121	3,576	39,619	26,055	2,962	994	727,989
KIBUYE	10,712	52,571	5,604	10,206	4,119	28,168	67,057	11,029	14,540	2,828	206,834
KIGALI	102,199	354,585	43,587	46,056	38,516	7,471	82,856	80,093	5,585	983	761,929
RUHENGERI	36,874	125,851	19,087	24,996	11,596	19,131	108,000	6,337	120,414	2,044	474,328
<b>RWANDA</b>	<b>630,092</b>	<b>1,793,445</b>	<b>270,616</b>	<b>230,433</b>	<b>149,035</b>	<b>110,612</b>	<b>809,774</b>	<b>335,248</b>	<b>226,895</b>	<b>14,970</b>	<b>4,571,119</b>

Source: MINAGRI, FSRP

**Appendix 14: Production per capita (kg) 1984, 1986-90 by province and total**

Prefecture	Cooking Banana	Brewing Banana	Banana Fruit	Bean	Sorghum	Maize	Sweet potato	Cassava	Irish Potato	Peas	TOTAL
BUTARE	44	281	25	40	32	5	186	94	8	1	717
BYUMBA	109	266	45	51	48	11	142	22	16	3	714
CYANGUGU	99	238	41	21	2	17	77	55	7	1	560
GIKONGORO	12	122	8	19	17	12	236	36	10	4	477
GISENYI	30	238	12	25	3	39	96	19	82	3	546
GITARAMA	68	374	51	37	20	5	128	110	9	2	804
KIBUNGO	448	509	85	47	28	6	69	46	5	2	1,245
KIBUYE	28	130	11	25	10	69	163	27	36	7	505
KIGALI	100	346	35	45	38	7	82	79	5	1	740
RUHENGERI	55	185	23	37	17	28	159	9	177	3	694
<b>RWANDA</b>	<b>101</b>	<b>284</b>	<b>35</b>	<b>37</b>	<b>24</b>	<b>18</b>	<b>129</b>	<b>54</b>	<b>36</b>	<b>2</b>	<b>718</b>

Source: MINAGRI

**Appendix 15: Yearly average rural sweet potato price trends 1997-2002 and average**

Month	1997	1998	1999	2000	2001	2002
Jan	22	56	15	21	38	12
Feb	21	71	16	22	37	10
Mar	20	65	19	21	34	7
Apr	23	52	21	19	27	6
May	25	41	20	20	22	
Jun	26	34	20	18	19	
Jul	24	25	21	20	18	
Aug	27	22	24	26	16	
Sep	32	21	25	28	17	
Oct	39	21	22	35	14	
Nov	44	16	25	40	15	
Dec	52	17	21	40	11	
Grand Total	30	35	21	26	22	8

*Source: PASAR Project*

**Appendix 16: Population trends, Rwanda**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total population ('000)	6,879	7,092	7,312	7,538	5,224	5,696	6,167	7,666	7,883	8,109	8,343
Annual % change		3.1	3.1	3.1	-30.7	9.0	8.3	24.3	2.8	2.9	2.9
Male ('000)	3,349	3,453	3,560	3,670	2,421	2,640	2,858	3,552	3,666	3,781	3,901
Female ('000)	3,530	3,639	3,752	3,868	2,803	3,056	3,309	4,113	4,217	4,328	4,442
Male (%)	48.7	48.7	48.7	48.7	46.3	46.3	46.3	46.3	46.5	46.6	46.8
Female (%)	51.3	51.3	51.3	51.3	53.7	53.7	53.7	53.7	53.5	53.4	53.2
Urban ('000)	413	426									
Rural ('000)	6,466	6,666									

