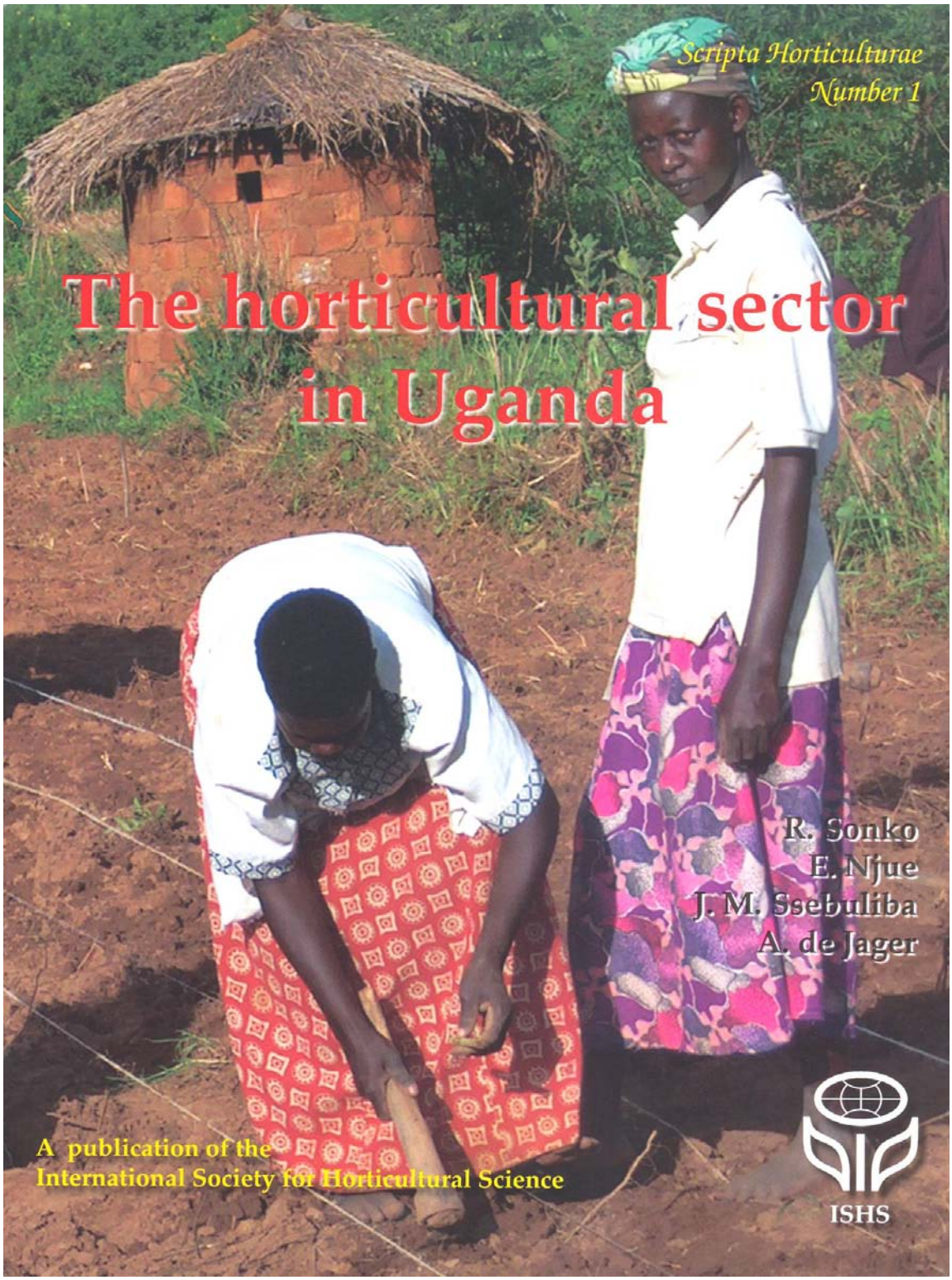
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R. Sonko
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A. de Jager
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# Pro-Poor Horticulture
# In
# East Africa and South East Asia

## The horticultural sector in Uganda

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January 2005

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## EXECUTIVE SUMMARY

### Background

Uganda is one of the East African countries, which lies astride the equator. Most of it is a plateau of 900 -1,500 metres above sea level. It is bordered by five countries - Sudan in the north, Kenya in the east, Tanzania in the south, Rwanda in the southeast and the Democratic Republic of Congo (DRC) in the west. Uganda is a landlocked country with a total surface area of 241,038 $km^2$. Of this 43,941 $km^2$ are under water and swamps. For administrative purposes, the country is subdivided into 56 districts.

The 1991 population census estimated the total population at 16.48 million, with 51% women and 49% men. The Uganda National Household Survey of 2003 estimated the population at 25 million with an average household size of 5 persons. A large proportion of this population is below 15 years of age. Uganda is predominantly a rural economy with approximately 88 percent of the population living in rural areas.

### Rationale and Objectives of the Study

In developing countries in general, and more specifically in the study regions, there is a huge potential for growth in the horticultural sector (comprising of fruits, vegetables, flowers, and spices production, distribution and marketing in domestic and export markets). However the access of African and Asian fruits and vegetables to the markets of the European Union (EU) countries is becoming increasingly difficult as a result of strict safety and quality standards on food at major export markets. Changes in the retail landscape affect both international and domestic markets.

The project 'EU assistance to Pro-Poor growth in Horticulture in East Africa and South East Asia' aims to provide insight on how household poverty in rural and peri-urban areas in these regions could be reduced through tailored EU assistance for the horticultural sector. The results of this project will be used to derive recommendations on the poverty-alleviating impact of development assistance and trade policies.

Specific objectives are:

- Assess the conditions for horticultural crops (fruits, vegetables, flowers, spices) production, distribution and marketing to serve as a pro-poor activity and to develop strategies for growth and development in Uganda;
- Assess current and future market opportunities for horticultural crops and products, on the domestic, regional and international markets;
- Analyse the impact of upcoming supermarkets in the distribution of food, and the increased scope of quality and safety demands on the scale and organization of horticultural commodities supply in the study regions.

Major questions being addressed by the project are:

- What is the potential for horticultural growth in the study regions?
- What is the impact of horticultural crops production, distribution and marketing on poverty reduction?
- What are effective strategies for growth of horticultural crops production and marketing?
- How could EU trade policy and development assistance support pro-poor horticulture in developing countries?

**Approach and Methodology**

To achieve the objectives and expected outputs as specified in the work plan for the sector analysis, two main approaches were adopted to undertake the study. First, the team held discussions with key informants and industry participants operating within Kampala on issues of production and marketing to gain insights into the policies (internal and external) that in one way or another influence the performance of the industry in Uganda and particularly its growth. The second step entailed detailed literature review that provided information on market developments for horticultural products and basic aspects of production. In addition information to capture the economic status of the country and its impact on the performance of the Uganda horticultural industry was analysed. Kenya serves as a benchmark for assessment of developments at the national level. Using selected crops, developments are assessed from a supply chain perspective. Specific focus is on the impact of the horticulture sector on poverty alleviation.

**Main Conclusions**

**The role of horticulture in economic development and poverty alleviation in Uganda**

This sector study has shown that horticulture in Uganda can contribute to economic development and poverty alleviation in several ways. Specifically, the study identifies the following areas in which the sector has and can play an important role:

*Foreign exchange earnings*

Horticulture is an important and increasingly reliable source of foreign exchange earnings and economic growth. The export earnings from the horticultural sector have been growing spectacularly over the last 5 years.

*Employment opportunities*

Although exact figures are lacking it is obvious that the horticulture industry generates a significant number of jobs in Uganda. The country's 20 floriculture farms directly employ more than 4,000 permanent staff; about 3,000 small-scale farmers grow fresh fruits and vegetables for export; more than 20,000 smallholders grow vanilla and many more base their livelihoods on production of fruits and vegetables for the domestic, regional and international markets. In addition, the input supply, transport, marketing, packaging and handling operations offer other job opportunities.

*Income generation*

The potentials of the horticultural sector to contribute significantly to poverty alleviation through income generation activities in both rural and urban areas are considered to be very high. This includes the contribution of the sector to wage income in the rural, urban and peri-urban areas and increased income for smallholder farmers in the rural areas from the marketed products in the local, regional and international markets.

*Rural development*

Horticultural production contributes to rural development in terms of wages to the rural and urban economies, provision of jobs, incomes, and public services, widening of the tax base, and human resource development through training of researchers, technicians and supervisors. In addition, roads, schools, health centres and electrification have been set up or extended to where commercial horticultural farms have been set up.

**Potentials perceived in the Horticultural sector**
The horticultural sector in Uganda has great potential in the following areas:

*Export growth*
There is significant growth potential for exports of Ugandan horticulture. Uganda has a relatively low market share for almost all horticultural products, and therefore has an opportunity for rapid growth from potential buyers. The value of horticultural exports could grow to US $75-100 million FOB by the end of the decade, based on products that are already being exported in relatively small quantities. In the long run, existing exports could be increased by at least ten times with sufficient investment.

There is significant growth potential for exports of Ugandan floriculture. Currently, EU floriculture imports are valued at more than US$1 billion and are growing at 2-4% per annum. Uganda has less than 2% of market share. Additionally, the market for tropical flowers and foliage is largely untapped and has tremendous growth potential.

*Vanilla production*
There is great growth potential for exports of vanilla from Uganda. Vanilla is the highest value crop ever grown in Uganda. Although the world prices for vanilla are expected to decline in 2004, vanilla will remain a very attractive crop for smallholders in the future.

*Growth of regional and domestic markets*
There is great potential for increasing regional exports of horticultural products from Uganda into neighbouring countries of Kenya, Sudan, DRC, Tanzania, and Rwanda. Further urbanisation processes will also give a boost to the development of the domestic market for horticultural products.

*Processing*
Although processing of fruits and vegetables is almost non-existent in Uganda, there is good long-term potential for it. Small market niches exist for solar-dried banana, pineapple, mango, papaya, and chili as well as passion fruit juice and concentrate.

*High-value niche markets*
Because of Uganda's dependence on airfreight for extra-regional horticultural exports, the sector is restricted to very high value products that can support the cost of airfreight. Uganda is therefore not competitive in the high volume markets for bulk fruits and vegetables but can competitively utilize its potential in the niche markets, including that for organically produced products. There is a vibrant organic movement worldwide that is prepared to pay premium prices for organically produced products.

*Growth and expansion of existing products*
Although diversification and identification of new products is useful, in the short term Uganda should focus on achieving maximum growth of existing products. Current qualitative and quantitative market indications suggest that there is no real need to find "new products and new markets." Most of the products exported have growth potential and include flowers and cuttings, fresh chilli/hot pepper, passion fruit, okra, baby vegetables, vanilla, sun-dried tropical fruit etc. Maintaining continuous supply and quality of product are the horticulture industry's most significant challenges.

*Variety development and seed production*
Development, multiplication and dissemination of high yielding varieties of horticultural crops and production of seeds and planting materials with demand in the market are major challenges in the horticultural sector. Seed improvement is currently so weak in Uganda that proper and quality materials usually are imported. It

is necessary to break this pattern. The challenge, then, lies in linking research to the needs of growers and supply chain partners.

*Quality improvement and control*
There are few institutional or legal barriers to the main markets for Ugandan products. Though MAAIF does need to continue reforming and streamlining the registration process for agricultural chemicals, essential controls on imports and exports of products are in place, however, there is need for continuity and quality of products.

**Challenges**
Like most agricultural sub-sectors, horticulture is affected by several constraints that have limited optimal and efficient utilisation of resources including those within reach of the smallholder farmers. The main constraints are highlighted below:

*Lack of improved varieties*
There is no organisation involved in quality production of seed or planting materials of fruits and vegetables and their distribution either in the private or public sector. Some farmers retain seeds but do not preserve them properly. Private nurseries for production and supply of quality planting materials are very scarce.

*Land preparation*
Land preparation is generally done using manual tools like the hoe and occasionally with oxen and as such not deep enough to allow good root development. In addition, land is rarely ready in good time due to inadequate tools for preparation.

*Limited use of recommended technologies/inputs*
Land, soil and crop management technologies are poorly adopted and not continuously applied. This has resulted to soil borne diseases, other diseases and pests that lead to low yields. In cases where insecticides and pesticides are used, their application is conducted according to a fixed time schedule, ignoring the level of incidence and degree of damage. This results in marketing of fruits and vegetables, contaminated with chemical residues.

Inorganic and organic fertilizer use is not common under smallholder situations despite the knowledge that they boost yields. The cost of inputs is relatively high making it very difficult for resource-constrained farmers to afford them.

*Poor post-harvest management/Quality Control*
Harvesting, sorting, packaging and transportation are not done in a proper manner. As a result, there is high incidence of post harvest losses, especially for the perishable commodities. Quality control in horticultural production is not organised centrally. The lack of assurance of quality by producers has continuously led them to accept very poor prices or non-payment for delivered products.

*Extension service*
The extension service delivery has been decentralized to the district. One of the SMS is responsible for horticultural crops at the district level and one officer at county level to provide services for all enterprises. The officers are poorly facilitated causing a very limited impact of extension services on production of horticultural crops.

*Limited access to information*
There are no technical bulletins or handouts for reference by farmers on general aspects of production of horticultural crops. There is insufficient market information for export opportunities as well.

*Poor infrastructure*
Most of the infrastructure needs to be improved to effectively support the horticultural sector growth and expansion, such as roads, competitively priced and reliable power, and an efficient airport.

*Finance/credit*
Finance and credit are perennial problems for agribusiness investors, due to the intrinsic risks involved. Procedures and processes to access the financial services have not been streamlined even for those who can afford them.

*Lack of expertise/technical skills*
Although the daily cost of labour is highly competitive, labour efficiency is low at all levels. Most investors have no understanding of the benefits and techniques of a permanent training policy. At national level, training is also weak. In the area of horticultural research and technology transfer, there is minimal public sector capacity.

*Lack of private sector investment*
Investment in new farms and processing facilities is essential. For example, only one of the vegetable exporters has cold chain facilities and there are only two professional pack houses (and a few rudimentary ones that do not meet international standards). Based on experiences in Kenya and Zimbabwe, specialized products require investment in integrated production and market systems by large-scale commercial growers with links to organized groups of out growers.

*Limited research in horticultural sector*
Despite its importance to the Ugandan economy, NARO focuses a relatively small amount of its research on horticulture. However, farmer associations such as the Uganda Flower Exporters Association (UFEA) have developed strong research capacity. Government support to these initiatives is required.