*Source: Household and demographic survey, ONAPO, Rwanda, 2000*

**Appendix 17:****Rural Transaction quantities**

Millions of units	Sales	Gifts given	Purchases	Gifts received	Net sales and gifts
Beans	16.11	5.47	75.91	5.39	-59.71
Peas	0.63	0.21	2.35	0.30	-1.81
Peanuts	0.86	0.11	1.03	0.07	-0.13
Soybeans	1.07	0.25	1.50	0.25	-0.44
Sorghum	25.42	1.93	50.57	3.31	-26.53
Maize	4.84	3.62	7.71	2.82	-2.07
Wheat	2.11	0.19	0.98	0.15	1.16
Finger millet	0.11	0.09	0.05	0.08	0.07
Rice	2.23	0.24	3.54	0.22	-1.29
Cassava	42.71	4.57	68.25	2.80	-23.77
White potato	77.95	5.99	52.85	3.23	27.86
Sweet potato	58.04	17.22	48.15	8.60	18.51
Taro	4.96	1.48	6.06	1.11	-0.74
Cocoyam	0.05	0.02	0.11	0.04	-0.08
Cooking banana	47.02	7.63	16.99	4.87	32.80
Beer banana	59.01	10.42	61.71	5.93	1.79
Fruit banana	7.26	0.54	2.53	0.41	4.86
Coffee	41.13	0.00	0.00	0.00	41.13
Banana beer	207.08	39.97	6.99	12.71	227.35
Sorghum beer	67.62	15.32	8.75	11.05	63.13
Milk	0.06	0.00	0.00	0.00	0.05
Cattle	0.13	0.02	0.05	0.03	0.07
Pigs	0.19	0.01	0.07	0.01	0.12
Sheep	0.28	0.02	0.09	0.02	0.20
Goats	0.65	0.05	0.20	0.07	0.43
Chicken	0.64	0.10	0.38	0.14	0.22
Ag. Labor	23.68	N.R.	34.30	N.R.	-10.63
Non-Ag. Unsk. Labor	15.02	N.R.	8.20	N.R.	6.82
Skilled Labor	41.43	N.R.	4.12	N.R.	37.31

Source: DSA/MINAGRI, Agricultural Survey 1990; 1184 households; Units are kilograms, except for beer, milk (litres), livestock (heads), and labor (mandays). N.R. = Data not recorded.