# 1. INTRODUCTION

## 1.1 Rationale and objectives of the study

In developing countries in general, and more specifically in the study regions, there is a huge potential for growth in the horticultural sector (fruits, vegetables, flowers, and spices production, distribution and marketing in domestic and export markets). However access of African and Asian fruits and vegetables to the market of the European Union (EU) countries is becoming increasingly difficult as a result of strict safety and quality standards on food at major export markets. Changes in the retail landscape affect both international and domestic markets.

The EU has the opportunity to support horticulture in the rural and peri-urban areas in developing countries, by means of trade policy and development policy instruments, provided that well-targeted interventions are implemented. However, the focus of the EU development policy should include development of the domestic market for fruit and vegetables, in addition to export orientation.

The project 'EU assistance to Pro-Poor growth in Horticulture in East Africa and South East Asia' aims to provide insight on how household poverty in rural and peri-urban areas in developing countries could be reduced through tailored EU assistance for the horticultural sector. The results of this project will be used as a basis for driving recommendation on the poverty alleviating impact of development assistance.

Specific objectives are:
- Assess the conditions for horticultural crops (fruits, vegetables, flowers, spices) production, distribution and marketing to serve as a pro-poor activity and to develop strategies for growth and development;
- Assess current and future market opportunities for horticultural crops and products, on the domestic, regional and international markets; and
- Analyse the impact of upcoming supermarkets in the distribution of food, and the increased scope of quality and safety demands on the scale and organization of horticultural supply in the study regions.

The project is being implemented in Vietnam and Uganda. Both countries are representative of their respective regions and hence results of this project will have a broad applicability. Major questions that are being addressed by the project are:
- What is the potential for horticultural growth in the study regions of East Africa and South East Asia?
- What is the impact of horticultural crops production, distribution and marketing on poverty reduction?
- What are effective strategies for growth of horticultural crops production and trade?
- How could EU trade policy and development assistance support pro-poor horticulture in developing countries?

In the framework of this project this sector study was undertaken with the following objectives:
- Review the status of the horticultural sector in Uganda (production, marketing and contribution to the economy);
- Assess the role of various actors in production and marketing of horticultural commodities and products in Uganda;
- Establish the constraints and potential of the horticultural sector in Uganda;
- Explore the role of horticulture in poverty alleviation in Uganda.

## 1.2 Approach and methodology

To achieve the objectives and expected outputs as specified in the work plan, two main approaches were adopted to undertake the study. First, the team held discussions with key informants and industry participants operating within Kampala on issues of production and marketing so as to gain insights into the policies (internal and external) that in one way or another influence the performance of the industry in Uganda and particularly its growth. The discussions were concentrated within Kampala to avoid unnecessary costs.

The second step entailed detailed literature review that provided information on market developments for horticultural products and basic aspects of production. In addition information to capture the economic status of the country and its impact on the performance of the Uganda horticultural industry was analysed. Kenya serves as a benchmark for assessment of developments at the national level. Using selected crops, developments are assessed from a supply chain perspective. Based on the latter, the study identifies growth potential and challenges in the horticultural sector in Uganda. Specific focus is on the impact of the horticulture sector on poverty alleviation. To get an adequate overview of the sector, four commodity areas were analysed as groups: fruits, vegetables, flowers, and spices. Various sources of the required information were explored including the USAID ADC/IDEA Project, the Economic Policy Research Centre (EPRC), Internet sources (FAO statistics), Uganda Bureau of Statistics and Uganda Investment Authority (UIA).

## 1.3 Structure of the report

Following the introduction, chapter two presents the economic environment and the attendant dynamics, focusing especially on general economic development and key indicators, service delivery, government policies relevant to the horticultural sector, infrastructure and entrepreneurship. Chapter three describes the horticultural sector, its institutional context and services, key policies and existing national programmes related to the sector. Chapter four analyses the international and European market developments and links with products from developing countries. National, regional and international trends in production and consumption are analysed. In Chapter five, the production trends, marketing and post harvest aspects of selected horticultural crops are presented in detail. Lastly, constraints, opportunities and the competitiveness of the Uganda horticultural sector are presented in Chapter six.

## 2. ECONOMIC ENVIRONMENT

### 2.1 Brief description of Uganda

Uganda is one of the East African countries, which lies astride the equator. Most of it is a plateau of 900 -1,500 metres above sea level. It is bordered by five countries - Sudan in the north, Kenya in the east, Tanzania in the south, Rwanda in the southeast and the Democratic Republic of Congo (DRC) in the west. Uganda is a landlocked country with a total surface area of 241,038 $km^2$. Of this 43,941 $km^2$ are under water and swamps. For administrative purposes, the country is subdivided into 56 districts (Fig. 1). The climate of Uganda is tropical, with temperatures moderated by altitude, and varying between $15^0$ C and $30^0$ C and rainfall between 750 to 2,000 mm/year.

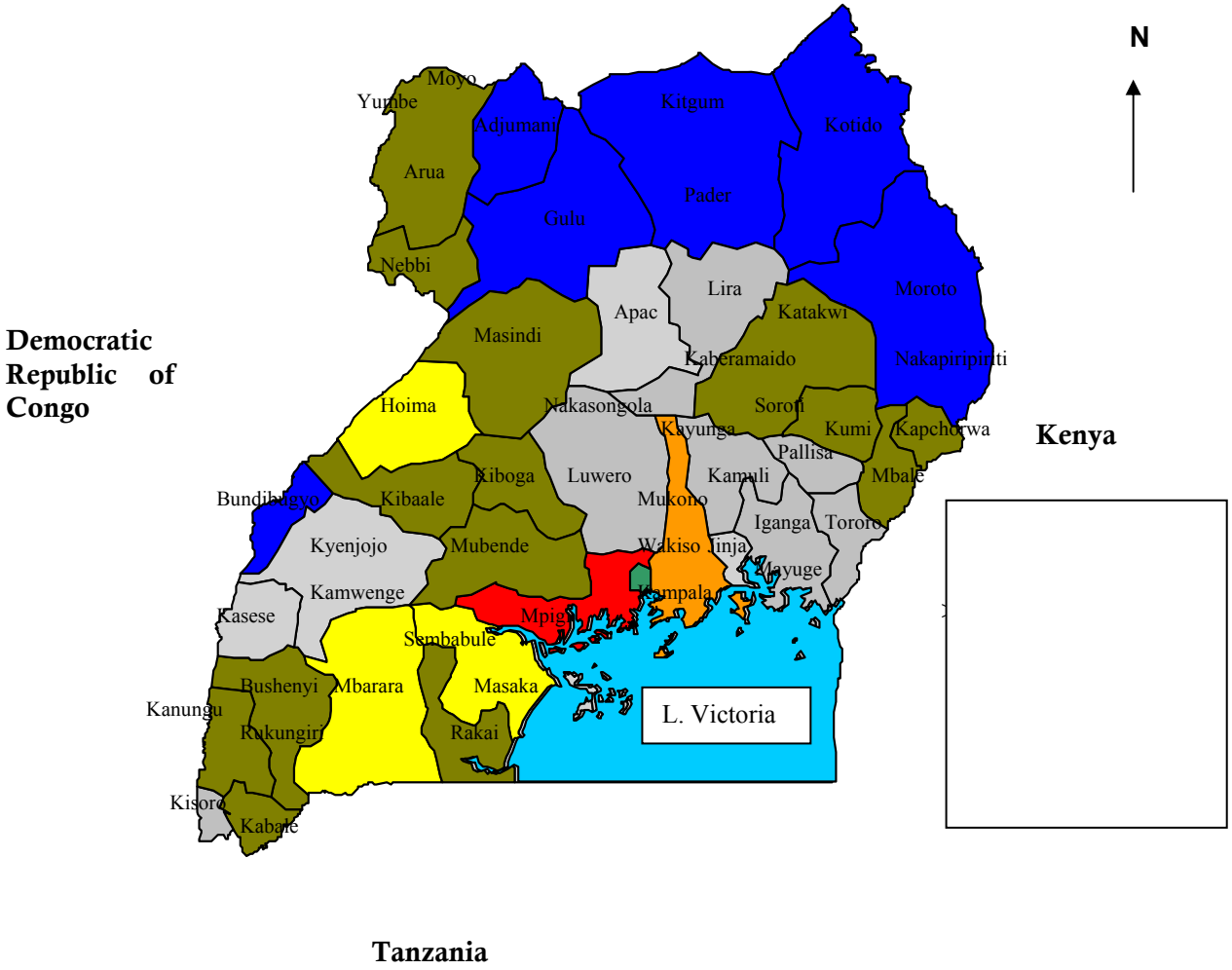



**Fig. 1. Map of Uganda showing the neighbouring countries and administrative districts**

The 1991 population census estimated the total population at 16.48 million, with 51% women and 49% men. The Uganda National Household Survey of 2003 estimated the population at 25 million with an average household size of 5 persons. A large proportion of this population is below 15 years of age.

Uganda is predominantly a rural economy with approximately 88 percent of the population living in rural areas. Some 18 million hectares of land is available for cultivation, less than one third of which is currently under cultivation. This reflects the potential for expansion of the agricultural sector. The country is well endowed with natural resources such as water (lakes and permanent rivers) and has attractive features and sceneries for tourism. Regional differences exist in terms of ethnicity, culture, topography (from mountains to low lands), livelihood systems (fishing, crops production, livestock keeping), infrastructure, service delivery and governance.

Between the early 1970s and 1986, Uganda suffered a civil strife, which left most of the country's infrastructure and services devastated. In 1986 the National Resistance Movement (NRM) government came to power and since then the country has generally experienced peace although insecurity still persists in the northern and western regions due to local insurgencies.

The AIDS epidemic has had a negative impact on general development and agricultural production in particular. It has affected the availability of skilled and unskilled labour for production, and general service delivery.

## 2.2 General economic development and key indicators[1]

Uganda achieved a major turnaround in the 1990s, following sweeping economic and institutional reforms undertaken after 1987 to revitalize its economy. Macroeconomic stability was achieved and maintained with annual inflation rates below 5 percent per year for most of the second half of the 1990s. Average income per capita rose from US$200 in 1990 to US$330 in 2000, a 65 percent increase. There was a significant reduction in the incidence of poverty from 56 percent of the total population in the 1992 to 35 percent in 2000. Economic growth averaged 6.8 percent per year during 1992-1998. In response to its reforms and solid performance, foreign aid was plentiful, amounting in 2000 to some 53 percent of the total Government budget, or 13 percent of GDP (Table 1).

**Table 1. Major economic indicators Uganda (1998-2002)**

| Indicator | 1998 | 2001 | 2002 |
|---|---|---|---|
| Total population | 21.9 mill | 23.9 mill | 24.6 mill |
| GNI per capita ($) | 290 | 250 | 240 |
| GDP (current $) | 6.5 bill | 5.6 bill | 5.8 bill |
| GDP growth (annual %) | 4.9 | 5.1 | 6.7 |
| Value added in agriculture (% of GDP) | 42.1 | 36.6 | 31.6 |
| Value added in industry (% of GDP) | 18.1 | 20.4 | 22.0 |
| Value added in services (% of GDP) | 39.8 | 43.0 | 46.4 |
| Export goods and services (% of GDP) | 9.7 | 12.0 | 12.0 |
| Aid per capita (current $) | 29.5 | 33.2 | 25.9 |

Source: World Bank

[1] Most information in this chapter from the website of the Agribusiness Development Center; Uganda's Investment in Developing Export Agriculture (IDEA) project.

Much of this success was due to policies that promoted macroeconomic stability and removed the serious price distortions that had led to a severe misallocation of resources, resulting in a substantial "bounce-back" effect as the economy recovered from its previous lows. The gains recorded during this period can also be attributed to the wide range of economic and structural reforms that were implemented by the Government. These reforms involved finance, marketing, taxation, restructuring of Government ministries and parastatals, decentralization, rehabilitation of infrastructure, and re-establishment of security of person and property and the rule of law.

Despite these solid achievements, Uganda's more recent growth performance raises serious concerns about the country's ability to engineer export-led growth for poverty reduction. Growth of real GDP slowed to less than 5 percent per year during 1999-2000. Export earnings from goods and non-factor services peaked in 1996, aided by the coffee boom years of 1994-1996: from US$294 million in 1994, they rose to US$786 in 1996, but then fell to US$596 in 2000 (Bank of Uganda, 2001). Exports as a percentage of total GDP declined from 11.3% in 1996 to 7.7% in 2000 (Imani Development Ltd., 2001). Since 1990, there have been 6 years of negative export growth, 3 years of positive growth, and 2 years of substantial fluctuations (IMF, 2001).

The composition of recent export performance, as shown in Table 2, highlights the lack of competitiveness and diversification in the export sector. Earnings from the main traditional exports of coffee, cotton, and tea rose from US$107 in 1992 to a high of US$414 million in 1996, before falling to US$172 in 2000. These three commodities still account for over 50 percent of total export earnings, although their share has decreased from 80 percent in 1994 (Imani Development Limited, 2001). Since these commodities are major generators of income and employment for smallholders, who include many of the rural poor, there is a serious danger that the gains achieved in poverty reduction will be short-lived. Other export sub-sectors, such as tobacco, fish and fish products, hides and skins, and horticulture, have performed somewhat better, but this has not been sufficient to offset the decline in traditional exports.[2] Thus erratic, and recently negative, growth of export earnings is a major concern.

**Table 2. Major Exports of Uganda (US$ million) 1992 – 2000**

| Year | Coffee | Cotton | Tea | Tobacco | Fish & Prods | Hides&Skins | Horticulture |
|---|---|---|---|---|---|---|---|
| 1992 | 95.0 | 7.2 | 4.7 | 4.1 | 4.6 | 3.4 | 0.0 |
| 1993 | 95.2 | 4.3 | 8.1 | 7.4 | 7.9 | 5.7 | 0.0 |
| 1994 | 343.3 | 2.3 | 9.0 | 6.9 | 15.4 | 9.2 | 2.7 |
| 1995 | 382.9 | 3.6 | 8.0 | 9.5 | 24.2 | 9.0 | 2.7 |
| 1996 | 396.1 | 7.5 | 10.6 | 4.9 | 45.9 | 8.4 | 7.2 |
| 1997 | 309.7 | 30.2 | 12.9 | 12.8 | 30.0 | 9.6 | 10.1 |
| 1998 | 295.2 | 7.7 | 28.2 | 22.5 | 39.4 | 6.6 | 12.8 |
| 1999 | 275.3 | 17.8 | 21.5 | 14.7 | 25.0 | 4.3 | 11.9 |
| 2000 | 125.4 | 19.0 | 27.5 | 24.9 | 22.6 | 13.6 | 13.5 |

Source: Bank of Uganda, *Quarterly Economic Report*, September 2001.

With the decline in protection of the pre-1987 regime, and continued high levels of foreign aid, imports soared from 21.5 percent of GDP in 1992 to 34.4 percent of GDP in 2000 (World Bank, 2001). Uganda's pre-1987 system was characterized by

[2] Fish exports suffered for several years from a food safety ban by the European Union. This has been resolved, at least for the time being.

numerous controls and high protection of domestic import substitutes; e.g., fixed exchange rate, *ad-valorem* duties ranging from 10-40 percent for most items but with numerous exemptions, and an indirect sales tax imposed only on imports (Nash and Foroutan, 1997). The major reforms undertaken in phases were: (a) successive devaluations of the Uganda shilling, (b) unification and market-determination of the exchange rate (November 1993); (c) abolition of the official foreign exchange allocation system; (d) simplification of export and import licensing procedures; (e) reduction of import duties to only three categories, and (f) reduction in import duty exemptions. In addition, the East African Community (EAC) was created in 1999 among Uganda, Kenya, and Tanzania to harmonize tariff and custom regimes, establish a customs union, facilitate free movement of people, and improve infrastructure.

As a result of soaring imports and stagnant exports, the deficit on the current account has continued to grow. This deficit has been financed largely out of private transfers and foreign assistance. Although private transfers may be reaching a ceiling, there is every indication that foreign assistance is continuing to grow. How sustainable this is over the longer run is another question.

One argument that is sometimes made is that poor export growth is due to lack of global market opportunities. However, it is observed that Uganda's global market opportunities have widened considerably since the GOU has become a signatory to many trade agreements, including:

- The World Trade Organization (WTO);
- The Africa-Caribbean-Pacific/European Community (ACP/EU) Cotonou Agreement;
- The EC-"Everything but Arms Agreement". Like all other developing countries, Uganda has unconditional and unlimited access to EU markets;
- The Africa Growth and Opportunities Act (AGOA) passed by the United States Congress on May 18, 2000;
- The Common Market for Eastern and Southern Africa (COMESA); and
- The East Africa Community Free Trade Agreement (ECA-FTA).

## 2.3 Status and dynamics of poverty in Uganda

Despite the impressive economic growth of Uganda in the past decade, it still remains one of the world's poorest countries ranked 159$^{th}$ out of 175 poorest countries as per the Human Development Index (1998). Consumption data reveal that 44% of its population (9 million people) do not meet their basic needs (food, shelter, clothing, education and transport).

Poverty is defined by the poor people of Uganda as not only "*a situation of perpetual need for the daily necessities of life*"… but also "*a feeling of powerlessness to influence the things around you*". Poverty is therefore a complex, multi-dimensional phenomenon in which the influencing factors are inter-linked and often inter-independent and include among other things access to natural resources, human factors, financial assets, social capital and physical infrastructure. The interconnectedness of the causes and effects of poverty demonstrate the frustration poor people face in moving out of poverty as the many factors produce a vicious cycle of poverty.

Poverty is not a uniform condition affecting all groups of people and locations in the same way. Some factors are common, (e.g. insufficient food, low yields and few

productive assets, inadequate income to meet health care and education costs, restricted access to services, large families, lack of social support and poor health) whereas other indicators are specific to a given situation (e.g. social or physical isolation, ethnic discrimination low social capital, insufficient infrastructure development and insecurity). The extent to which such factors influence poverty and are interlinked varies depending on the geographical location, group of people, gender, season, existing services and infrastructure.

The analysis of poverty levels in Uganda (Fig. 2) is based on consumption data collected in six household surveys over the period 1992 to 2000 (the 1992/93 Integrated Household Survey (IHS); the 1997/98 Fourth Monitoring Survey (MS-4); and the 1999/2000 Uganda National Household Survey (UNHS). The poverty line for all five surveys is defined in the same way, using the method based on the cost of meeting calorie needs from the food basket of the poorest half of the population (as observed in the 1994 Monitoring Survey), with some allowance for non-food needs. The precise location of the poverty line in the consumption scale is always somewhat arbitrary; the key point is that the same poverty line is used so that the degree of poverty can be meaningfully compared, whether over time or across different groups. Nevertheless, analysis using different poverty lines shows that the incidence of poverty has improved from each survey to the next, no matter which poverty line is chosen. All the estimated changes in poverty between MS-4 and UNHS are statistically significant at the 5% confidence level, except for the fall in urban poverty in the northern region.

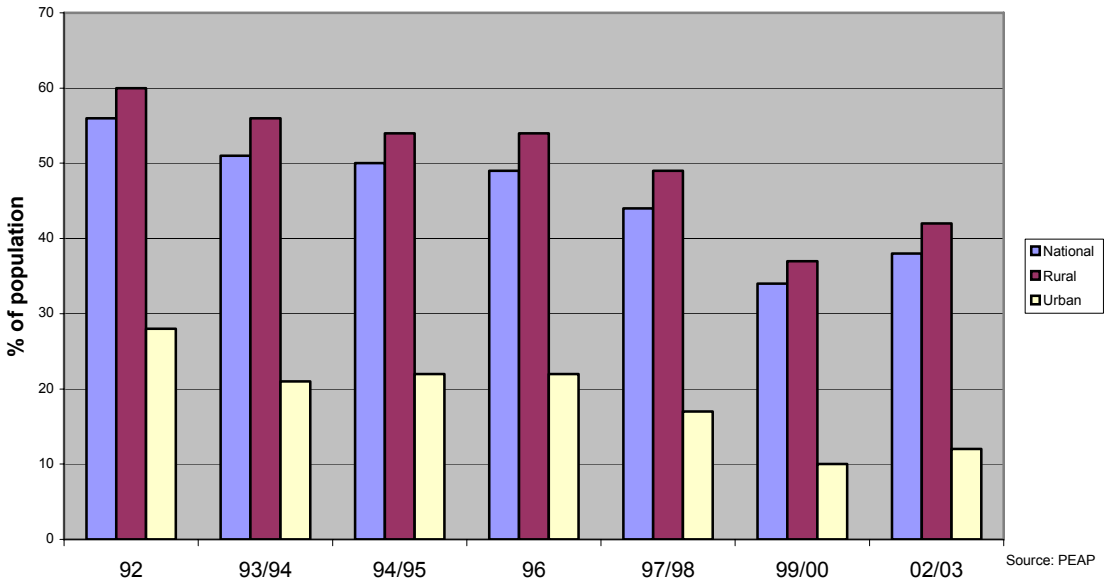



**Fig. 2. Poverty levels in Uganda comparing National Rural and Urban areas**

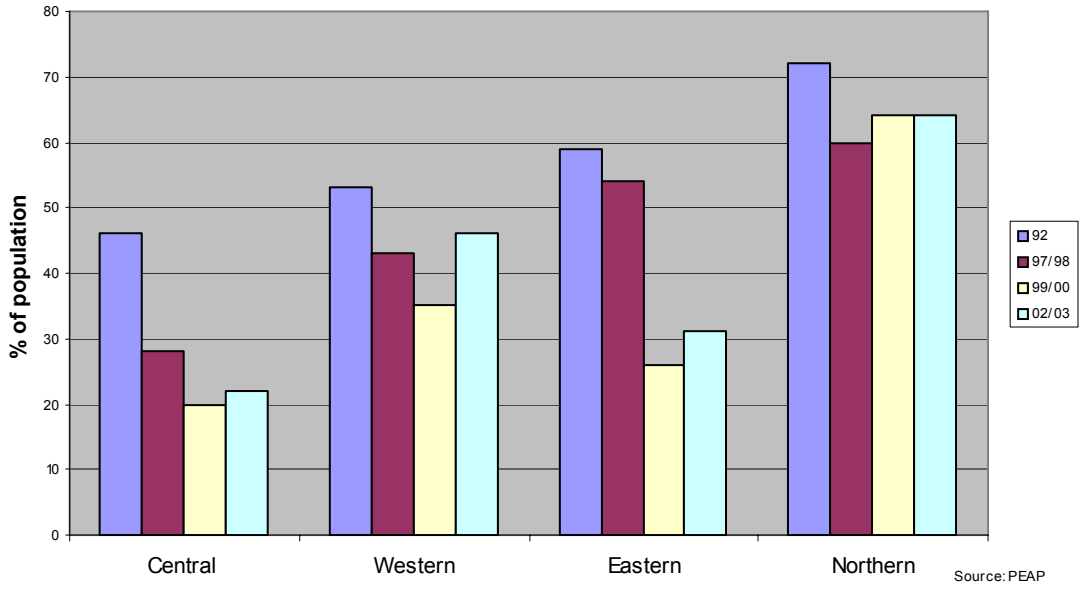



**Fig. 3. Poverty levels in Uganda by region**

The major observations:

- Overall, the incidence of poverty in Uganda is estimated to have fallen from 56% in 1992 to 44% in 1997/98 and to 35% in 2000 (one of the fastest declines in poverty ever recorded over such a short time; poverty declined twice as fast during the late-1990s as it did during the mid-1990s);
- Poverty fell significantly in both urban and rural areas, but much more rapidly in urban areas;
- The ranking of regions according to the poverty level remained the same over the entire period 1992 through 2000. From lowest to highest level of poverty, the regions were consistently ranked as follows: Central, Western, Eastern, and Northern (Fig. 3).

Based on panel data some observations were made on the poverty dynamics over time and characteristics of the households falling below the poverty line (Deininger, 2001). The most relevant observations:

- Overall, 27% of panel households emerged from poverty over the period 1992-2000, while 7% fell into poverty.
- Over two-thirds of households in the panel have their main occupation in agriculture, with almost no change during 1992-2000. This is in spite of the decline in the share of GDP derived from the agriculture sector over the same period from 52% to 43%.
- For the poor, although the number of poor households declined markedly over the period, the share of those still poor who earned their living from agriculture increased over the period, and stood at around three-fourths of poor households.
- While the share of non-poor households earning their living from agriculture remained constant at just over half.
- Non-farm enterprise activity: nearly half of all households had a non-farm enterprise.

  - While the share for all households with non-farm enterprises remained the same over the period, the share for poor households declined and that for non-poor households increased.
  - Only 15% of those with non-farm enterprises employed non-family labour. Implying that increased income was partially explained by an expansion of exiting family businesses.
- During the late-1990s (1995/96 to 1999/2000), both cash crop and food crop farmers experienced a marked decline in poverty: 46% to 30% and 62% to 46%, respectively. Whereas during the earlier period, reductions in poverty were pretty much limited to cash crop farmers.
  - The one group of agricultural households not to experience a marked reduction in poverty was the group of non-crop agriculture (livestock and fishing), with the incidence of poverty holding steady at around 40%. This is due to:
  - The EU ban on fish imports from Uganda which decimated fishermen's incomes precisely during the 1999/2000 period when the UNHS was undertaken, and
  - Possibly due to the decline in milk prices during latter part of the survey period.

Despite a modest economic growth, the latest national household survey however showed again an increase in poverty levels in the last three years (UNHS-UBOS, 2003). The analysis revealed that in 2003 39% of the population was poor, against 35% in 2000. Poverty has increased in both rural and urban areas in the last three years. In rural areas, where there was no apparent growth in consumption, the percentage of people living in poverty rose from 37% to 42 % in three years time. In urban areas, the corresponding increase was from 10% to 12 %. Although rural areas remain markedly poorer than urban areas, and saw lower growth rate in mean living standards, the proportionate rise in poverty is actually higher in urban areas.

Although the majority of rural households engage in subsistence agriculture, many poor households cannot produce enough food to feed their families or generate enough income to meet household's basic needs. In addition, on average in poor rural households, the purchase of food accounts for 60% of monthly expenditure. The situation may lead to forced sale of assets in order to meet household needs. Therefore increased production is vital for poor rural households in order to improve food security and promote income generation.

## 2.4 Contribution of horticulture to economic development and poverty alleviation in Uganda

The Uganda economy is dominated by the agricultural sector, which accounts for 39% (2003) of the GDP, 85% of export earnings, 80% of employment and provides most of the raw materials to the mainly agro-based industrial sector. Eighty five percent of the population of 25 million live in the rural areas and depend mainly on agriculture for their livelihoods. The agricultural sector is also the provider of national food requirements and food security during adverse years. Agricultural output comes almost exclusively from smallholders, most of whom have less than 2 ha of land. Food crops dominate the agricultural sector, in terms of acreage accounting for 92 percent of the area under cultivation while export crops account for 5 per cent (MAAIF, 1998). The traditional cash crop sub sector (coffee, cotton, tea, and tobacco) contributes 10 per cent to the GDP, but is more important in terms of foreign exchange earnings (60% of the total). Food crops contribute 71 per cent of total agricultural GDP and livestock 17 percent.

The contribution of the horticultural sector to the Ugandan economy cannot be under rated. However, no figures are available to assess the actual contribution of the horticultural sector to the GDP. Nevertheless it is obvious that the horticultural industry is making a major contribution to the national economy in terms of foreign exchange earnings, employment opportunities, rural development and food and nutritional security.

The horticultural sector both for the domestic market as for export (regional and international) creates employment for a large number of people. It is estimated that more than 30,000 people are involved in horticultural crop production in Uganda specifically for export: 12,550 in the fresh fruit and vegetable sector, 3300 in the flower sector and 6100 in the spice production sector (ADC/IDEA Project, 1999). Data necessary for assessing the role of the domestic horticultural sector in the Ugandan economy are lacking, but it is assumed that an even much larger number of people are involved in this sector and depend at least partly for their livelihood on production, trade and processing of fruits, vegetables and spices.

In 2001, the total FOB value of horticultural exports was conservatively estimated at USD 30 million. The products that are currently exported include flowers, (roses and chrysanthemum cuttings), fresh chilli, passion fruits, okra, vanilla, sun dried vegetables, and fruits. Horticulture is one of the fastest growing sub sectors in Uganda with an estimated growth rate of about 20% per annum. Vanilla and cocoa can be produced by small-scale farmers in many parts of the country. Their potential as supplemental cash crops to coffee has been largely untapped. Fresh flowers, plants, fruits and vegetables generally require significant investment capital, but offer high quality employment, and opportunities for out-growers to supply commercial farms.

The magnitude and ways the development of horticultural sector can contribute to poverty alleviation in Uganda has not been quantified. However, since it is a fast growing and labour intensive sector, the hypothesis is that horticulture may have a significant contribution to poverty alleviation both in the rural and urban areas. One of the overall objectives of this project is to identify the current and potential role horticulture development can play in poverty alleviation.

## 2.5 Government policies relevant to growth of the horticultural sector

The government of Uganda has successfully implemented sound macro-economic policies aiming to provide a conducive and enabling environment for private sector participation in economic development and real growth promotion. The implementation of prudent fiscal, monetary and exchange rate policies has restored investor confidence in the economy as well as public confidence in the currency, resulting in fiscal stability, balance of payments viability and rapid economic growth with low and stable inflation. Macro-economic stability, especially low inflation rate is an essential foundation for economic growth. In the last few years, the inflation rate has averaged 5.6% per annum, allowing the government to establish credibility for its anti-inflationary policies resulting in a sustained record of success observed in the last few years.