**Appendix 18: List of people contacted**

Geci Kabera, wholesaler/travelling trader – 08300672

Nkubili Alfred, wholesaler, travelling trader-08300760; 08301967

KIST (Kigali Institute of Science and Technology), Kigali

KIE (Kigali Institute of Education), Kigali

MINITEL, Kigali

Innocent Benineza, wholesaler

Callixte Kabera, wholesaler

Nathan Loyd Ndungu, wholesaler

David Stevenson, Country Representative, WFP-Rwanda

Elie Iyakaremye, Head of Programme, WFP-Rwanda

Rathi Palakrishnan, Programme Officer, WFP-Rwanda

Simone Lyons, Head of Procurement

Epitace Nobera, Fewsnets - Rwanda

Bizimana Fidele, retailer, Nyarugenge market

Annonciate, SEMAGRI Association, 08591243, seed retailer

Mukamudenge, retailer of maize flour, Nyarugenge market

Mukamana, retailer of white flour, Nyarugenge market

Callixte Nduwinana, wholesaler, maize flour

Adelaide Rubagumira, wholesaler

Emmanuel, miller

Sebukayire Francis, 084-79888, miller

Bitwayiki A, rural assembler and travelling trader

Duhamic ADRI, 08540741, wholesaler

Sam Rubagumya, SOPABU, wholesaler, 08301289

Uwimana Innocent, NSS, 08302301, seed producer

Lyce de Kigali, 08431940

Edward, travelling trader

Nkubili Alfred, wholesaler, 08300760, 08301967

Iyanuranye Uzia, wholesaler, 08521055, 08300911

Kabera Geci, 08300672, wholesaler

COODAF, farmers cooperative, Ruhengeri

Sam Karuyonga, Kanguka association, Umutara

Marie Nyarabeza, maize retailer, Ruhengeri

Beatrice Uwimanaikunda, farmer

Isabele Riziki, farmer

Twagirayezu, retailer, Ruhengeri

Seninega, travelling trader

Bitwayiki, travelling trader



## Appendix 19: Data collection instrument

### Rwanda Sub-sector survey - Producers

Topic	Sub-topics	Questions/comments
Personal information	<ol style="list-style-type: none"> <li>Name</li> <li>Physical location</li> <li>Experience</li> </ol>	
Production	<ol style="list-style-type: none"> <li>Quantity</li> <li>Trends</li> </ol>	<ol style="list-style-type: none"> <li>Estimate acreage planted of the commodities in question and the trend of in acreage planted</li> <li>Find out the reasons for the trend</li> <li>Estimate the the trends in output of each of the commodities in question</li> <li>Find out the reasons for these trends</li> </ol>
Sales	<ol style="list-style-type: none"> <li>Quantity</li> <li>Type of buyer</li> <li>Seasonality</li> <li>Variety</li> <li>Consumer preferences</li> <li>Price data</li> </ol>	<ol style="list-style-type: none"> <li>How much do you normally sell eg. per day, per week, per month</li> <li>Who do you sell to</li> <li>Are there changes in volume sold over time</li> <li>Are their different varieties sold</li> <li>If so, which ones and what is their respective demand/preference</li> <li>What is the price you sell at by variety (get unit measure)</li> <li>Are there changes in price over time (short term &amp; long term changes)</li> <li>If so, what are the reasons</li> <li>Do you find problems selling your products. Which problems</li> <li>Where do you sell from and why?</li> </ol>
Supply of inputs	<ol style="list-style-type: none"> <li>Source by area</li> <li>Source by type of person</li> <li>Price</li> <li>Quality</li> </ol>	<ol style="list-style-type: none"> <li>What inputs do you use</li> <li>What inputs do you buy</li> <li>How much seed do you usually plant</li> <li>From whom do you buy your inputs</li> <li>From where do you buy (meeting point)</li> <li>At what price do you buy by variety/input</li> <li>Does the price change over time. If so, why and how</li> <li>Do you have problems getting the inputs. If so, which ones</li> <li>What is the quality of the inputs (for seed eg improved or not)</li> <li>Do you get technical advice about inputs/farming</li> </ol>
Quality	<ol style="list-style-type: none"> <li>Quality of output</li> <li>Post-harvest issues</li> </ol>	<ol style="list-style-type: none"> <li>What is the quality of your produce</li> <li>How do you dry ?</li> <li>What quality problems do you face during and after harvest</li> </ol>
Storage	<ol style="list-style-type: none"> <li>Quantity</li> <li>Time</li> <li>Storage problems</li> </ol>	<ol style="list-style-type: none"> <li>How much do you usually store</li> <li>For how long do you usually store</li> <li>Do you have storage problems</li> <li>Do you experience storage losses</li> </ol>
Production costs	<ol style="list-style-type: none"> <li>Type</li> <li>Proportions</li> </ol>	<ol style="list-style-type: none"> <li>What are your production costs</li> <li>What is their proportions</li> </ol>
Grading / sorting	<ol style="list-style-type: none"> <li>Grading incentive</li> </ol>	<ol style="list-style-type: none"> <li>Do you grade or sort</li> <li>Does better grade fetch higher price</li> <li>If you don't sort/grade why?</li> </ol>
Market information	<ol style="list-style-type: none"> <li>Sources</li> <li>Spatial arbitrage</li> </ol>	<ol style="list-style-type: none"> <li>Do you get market information eg. on price</li> <li>If so, from whom and how</li> <li>Is there a relationship between prices in different areas at a given time</li> </ol>
Price formation	<ol style="list-style-type: none"> <li>Market power</li> </ol>	<ol style="list-style-type: none"> <li>Who determines the price</li> <li>How is the price determined</li> <li>If farmer/individual is a price taker, find out why</li> <li>If you negotiate the price what factors do you consider</li> </ol>
Institutional and legal framework	<ol style="list-style-type: none"> <li>Associations</li> </ol>	<ol style="list-style-type: none"> <li>Do you have an association</li> <li>Are there any market regulations. If so, which ones and how do they affect your business</li> </ol>
Market structure	<ol style="list-style-type: none"> <li>Competition</li> </ol>	<ol style="list-style-type: none"> <li>No of sellers</li> <li>Is there price competition</li> <li>Is there non-price competition. If so, how eg. interlocking markets</li> </ol>
Credit availability	<ol style="list-style-type: none"> <li>Sources</li> <li>Types</li> </ol>	<ol style="list-style-type: none"> <li>Are there credit institutions</li> <li>Do you use them. If no, why</li> <li>What are their rates</li> </ol>