The government has also effectively pursued the policy of liberalising the economy and opening the market for domestic and external trade. In addition, the GoU has maintained an open and transparent regulatory policy framework for the private sector. This has attracted investors in the horticultural sector, especially in floriculture and other export oriented crops.

Critical structural reforms have been addressed that are needed to remove bottlenecks to the growth of the private sector and to raise productivity and output of the smallholder farmers.

The following policies have specifically contributed to the growth of the horticultural sector:

- *Liberalisation of markets*
  Since 1980s, the GoU has embraced liberalised systems for input and output markets, trade, investment and tax regimes. This has effectively been done by reducing the direct involvement of the government in production and commercial activities. For the agricultural sector, these reforms have included liberalisation of agricultural input trade, liberalisation of domestic and export produce marketing and processing, removal of restrictive tariff and non tariff barriers (particularly those for agricultural inputs) and abolition of taxes on agricultural exports. The measures implemented also included institutional reforms resulting in the privatisation and divestiture of public enterprises such as Coffee Marketing Board (CMB), Lint Marketing Board (LMB) and Produce Marketing Board (PMB) for coffee, cotton and food crops respectively. As a result of increased competition brought about by the liberalisation policies, the farmers' share in the realised international and overall farmers terms of trade for traditional export crops have improved significantly. The reforms have also boosted the growth of non-traditional exports, which have registered a steady expansion from USD 2.2million to USD 183 million between 1986 and 1997.
- *Gender*
  A comprehensive gender policy was formulated in 1997. The overall goal of the policy is to mainstream gender issues and concerns into the national development process in order to improve the social, legal, political, economic and cultural conditions of the people of Uganda, particularly women who are traditionally marginalized. Participation of all gender groups is promoted at all levels and institutions. Equality of access and control over economic resources and benefits is rigorously pursued and recognition of women's roles and contributions to national development efforts is accorded the priority it deserves. A supportive policy has therefore enhanced greater participation of women in the production and marketing of horticultural produce and products in Uganda.
- *Agricultural research*
  The thrust is to make agricultural research farmer oriented and farmer driven by providing appropriate technological packages.
- *Agricultural advisory services*
  There is need to formulate an agricultural extension that strives to promote an efficient extension service primarily focused on private sector delivery
- *Farm power and agricultural mechanisation*
  The government is promoting the use of intermediate technology, namely animal traction particularly under smallholder agriculture.
- *Diversification*
  Promotion of increased diversification in export crops in order to widen and stabilise the export revenue base
- Other factors that have contributed to the growth of the horticultural sector include removal of foreign exchange restrictions, removal of and /or refund of VAT on exports and removal of marketing monopolies

However, still a considerable number of problems in the enabling environment are observed:

- Inefficiency and Corruption of Public Institutions
  Despite the improvements that have been made in Uganda's enabling environment, business leaders point to a deep mistrust of many public institutions in Uganda. In particular, there is little trust in the ability of commercial courts to enforce commercial justice, e.g. enforce contracts and collect debts. There is also little trust in the competence and the integrity of public sector institutions dealing with trade and taxation, in particular the Uganda Revenue Authority. Although there has been some progress in the fight against corruption in Uganda, widespread corruption is perceived to be one of the most serious impediments to conducting business, especially in the formal sector. A very important finding based on Ugandan data is that corruption hurts investment and growth much more than explicit taxation (Fisman and Svensonn, 2000).

- Deficient and Unreliable Public Infrastructure and Utility Services
  Infrastructure problems are of long standing in Uganda. A 1998 survey of private businesses estimated that 90 operating days in a year lost due to loss of electrical power (Government of the Republic of Uganda, 2001a). Two surveys of foreign investors (1994, 1998) identified poor infrastructure, e.g., poor road transport and telecommunications, and unreliable utility supply as key liabilities for investing in Uganda (CIC, 1999). Though there have been improvements since then, erratic electricity supply is still problematic. For perishable high-value horticulture, these infrastructure and utility problems can determine profit or loss. The average transport cost or "tax rate" on Ugandan exports to world markets has been estimated at 64 percent, roughly twice that for neighbouring African countries (Wood and Jordan, 2000).

- Costly and Unavailable Finance
  Despite important reforms in the financial sector, e.g., introduction of improved prudential regulations and more effective supervision and enforcement, opening of the sector to foreign banks, and improvements in the payments system, banks do not function as efficient mechanisms to allocate scarce financial capital. Banks have excess liquidity, while accessing affordable capital for business (except for prime customers) is a chronic and pervasive problem.

- Land Use
  At present, there is no formal land use policy at the national or local levels. Reliable land tenure acts as an incentive for investment in land for better agricultural productivity.

- Labour as Both Asset and Liability
  Cheap labour is an asset, but the low level of skills and low productivity are liabilities. Foreign investors are particularly concerned about the lack of middle managers, technicians, and skilled labour. Further, the scarcity of seasoned entrepreneurs is a major deterrent for the development of joint ventures, a formula that has been instrumental in reducing the lack of finance, know-how, and skills typical of SMEs all over the developing world.

- Institutional Support for Trade Development in the Public Sector
  Currently, trade institutions in Uganda are not adequately designed to fulfil the goals of the Poverty Eradication Action Plan (PEAP). Further, public responsibility for handling trade issues is fragmented among numerous ministries and agencies (e.g., agriculture, foreign affairs and regional cooperation, justice

and constitutional affairs, Uganda Investment Authority, Export Promotion Board), contributing to duplication and "bureaucratic fights." In addition to problems regarding institutional capacity, Uganda also lacks capacity in related support areas. Research ability and knowledge in dealing with trade arrangements is one of these weaknesses. In addition, beyond policy-oriented research, capacity is needed in developing and enforcing rules of standardization and quality assurance in order to comply with the many technical regulations, standards, and sanitary and phytosanitary measures of the trade arrangements.

- Building Financial and Analytical Capacity of Private Sector Associations
  There are three organizations that represent the private sector in Uganda: the Uganda Manufacturers Association (UMA), the Ugandan National Chamber of Commerce and Industry (UNCCI), and the Private Sector Foundation (PSF), as well as a large number of sector specific associations involving producers, processors, traders, and exporters. These consult Government on specific issues related to the trade concerns of their members. They have also begun to develop sub-sector strategies, for example in the coffee sector. However, the extent to which they can be effective depends on their capacity to undertake analysis and to be involved in advocacy and promotion. That capacity, in turn, hinges on the associations' financial strength.

## 2.6 Infrastructure

As a landlocked country, Uganda has always been dependent on its neighbours, especially Kenya, for transportation of its imports and exports. It is connected to the sea through the ports of Mombasa in Kenya and Tanga and Dar es Salaam in Tanzania. Uganda has a reasonably well-developed infrastructure comprising of a network of road, rail, and airports. The country is fairly adequately connected to its neighbours as well as COMESA member states by rail, road and air.

*Road Network*
Road is the most dominant mode of transport in Uganda. It plays a pivotal role in supporting development programmes. It carries over 90 per cent of the country's passenger and freight transport and provides the only form of access to most rural communities. The gazetted roads, which form 30% of the road network, carry 80% of the total road traffic volume, while the rural feeder roads are the major means of access to the rural areas. The road transport system in Uganda comprises about 10,000km of classified main road (trunk, secondary and tertiary), about 23,000km of district feeder roads, 3,000km of urban roads and 30,000km of community access roads. There are 2,000km of bitumen-surfaced highways, 6,000km of gravel highways, 20,000km of feeder roads. The condition of the classified roads varies. Uganda's gazetted road network also plays an important role in the regional economy. It serves as a transit corridor linking the land locked regional countries of Rwanda, Burundi, parts of eastern Democratic Republic of Congo and southern Sudan to the Indian Ocean via the ports of Mombasa in Kenya and Dar es Salaam in Tanzania. Major trunk road network has improved, although rural feeder roads are impassable during the rain season.

*Railway Transport*
Uganda Rail Corporation (URC) is the sole rail operator in Uganda. The rail services are extended to the Indian Ocean through Kenya and Tanzania by cooperation agreements with Kenya Railways Corporation (KRC) and Tanzania Railways Corporation (TRC), respectively. The Kampala-Malaba line requires new rails,

sleepers, track fittings, ballast and replacement of culverts while the Kampala-Kasese line is not useable and needs complete rehabilitation.

*Air Transport*
The Entebbe International Airport, which is 30 km from Kampala city, has now been fully refurbished. Several local and international airlines currently provide regular scheduled flight services between Uganda and Europe, Middle East and other African countries and within Uganda. Cargo traffic has been increasing at Entebbe International Airport. The general increase in Cargo handled at Entebbe Airport is attributed to the increase in volume of imports and exports of mainly horticultural, flowers and fish products. Most of the cargo is freighted under scheduled passenger flights. Due to the upsurge in the growth of air transport, the present air facilities can no longer accommodate the rapid growth. The present cargo terminal has an area of 3,200 square meters of handling space. The processing space is inadequate, there is no racking and facilities for storage of cleared shipment are non-existent.

*Water Transport*
Inland water transport is a major component of the transport system since 18% of Uganda's total area is under water in the form of lakes and rivers, many of which are navigable. It is also the cheapest mode of passenger and cargo transport. The main navigable waterways include Lakes: Victoria, Kyoga, Albert and Rivers: Nile, Katonga, Kafu, Aswa, Semliki and Kagera.

*Utilities - Electricity and water*
Accessibility to utilities in the rural areas is poor and many commercial farmers have to improvise or incur extra cost to install the necessary infrastructure, especially for perishable commodities like flowers. In many places power supply is erratic and poorly distributed. Water supply is reliable only in major towns, though supply does not meet the current demand. Clean water is still very difficult to obtain in many places.

*Telecommunication*
The telecommunication sector is fully liberalised. Both land and mobile phones services are adequately available on a competitive basis. These are further supplemented by availability of Internet services in major towns like Kampala.

## 2.7 Research and Extension

The Uganda National Council of Science and Technology (UNCST) is the apex organisation for Uganda's research system. It has the mandate to promote, advice and coordinate the formulation of national research policies and fostering the integration of science and technology in Uganda's economic and social development. The mandate for agricultural research under UNCST was delegated to National Agricultural Research Organisation (NARO) whose mandate is to undertake, promote and coordinate research in crops, livestock, fish and forestry. In addition, it is to ensure that the research findings are disseminated and continuously applied by clients or farmers. NARO implements her mandate through nine institutions supported by a secretariat (NAROSEC) located in Entebbe. Kawanda Agricultural Research Centre (KARI) undertakes most of the horticultural research. The main weakness of the research system is that it has operated without a comprehensive agricultural research policy that would define the goals, objectives, institutional roles, and resources for agricultural research.

Other institutions that form the National Agricultural Research System (NARS) include the Makerere University Faculties and Institutes, Economic Policy Research Centre (EPRC), Uganda Institute of Ecology, the private sector, especially the large commodity companies and agro processors, NGOs and International Agricultural Research Centres (IARCs) located in Uganda such as CIAT.

Currently, the donor community finances about 75% of research activities while the remaining 25% is provided by the government mainly in form of remuneration.

Agricultural extension in Uganda has served few farmers. The delivery of technical messages to farmers has been associated with government agricultural extensionists who have also administered the delivery of various inputs and /or support and service programmes. For a long time, extension has been inherently exogenous, donor driven and non-participatory. It is characterised by too much bureaucracy and low responsiveness to the farmers needs, making it susceptible to the diminished budgetary support. Lack of financial and performance accountability and client ownership have further aggravated the situation. The research-extension-farmer-linkages and the delivery systems mechanism have also been inadequate. Though the system was performing relatively well after independence, it collapsed during the political turmoil of the 1970s and 80s and since then it has not recovered in performance.

Institutions involved in provision of agricultural extension services are MAAIF, NGOs promoting agricultural activities and extension staff employed by private companies engaged in commercial agriculture.

## 2.8 Relevant Institutions

Three types of institutions involved in horticultural related activities can be identified: public institutions, private institutions, and development partners.

Public Organizations:

- *Uganda National Bureau of Standards (UNBS)*
  The bureau is responsible for development, promotion and enforcement of standards, quality assurance, metrology, and testing practices. It protects consumer interests and equity in the market place and maintenance of an international tracking system.
- *Uganda Investment Authority (UIA)*
  Assists in the issuing of licences, work permits, and loan approvals, industrial and agricultural land, contacts for those interested in joint ventures, and makes recommendations to the government to facilitate a sector or category of investors.
- Uganda Export Promotion Board (UEPB)
  UEPB provides trade and market information services, customized advisory services, formulate and recommend to government export plans and strategies.
- *National Agricultural Research Organisation (NARO)*
  Has a mandate to undertake, promote and coordinate research in all aspects of crops, livestock, fishery and forestry. Kawanda Agricultural Research Institute (KARI) one of NARO's institute is responsible for horticultural research and development. New varieties of horticultural crops are developed or introduced and new inputs are tested at KARI.
- *National Agricultural Advisory Services (NAADS)*

The National Agricultural Advisory Services (NAADS) is one of the seven programmes under the Plan for Modernisation of Agriculture (PMA) put in place to increase the efficiency and effectiveness of advisory service delivery. It is aimed at increasing farmer access to information, knowledge and technology.

- *Ministry of Tourism, Trade and Industry (MTTI)*
  The role of the MTTI is to coordinate domestic, regional and international trade and marketing (including WTO), agro processing and industrial use of raw materials.
- *Ministry of Agriculture Animal Industry and Fisheries (MAAIF)*
  The ministry deals with agricultural policy formulation, planning, sector monitoring and guidance.
- *Ministry of Finance Planning and Economic Development (MFPED)*
  The MFPED deals with public funding, coordinating with donors, national planning and monitoring.
- *Makerere University (MU)*
  MU is the leading institution of higher learning producing graduates in agriculture and agro-industry. The key role of the Faculty of Agriculture is to develop human resource required in the agricultural sector.

Private Institutions:

- *Uganda National Farmers Federation (UNFFE)*
  UNFFE is an umbrella organisation bringing together all farmers in Uganda.
- *Horticultural Exporters Association (HORTEXA)*
  The organisation serves horticultural growers and exporters by promoting horticultural production for local and international markets, ensuring product quality to meet international standards, provide technical assistance and serves as a medium for negotiating competitive and uniform prices.
- *Uganda Flower Exporters Association (UFEA)*
  The UFEA is an umbrella organisation bringing together all the stakeholders in the flower industry in Uganda. It provides support services to the flower growers.
- *National Organic Agriculture Movement (NOGAMU)*
  This is an umbrella organisation bringing together all organic crops producers and exporters.
- *Uganda National Chamber of Commerce and Industry (UNCCI)*
  The organisation is responsible for coordinating the commercial and industrial sectors in Uganda.
- *Private Sector Foundation (PSI)*
  Is an apex body of the private sector organisations in Uganda and advocates for policies, carries out studies related to private sector competitiveness and participation in economic development.
- *Uganda National Vanilla Association (UNVA)*
  UNVA brings together all stakeholders involved in vanilla production, processing and export.
- *Uganda Floriculture Association (UFA)*
  UFA promotes and encourages floricultural production and marketing mainly for the local market.

Development partners:
These include some important organisations such as the USAID ADC/IDEA Project, DANIDA and many other Non-Governmental Organisations (NGO's).

# 3. THE HORTICULTURAL SECTOR IN UGANDA

## 3.1 Definition of the horticultural production sector

In this study we consider horticultural production to include the growing of fruits, vegetables, flowers, and spices. Important characteristics of most horticultural crops are:

- Food products mainly eaten for flavour, minerals and vitamins;
- Non-basic food commodities; people will not buy them if the price is too high;
- Consumption levels vary, depending on the selling price and the income of the buyer;
- Perishable products, which means there is always a reduction in quality if they are not sold immediately, usually leading to a fall in value;
- Much substitution between products: if one product is too highly priced the consumer will generally buy another alternative;
- Products are normally traded in a free market where price is determined by supply and demand (FAO, 1989).

Uganda has tremendous potential for production of all kinds of horticultural crops. The temperature regime, the rainfall distribution and the soils are very favourable for growing a wide range of tropical, sub-tropical and temperate fruits, vegetables, spices, flowers and ornamentals in its 56 districts.

The horticultural sector has become important in the Uganda economy as it contributes a big share of the non-traditional exports. Of the total 2,277,184 ha under agricultural production, 29,600 ha are under vegetables, 16,000 ha are under fruits, 2,500 ha are under spices and 126 ha are under flowers. The areas under cultivation and production may be much larger than what is estimated above since most households intercrop horticultural crops with other crops for domestic consumption. Horticultural crops production constitutes only 3% of total agricultural land and about 30% of the total agricultural production. The average yields of horticultural crops are still low. (Hossain, 1995; ADC/IDEA Project 2003; ADC/IDEA and UFEA, 2002). Horticultural crops for export occupy only about 8,041 ha and a total production of 7,210 MT (ADC/IDEA, 2000).

The major horticultural crops grown in Uganda are presented in Table 3. The crops recommended for the sector study analysis are indicated with an asterisk at the end. The crops selected for more detailed analysis under vegetables include cabbage, tomatoes, onion, hot pepper/chilli and okra. These crops are significant in terms of volumes produced in the country though most are utilised locally except hot pepper okra that are mainly produced for export market. Under fruits the crops prioritised as important include passion fruit, papaya/papain, citrus, pineapple, mango, avocado and apple banana. Most of these serve the local demand and are also exported. The flowers prioritised include roses, chrysanthemum cuttings and summer flowers. These are the major types of flowers grown in Uganda. The spices selected for detailed analysis include vanilla and ginger. The other listed are grown in small quantities and are of no economic significance. The selection was based on the number of producers involved dealing with the crop and or the economic importance in terms of value to the country.

Production of horticultural crops is largely by smallholder growers, scattered all over the country. The main production areas are Kabale, Kamuli, Kapchorwa, Kasese, the lake basin, Mbale, Masaka, Mubende, Mukono, Wakiso and West Nile Districts and

North and Northeastern region (Ssemwanga Centre, 2003) (Table 4; Fig. 1.) The system of production is mainly under rainfed conditions with very little mechanisation for fruits, vegetables and spices, while flower production is done under irrigation and is highly mechanised.

**Table 3. Major horticultural crops grown in Uganda.**

| Vegetables | Fruits | Flowers | Spices |
|---|---|---|---|
| Cabbage* | Passion fruit* | Rose* | Vanilla* |
| Tomato* | Papaya/papain* | Chrysanthemum | Ginger* |
| Onion* | Jackfruit | cuttings* | Chillies |
| Eggplant | Citrus* | Celosia/Poinsettia | Pepper |
| Amaranthus | Pineapple* | cuttings | Tumeric |
| Carrot | Mango* | Gerberas | |
| Green pepper | Avocado* | Summer flowers,* | |
| Sweet pepper | Apple banana* | Foliage plants | |
| Cauliflower | Bogoya | Ornamentals | |
| Kale | (Cavendish) | | |
| Cucumber | Watermelon | | |
| Garlic | Guava | | |
| Leek | Grape | | |
| Hot pepper/Chilli* | Strawberry | | |
| Lettuce | Melon | | |
| Spinach | Tree tomato | | |
| French beans | | | |
| Green beans | | | |
| Cowpeas | | | |
| Pumpkin | | | |
| Field peas | | | |
| Aubergine | | | |
| Okra* | | | |
| Malakwang (Hibiscus) | | | |
| Ntula (Solanum spp) | | | |
| Nakaati (Solanum spp) | | | |
| Jobyo (Gynandra spp) | | | |

(Anon. 1989; Hossain, 1995; Ssebuliba, et al., 2001;IDEA Project/UFEA, 2002; Smart, 1988).
***** Crops included in the Ugandan sector study

**Table 4. Location of production centres for horticultural crops in Uganda**

| Fruits | Vegetables | Flowers | Spices |
|---|---|---|---|
| Lake basin | Lake basin | Lake basin | West Nile |
| Kabale | Kabale | Mukono | |
| Kasese | Kasese | Kamuli | |
| Mbale | Mbale | Kabale | |
| Kapchorwa | Kapchorwa | Kasese | |
| N+NE | Mubende | Mbale | |
| Region | Masaka | Mabira | |
| | Wakiso | Masaka | |

Source: Ssemwanga Centre Ltd (2003) Analysis of the horticultural Sector

## 3.2 Definition of the horticultural supply chain

### 3.2.1 Horticultural supply chains in general

The supply chain is the connected series of activities, which is concerned with planning, co-ordinating, and controlling material, parts, and finished goods from suppliers to customers. It is concerned with two distinct flows through the organisation: materials and information. The scope of the supply chain begins with the source of commodity being supplied and ends at the point of consumption. It extends much further than simply a concern with the physical movement of material and is just as much concerned with supplier management, purchasing, materials management, manufacturing management, facilities planning, customer service and information flow as with transport and physical distribution (Steven, 1989). The supply chain encompasses all activities associated with the flow and transformation of goods from raw materials stage, through to the end user form, as well as the associated information flows (Handfield/Nichols, 1999).

In this study, the supply chain of horticulture products is defined as a set of production, distribution and marketing process of the horticulture products. It provides the perspective for horticulture growers to be able to participate in the commercial network or relations with processors and marketing agents. Horticulture supply chains comprise of many actors including input suppliers, growers, pickers, packers, processors, storage and transport facilitators, marketers, exporters, importers, distributors, wholesalers, and retailers. Each actor will add more value for the products when doing his task. Supply chain development can thus benefit a broad spectrum of society, rural and urban in developing countries.

### 3.2.2 Horticultural supply chains in Uganda

The success of the horticultural sector is largely based on the efficiency and flexibility of the marketing system. Though grown widely for subsistence purpose, most horticultural products contribute to the generation of income at household and country level. A bulk share of the potential demand of horticultural products is in urban areas and in foreign markets. This underscores the importance of efficient marketing strategies for various commodities. The current distribution chain of horticultural commodities in Uganda varies depending on the commodity and its level of commercialisation. The variation is further determined by whether the commodity is for rural, regional or for overseas consumption. The following paragraphs further define the supply chain of the four commodity groups identified for the sector analysis study.

*Fruits and vegetables marketing*
Most of the fruits and vegetables produced in Uganda are consumed locally and are produced by smallholder farmers. After harvest, they are transported to rural market centres for local consumers or are bought at the farm by neighbours. Others are transported to bigger market centres where many producers utilise the open-air markets that are patronised occasionally, once or twice a week. Limited post harvest improvement is done for locally consumed fruits and vegetables. However, fruits like pineapples and avocadoes exported to Europe and other destinations are graded and packaged appropriately.

*Spices*
The main spices grown in Uganda for commercial purposes are vanilla, ginger, and turmeric at a very small scale. The main spice is vanilla. Marketing of vanilla is well understood since almost all the produce is exported after processing.

*Flowers*
Flowers grown in Uganda have their market in Europe. Most of the flowers are grown in well-managed farms with links to importers abroad.

Generally market channels vary widely depending on the commodity, the location of the final consumer relative to the production area and the degree of processing. It is important to distinguish between market channels to serve rural consumers, urban consumers, and the export market. The diversity in the channels is reflected in the number of participants involved in the marketing of various commodities. The participants in the marketing process include input-suppliers, producers, intermediaries/ wholesale traders, processors, transporters, retailers and consumers (Fig. 4).

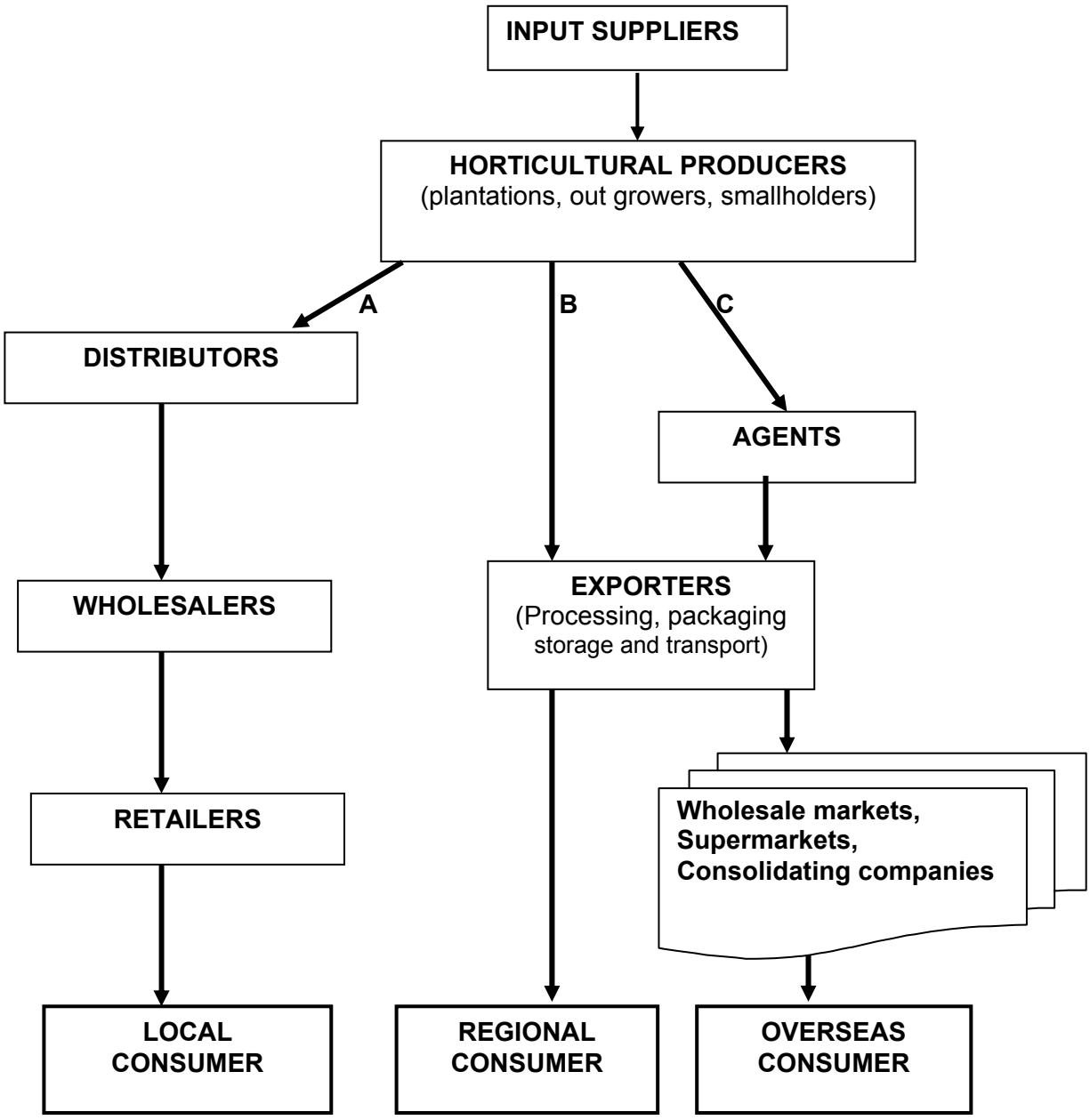
*Input-suppliers*
Producers require various production inputs such as seeds, seedlings, fertilizers and pesticides. Trading companies and local stockists are the major actors and the supplies of these inputs.

*Horticultural Producers*
Producers are important participants in the supply chain since they ensure the commodity is available for the initial transaction to take place. The smallholder producers do not have good marketing strategies for their produce as they wait for traders to go and buy the commodity at farm gate. In most cases, there are no organised farmer groups or marketing associations to facilitate the marketing process. As a result, farmers are basically price takers.

An overview of the main actors:

*Agents/brokers - Intermediaries*
The intermediaries or rural traders are involved in rural purchases and transportation arrangements and sales at the terminal markets or distribution points. They literally go round the farms buying horticultural produce, in some cases they are involved in actual harvesting to meet the targeted volumes for the day. The rural traders set the price they want to buy the produce from farmers. They are the most powerful participants in the marketing process since they determine the price at farm level and at the terminal market. The rural traders sometimes double up as wholesalers once the commodity has reached the market place. Individual traders use a common place to display and sell the commodity in the various markets. Intermediaries are more vocal in the marketing of commodities that do not have formal marketing arrangements. Their business thrives in marketing produce such as fruits, vegetables and in some cases spices.

*Processors*
Processing of horticultural products plays an important role in attempting to add-value to the product in the supply chain. Fruit and vegetables juices, jams, frozen and packed vegetables, cut and pre-packed salads are some examples. Processing is still a minor activity in the horticultural sector in Uganda, however, it has a high potential.




**A** The main channel for fruits and vegetables
**B** Channel for some fruits and vegetables and exclusive channel for commercial flower growers
**C** Channel used for spices like vanilla

**Fig. 4. Overview of common horticulture marketing channels in Uganda**

*Transporters*
They facilitate the movement of the commodity from the production point to the consumption end. In Uganda, transportation of produce from site of production to market is inadequate. This is mainly due to lack of appropriate means of transport. Transportation of horticultural produce from the field is tedious (carrying the produce on the head). Sometimes wheel burrows and bicycles are used to ferry the produce to rural periodic markets. From village to trading centres bicycles and motorcycles are used within the rural areas. Motor trucks are used when volumes are large, and distances are long. Big commercial growers/exporters use cold or refrigerated trucks

to ferry produce to the airport, from where produce is air lifted to its final destination. Transporters play a key role in moving the produce from rural to urban markets due to the wide variation in agro-ecological zones and geographical distribution of horticultural produce.