## Rwanda Sub-sector survey Traders/processors

Topic	Sub-topics	Questions/comments
Personal information	4. Name 5. Address physical 6. Telephone 7. experience	NB: For better established firms exchange of business cards saves time. For small traders market place is enough. Note: if a trader has a mob. Phone it might be useful to get it for future follow up.
Type of Business	1. Value addition 2. Physical functions	1. How does the respondent add value along the marketing chain? Does he change the form of the product ( <b>Processor</b> ) or just move the product ( <b>Travelling trader</b> ) or store ( <b>Wholesaler</b> ) or is he <b>Retailer</b> or is he <b>Consumer</b> . <b>NB:</b> There might be overlap as firms try to maximise profit through vertical integration
Demand ( <i>For consumer substitute consumption for sell in the probe</i> )	9. Quantity 10. Type of buyer 11. Seasonality 12. Variety 13. Consumer preferences 14. Price data	15. How much do you normally sell eg. per day, per week, per month 16. Who do you sell to 17. Are there changes in volume sold over time 18. Are their different varieties 19. If so, which ones and what is their respective demand/preference 20. What is the price you sell at by variety (get unit measure) 21. Are there changes in price over time (short term & long term changes) 22. If so, what are the reasons 23. Do you find problems selling your products. Which problems
Supply	5. Source by area 6. Source by type of person 7. Price 8. Quality	11. Which are your supply areas (geographical) 12. From whom do you buy 13. From where do you buy (meeting point) 14. At what price do you buy by variety 15. Does the price change over time. If so, why and how 16. Do you have problems getting the products. If so, which ones 17. What is the quality of the supplies
Quality	6. Perishability 7. Post-harvest issues	8. What is the quality of products along the chain 9. What is the shelf-life of the products
Storage ( <i>Relevant to wholesaler</i> ) <b>NB: For others it's not intentional but still get the impact of not selling quickly</b>	8. Quantity 9. Time 10. Storage problems	10. How much do you usually store 11. For how long do you usually store 12. Do you have storage problems 13. Do you experience storage losses
Transaction costs	3. Forms 4. Proportions	3. What are your transaction costs 4. What is their proportions
Grading / sorting	2. Grading incentive	4. Do you grade or sort 5. Does better grade fetch higher price
Market information	3. Sources 4. Spatial arbitrage	4. Do you get market information eg. on price 5. If so, from whom and how 6. Is there a relationship between prices in different areas at a given time
Price formation	2. Market power	5. Who determines the price 6. How is the price determined 7. If firm/individual is a price taker, find out why
Institutional and legal framework	2. Associations	3. Do you have an association 4. Are there any market regulations. If so, which ones and how do they affect your business
Market structure	2. Competition	4. No of sellers 5. Is there price competition 6. Is there non-price competition. If so, how eg. interlocking markets
Credit availability	3. Sources 4. Types	1. Are there credit institutions 2. Do you use them. If no, why 3. What are their rates