*Wholesalers*
These are the individuals found at the market place dealing with bulk quantities of produce. The wholesalers sell the produce to the retailers who then sell to consumers. The wholesalers buy the produce from producers and rural assemblers and are crucial in determining the price at other levels. Their main buyers are retailers, institutions and processors.

*Retailers*
The retailers stock very small quantities of the commodity, mainly due to high cost and limited demand among the users. The units of measure at the retail point vary depending on the clients and the quantities the retailers are able to afford. The main buyers from retailers include individual households, hoteliers and institutions dealing in relatively small quantities.

*Consumers*
Different types of consumers are served through different market channels. The consumers in the domestic market and the regional market are served by various channels depending on the type of commodity, the location (urban versus rural) and wealth status (from slum resident to up-class hotel guests) of the consumer. The consumers in Europe, USA are served by exclusive exporting marketing channels.

# 4. PRODUCTION AND MARKET DEVELOPMENTS

## 4.1 Area and production developments

### 4.1.1 Introduction

Developments in cultivated areas and total production levels for the identified commodity types are reviewed over the last 10 years. The developments in Uganda are compared to Kenya (having the largest horticultural sector in the region), Sub-Saharan Africa, the European Union and the World.

### 4.1.2 Vegetables[3]

At global scale the total harvested area of vegetables increased by almost 50% in the past 10 years, with the largest increase taking place in Asia. In SSA an increase of about 25% is observed in the period 1993-1999, but stabilises in the following 4 years. In Uganda an increase of 30% of harvested area of vegetables in the same period is observed with a total of almost 93,000 ha in 2003. In the last 3 years (2000-2003) however no considerable increase in the cultivated area has taken place (Fig. 5).

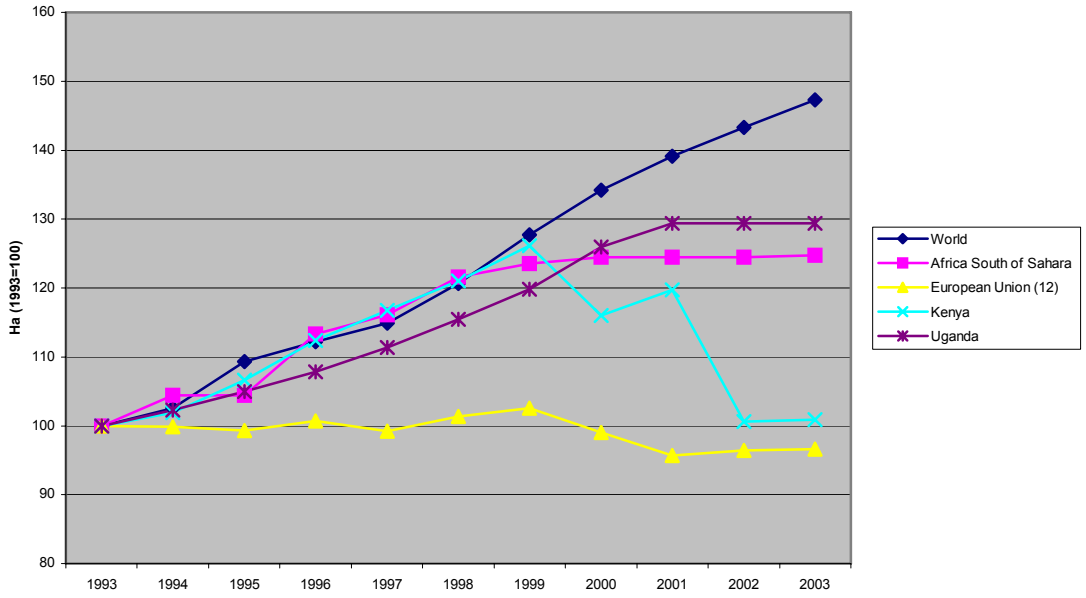



**Fig. 5. Harvested areas of vegetables in the World, SSA, EU, Kenya and Uganda (1993 – 2003)**

Global production levels of vegetables increased by 55%, the majority of this increase coming from area expansion. Growth in productivity (yields per unit area) is limited with approximately 0.5% annually. In SSA a 30% increase in total production of vegetables has been realised, with comparable growth rates of annual productivity. In Uganda total vegetable production increased with 23% to a total of 556,000 Mt in 2003. Given the area increase of 30% a logical conclusion is that overall productivity of vegetable production declined.

[3] Source: FAOSTAT; for definition of vegetables refer to FAOSTAT

Neighbouring Kenya has seen a sharp decline in harvested area (from 145,000 ha in 1999 to 115,000 ha in 2003) and total production in the last 4 years, after a steady growth till 1999. Overall productivity levels remained largely unchanged. The stagnating productivity levels both in Uganda and Kenya are alarming since this may affect the production costs and competitive position compared to other production centers in the region and the world Fig. 6).

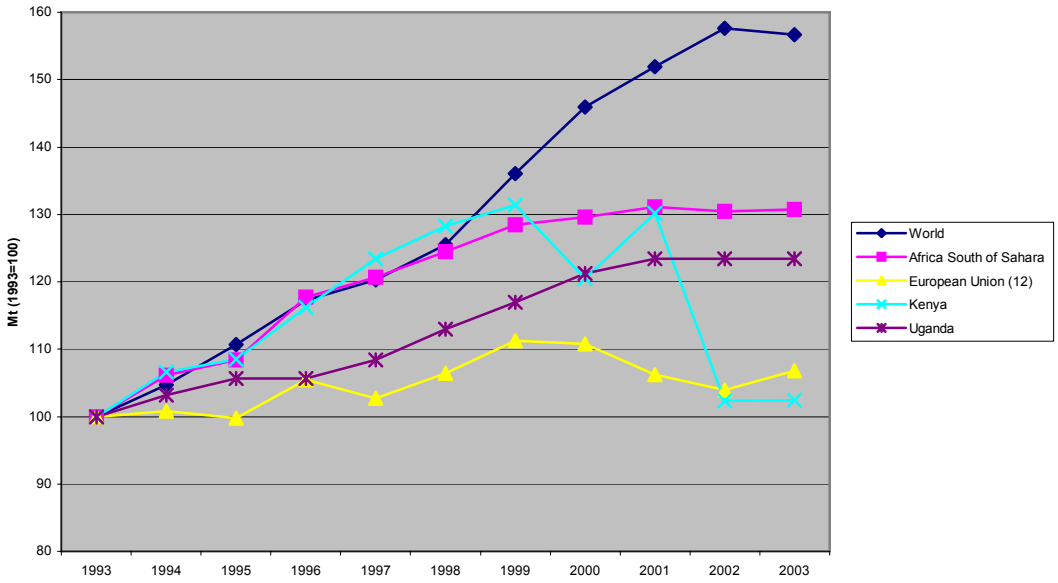



**Fig. 6. Vegetable production in the World, SSA, EU, Kenya and Uganda (1993 – 2003)**

### 4.1.3 Fruits[4]

The total harvested area of fruits worldwide increased with 14% in the period 1993-2003 (Fig. 7). In SSA a growth of 11% was realised against a decline of 6% in the EU. Uganda and Kenya realised comparable growth rates to SSA, with 11 and 7 % respectively. For Uganda these statistics include cooking bananas (Matooke), the major staple crop in the country, which is not considered a horticultural crop. However, the individual crop statistics presented in Chapter 5 provide a comparable picture.

Global fruit production increased 22% in the period 1993-2003, against 14% in SSA. Uganda and Kenya saw a growth in total production of 19% and 20% respectively. This leads to the conclusion that the production levels per ha increased considerably in the past 10 years at global level. Especially in Kenya (1.3% per year) and Uganda (0.8% per year) yields levels saw a spectacular growth, even higher than at the global and SSA level (Fig. 8).

Fresh fruits and vegetables for export are grown by less than 3,000 small-scale growers, who sell regularly or intermittently to opportunistic export traders. Since most growers have no irrigation, their earnings depend upon weather conditions as

[4] Source: FAOSTAT; for definition of fruits refer to FAOSTAT. Banana's are included in the fruits group in FAOSTAT, while in Uganda Matoke banana's are considered a staple crop rather than a horticultural crop.

well as market demand. The traders operate with minimal facilities and sell to price-driven fringe importers, usually located in the wholesale markets of UK and Holland. This is a shrinking business, since the wholesale markets are gradually losing out their share to supermarket chains, which operate procurement contracts with a small group of approved importers.

The ever-increasing quality, hygiene and traceability requirements of the supermarkets mean that opportunities for smallholder production of fresh fruits and vegetables are very limited. Modern farms with year-round irrigation, hygienic packhouses and cold chains are essential. Mairye Estates, located 40 minutes drive east of Kampala on the Guyaza road, is the only commercial farm of this type producing fresh vegetables to standards approved by major European supermarkets.

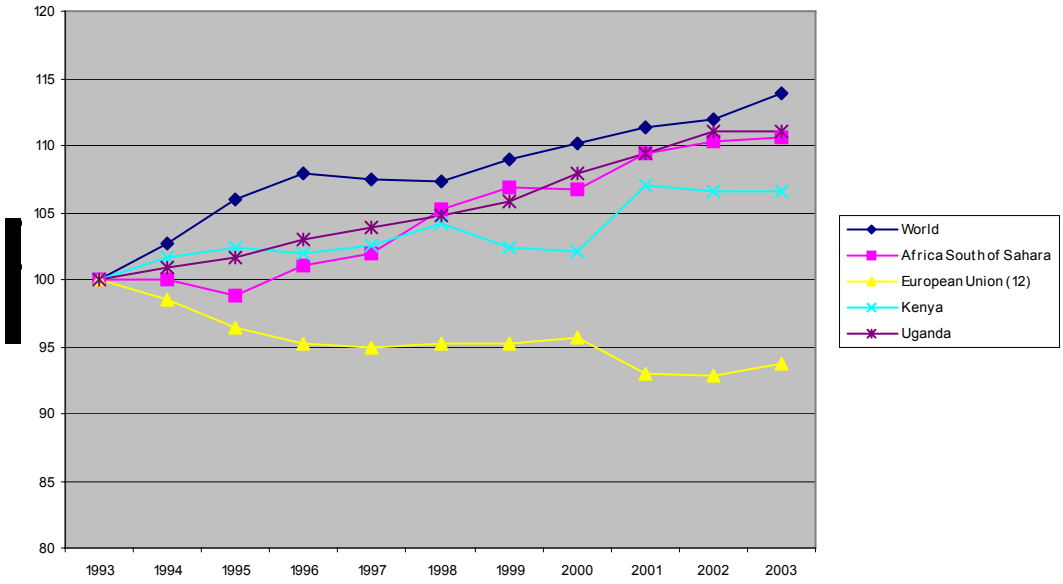



**Fig. 7. Harvested areas of fruits in the World, SSA, EU, Kenya and Uganda (1993 – 2003)**

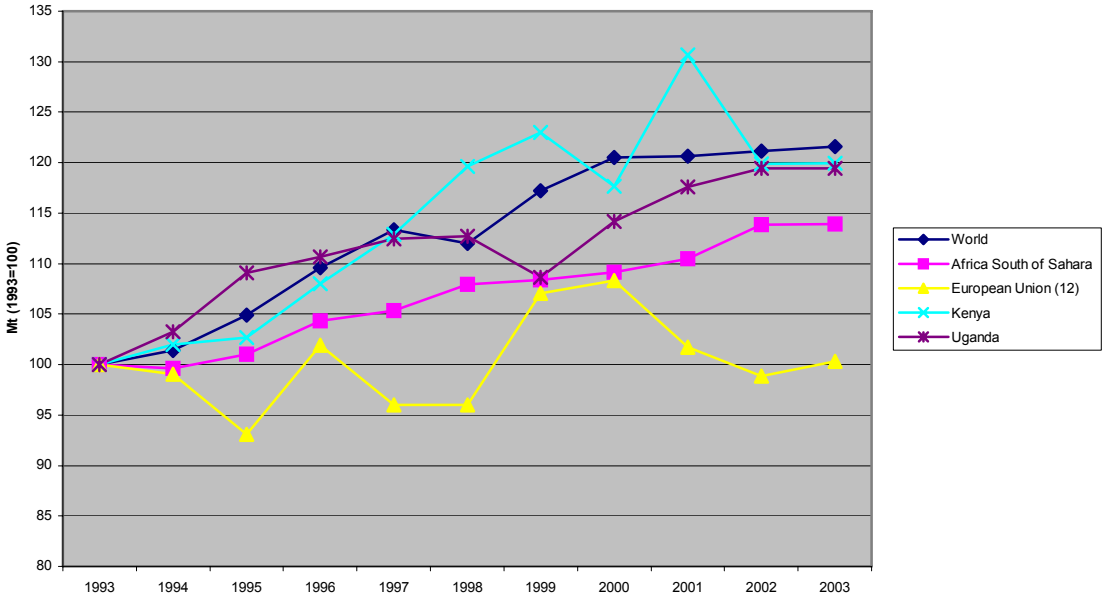



**Fig. 8. Fruit production in the World, SSA, EU, Kenya and Uganda (1993 – 2003)**

### 4.1.4 Flowers

There are currently 20 firms in floriculture, growing 140 hectares of flowers in custom-built greenhouses, which employ directly more than 4,000 permanent staff. More than three times this number benefit from associated service industries. There are no small-scale growers of flowers since the investment requirements are prohibitive. All flower farms are located within two hours of Entebbe Airport. Floriculture comprises of two main product groups, cut roses and chrysanthemum plant cuttings, shipped mainly to Holland as the primary destination. Other species are currently being tested on a trial basis.

### 4.1.5 Spices

Vanilla is grown by more than 10,000 smallholders, usually with less than 0.2 hectares. They pick fresh vanilla beans twice each year and sell to one of ten processing/ export companies. The exporters process and dry the beans over a three-month period to about 20% of their original weight. In January 2002 farmers received 15-20,000/- per kilogram for good quality vanilla, making it the highest value crop ever grown in Uganda! The extremely high world prices, due to production problems in Madagascar which is the main supplier to the world market, are expected to drop during 2004/2005. Nevertheless this will remain a very attractive crop for small holders in the future.

## 4.2 Developments in global trade

Worldwide exports in fruits and vegetables increased with 37% over the period 1993-2002 to an estimated 75 billion US$. Much higher growth figures were realised however in the EU and SSA with 76% and 80 % to levels of 7 billion US$ and 800 million US$ respectively. Exports from Uganda however declined sharply in the same period (-55%) to a meagre level of 6 million US$ in 2002. This contrasts with the developments in Kenya that saw an export growth of 34% to a level of 145 million US$ in 2002 (Fig. 9).

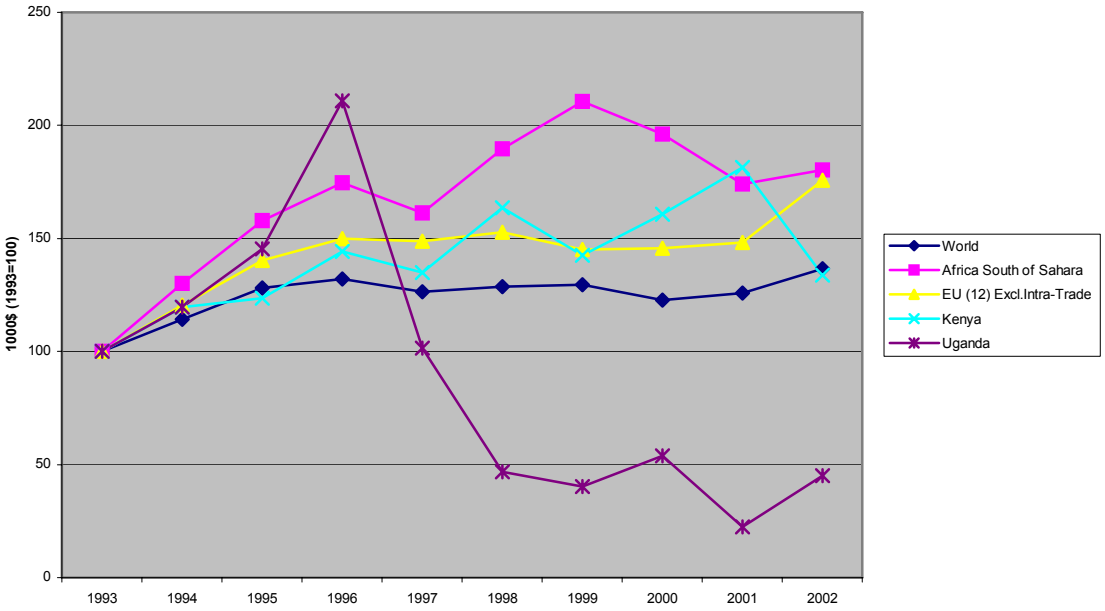



**Fig. 9. Fruit and Vegetable Exports in the World, SSA, EU, Kenya and Uganda (1993 – 2002)**

Imports of fruits and vegetables in SSA saw only a small increase of 7% over the period 1993 – 2002. In Kenya large fluctuations in imports occurred, but on average remained stable, while in Uganda a rather steady decline of imports was observed (Fig. 10).

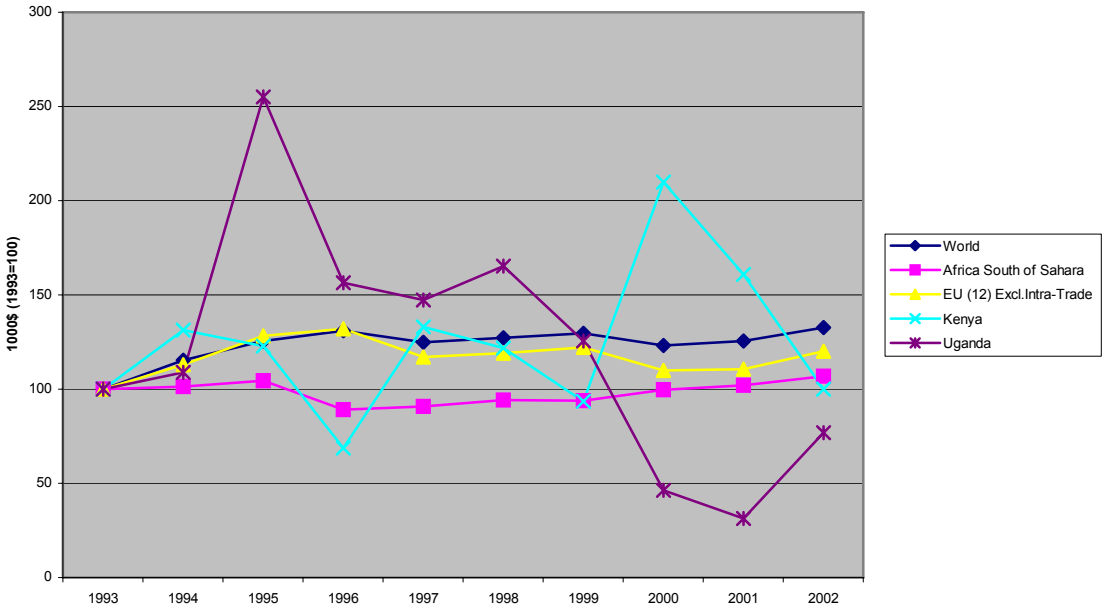



**Fig. 10. Fruit and Vegetable Imports in the World, SSA, EU, Kenya and Uganda (1993 – 2002)**

## 4.3 Domestic trade

The per-capita/day consumption of fruits and vegetables in Uganda is estimated at 29.4g and 31.5g, respectively. This is far below what is recommended by nutritionists of 80g fruit and 200g vegetables per capita/day, respectively (Hossain, 1995).

Although difficult to quantify, the local market for horticultural crops is expanding very rapidly, as indicated by the growing number of fresh food markets and growth in importance of specialised commercial horticulture. However, there are no reliable figures on total marketed production and price trends, which can be accessed by growers or organisations to plan for an efficient marketing strategy for the domestic market.

The potential for increased production exists due to the wide range of fertile soils and climatic conditions which are ideal for these crops. However, there are formidable problems of poor produce quality, poor post harvest handling, weak distribution and marketing infrastructure and non-existent refrigeration facilities for the local market.

The quality of produce varies so widely that sales potential exists for most products. Imported produce, mainly from Kenya, Rwanda and Tanzania, is of a higher quality as it is sorted and cleaner than that sourced locally. Commodities are not sold on the basis of uniform standards of grading. Weight is not taken as the basic measure but volume (i.e. baskets, sacks, or box size). Quite often the price will depend on individual negotiations. Subsequently, the fairness of prices depends on information, trading skills and bargaining power between suppliers (producers/growers) and buyers. Consumers are not knowledgeable about varieties and usually buy according to price and appearance. Stall retailers tend to stock in large quantities especially to take advantage of the fluctuating prices and their sales are through bargaining and haggling, given that there are no uniform standards except in a few cases. The variations in prices reflect the functions of inter-seasonal storage operations. Most of the price variations are supply based because of imperfect coordination in the supply of products to the market (by the producer and traders from different regions of the country).

## 4.4 Export developments in Uganda and Kenya

### 4.4.1 Export developments per product group

In 2003 the total *fob* value of high value horticultural export products was estimated at $60 million (IDEA Project, 2002). In Uganda the exported value of vegetables saw a sharp decline in the period 1995-1998, but stabilized thereafter. Both flowers and vanilla export realised an impressive growth to about an estimated 23 and 17.5 million US$ in 2003 respectively. Also the export value of plant cuttings showed a steady increase after 2000 (Fig. 11). Table 5 gives the export volumes of fruits and vegetables from Uganda, while Table 6 gives the export volume of fruits to the European Union and other countries.

**Table 5. Fruits and vegetables export volumes and values (air freighted)**

| YEAR | VOLUME IN MT | VALUES IN US $ |
|---|---|---|
| 1996 | 985 | 1,420,000 |
| 1997 | 1,175 | 1,830,000 |
| 1998 | 1,580 | 2,830,000 |
| 1999 | 2,393 | 3,300,000 |
| 2000 | 3,500 | 3,652,813 |
| 2001 | 4,528 | 3,561,254 |

Source : Tree Fruit Strategy Development Workshop (2003) Uganda.

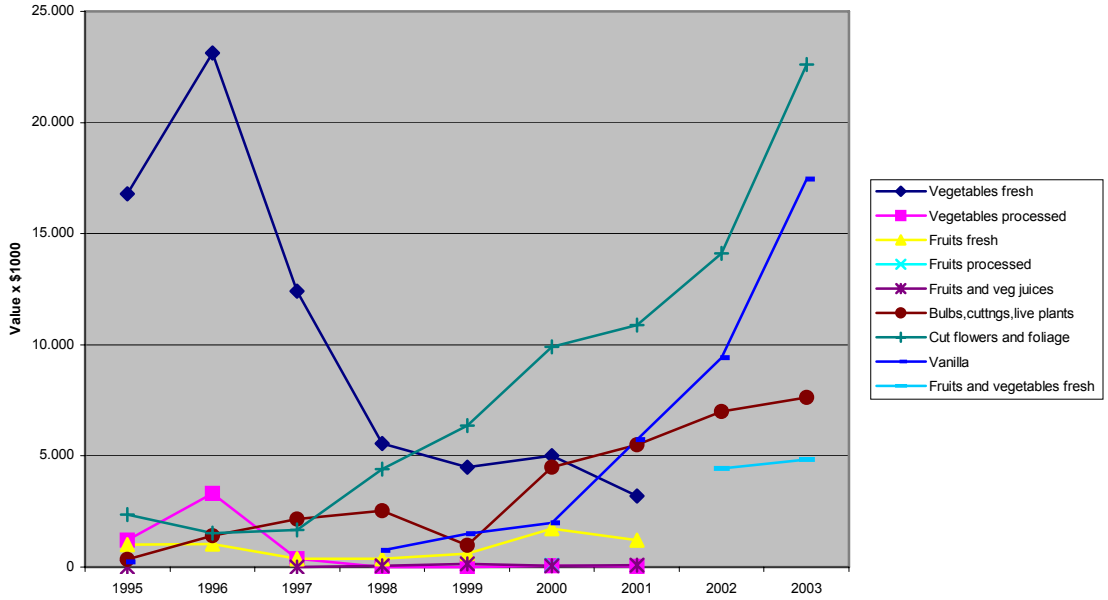



**Fig. 11. Horticultural Exports from Uganda (1995 – 2003)**

**Table 6. Volume (kg) of Fruit Exports from Uganda for the period 1995-1999**

| Fruit | 1995 | 1996 | 1997 | 1998 | 1999 |
|---|---|---|---|---|---|
| Bananas | 584,088 | 3,045,236 | 50,454 | 524,986 | 969,420 |
| Pineapples | 61,649 | 23,842 | 4,359 | 23,976 | 64,836 |
| Avocadoes | 7,634 | 7,220 | 1,560 | 11,322 | 48,250 |
| Guavas & Mangoes | 12,712 | * | 600 | * | * |
| Citrus | 769 | * | 443,964 | * | * |
| Cherries | 7,000 | 7,200 | * | * | * |

Source: Uganda Revenue 2000 (unpublished) Data not available

The export levels of vegetables from Kenya are about 10 times higher than in Uganda, for flowers about 5 times. In Uganda fresh vegetable exports declined and stabilised later, while in Kenya a rather sharp growth of vegetables exports took place. A steady growth in the flowers exports from Kenya was seen with less spectacular growth percentages than in Uganda (Fig. 12).

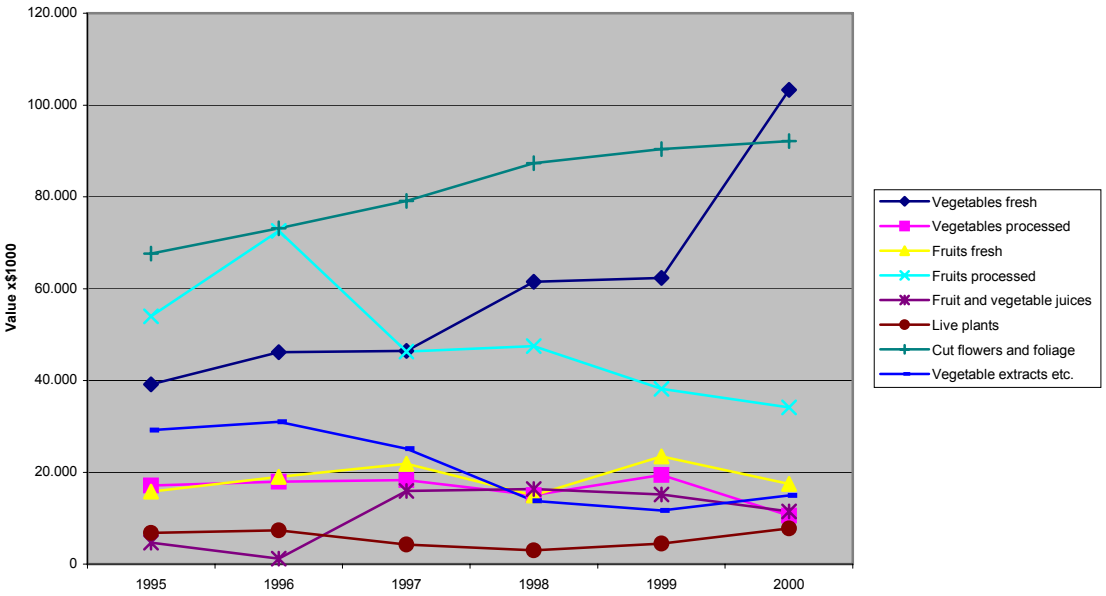



**Fig. 12. Horticultural Exports from Kenya (1995 –2000)**

### 4.4.2 Developments in regional export

Fruits and vegetables are mainly traded regionally. Uganda had a considerable regional export market of fruits and vegetables to the neighbouring countries to the West: Burundi and Congo. Although figures of regional trade are not reliable, trends show that these export volumes have declined considerably due to the political instability in this region. Regional export flows of fruits and vegetables from Kenya were much smaller compared to Uganda. However, in recent years an increase in exports to the United Arab Emirates is observed.

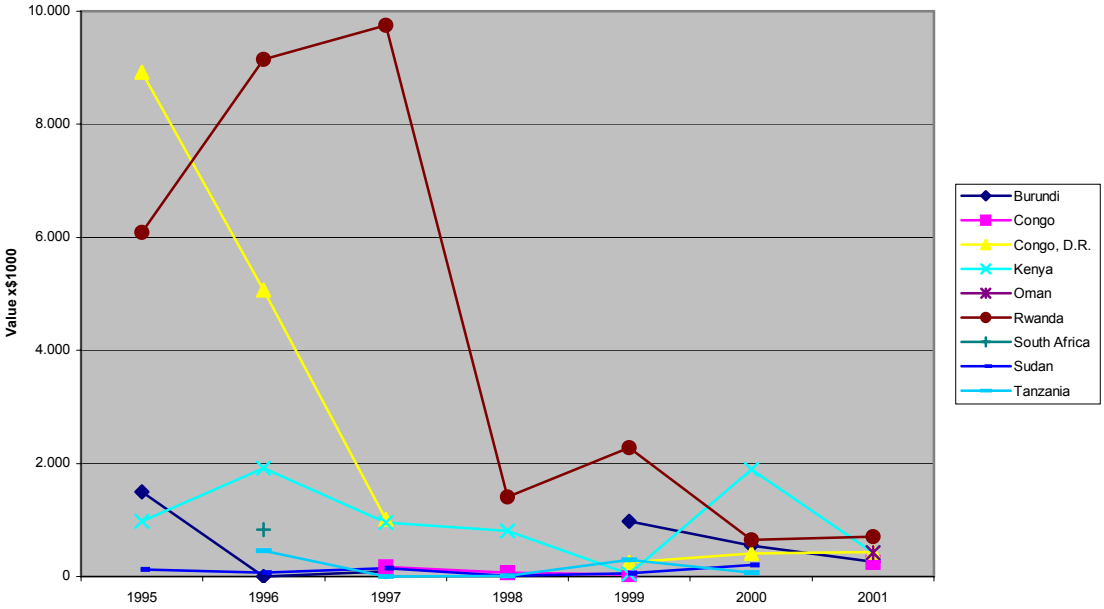



**Fig. 13. Regional Fruit and Vegetable Exports from Uganda to various destinations**

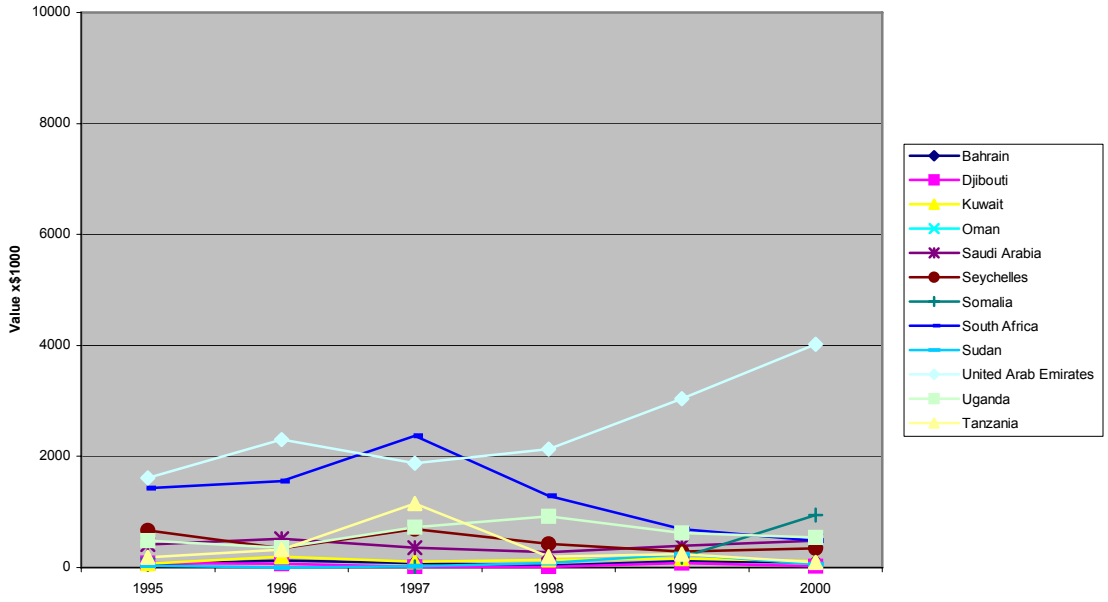



**Fig.14. Regional Fruit and Vegetable Exports from Kenya to various destinations**

### 4.4.3 Developments in international exports

Most of the identified horticultural product groups are exported to mainly European markets. Vanilla is the only significant export to the USA.

*Uganda fresh fruit and vegetable* exports are mainly to specialised ethnic buyers in Europe, with the United Kingdom as the only significant market (Fig. 15). No significant growth in export volumes is observed in the period 1997-2001. Cooking banana and chilli (including hot pepper) account for 65% by quantity, with more than 20 other products shipped in small quantities. Cooking banana (Matooke) is sold predominantly to the Ugandan community in Europe. It is quite different from plantain (roasting) and Cavendish (dessert) bananas, which are imported, in large quantities to northern markets. It is expensive, because of airfreight, and does not generally appeal in flavour to the European palate, so growth potential is small. On the other hand, the chilli market is diverse and growing fast. Uganda is well-placed to become a major supplier to the European market. Small volumes of starchy staples such as sweet potato, cassava and yam are also exported to niche consumers in Europe, but they cannot compete on the open market against much cheaper sea-freighted products from Costa Rica, South Africa and other sources.

Table 7 and 8 gives the volume and value of horticultural exports from Uganda to various destinations.

**Table 7. Volume of Horticultural Exports from Uganda (1997-2001)**

| Commodity | Unit | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|
| Pepper | Tonne | 56 | 50 | 987 | 144 | 517 |
| Vanilla | Tonne | 16 | 18 | n.a | 10 | 49 |
| Fruits | Tonne | 429 | 46 | 138 | 1,637 | 92 |
| Roses& cut flowers | Tonne | 537 | 1,522 | 1,563 | 2,207 | 3,687 |
| Ginger | Tonne | 35 | 11 | n.a | 75 | 16 |

Source: Uganda Bureau of Statistics (Statistical Abstracts 2002)

**Table 8. Value of Horticultural Exports from Uganda (US$ x 1000) (1997-2001)**

| Commodity | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|
| Pepper | 81 | 117 | 692 | 354 | 397 |
| Vanilla | 4 | 1,260 | - | 781 | 2,417 |
| Fruits | 314 | 386 | 111 | 733 | 68 |
| Roses& cut flowers | 3,592 | 7,502 | 7,328 | 9,912 | 14,750 |
| Ginger | 23 | 21 | - | 77 | 26 |

Source: Uganda Bureau of Statistics (Statistical Abstracts 2002)

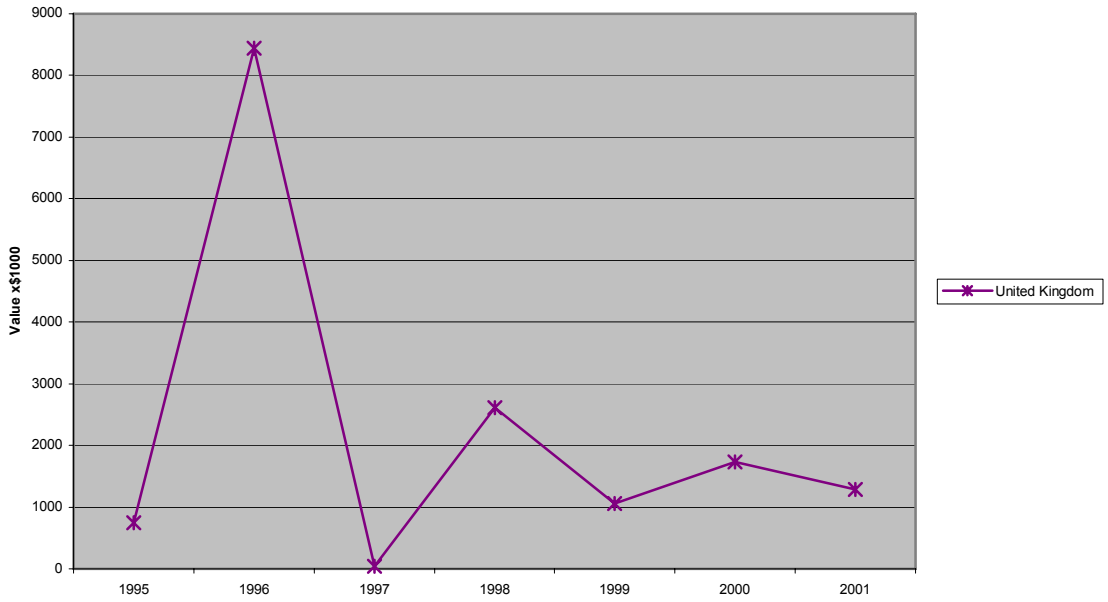



**Fig. 15. Fruit and Vegetable exports from Uganda to the United Kingdom (1995 –2001)**

Compared to Kenya, export volumes are extremely low. The United Kingdom is also by far the most important and fastest growing market for Kenyan fruits and vegetables, but at the same time Kenya exports go to other European markets and small niche markets in India and Japan (Fig. 16).

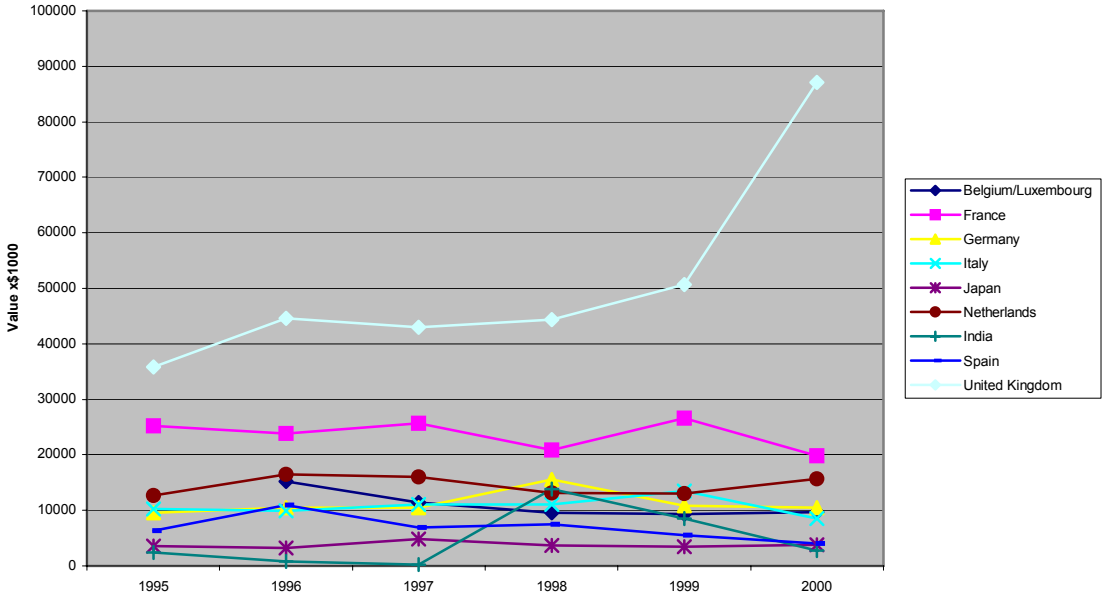



**Fig. 16. Fruit and Vegetable Exports from Kenya to various destinations (1995 – 2000).**

Export of flowers continued to increase. The good quality and vase life of Ugandan flowers has been an important factor in enabling growers to fill the gap caused by reduced production of sweetheart roses in The Netherlands, Israel and Zimbabwe. The Dutch auctions remain the major destinations, but just as can be seen in Kenya, direct trade channels with supermarket chains in the UK and Germany are gradually gaining importance (Figs. 17 and 18). Table 9 gives the volumes of floriculture exports from Uganda.

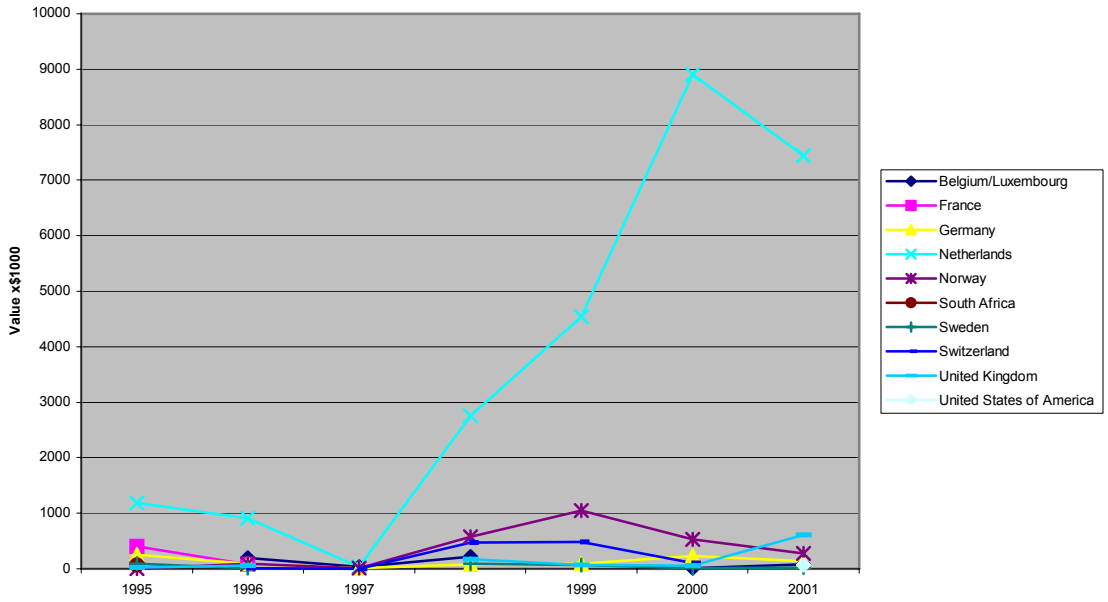



**Fig. 17. Flower Exports from Uganda to various destinations (1995 – 2001).**

**Table 9. Uganda Floriculture Exports 1993 – 2003.**

| Year | Roses | | Chrysanthemums cuttings | | TOTAL | |
|---|---|---|---|---|---|---|
| | *MT* | *US$ (mil)* | *MT* | *US$ (mil)* | *MT* | *US$ (mil)* |
| 93/94 | 313 | 0.13 | - | - | 313 | 0.13 |
| 94/95 | 721 | 1.11 | - | - | 721 | 3.61 |
| 95/96 | 1222 | 3.48 | - | - | 1,236 | 6.24 |
| 96/97 | 1729 | 9.19 | 133 | 1.6 | 2,012 | 9.84 |
| 97/98 | 1541 | 15.93 | 244 | 3.3 | 2,065 | 9.72 |
| 98/99 | 2000 | 11.64 | 352 | 4.3 | 2,852 | 14.46 |
| 99/2000 | 2594 | 17.00 | 430 | 5.0 | 3,414 | 14.61 |
| 2000/2001 | 3069 | | 641 | | | 15.90 |
| 2001/2002 | 3820 | | 795 | | | 21.13 |
| 2002/2003 | 4544 | | 846 | | | 30.24 |

Source: UGAFLOR (2001), IDEA (2003)

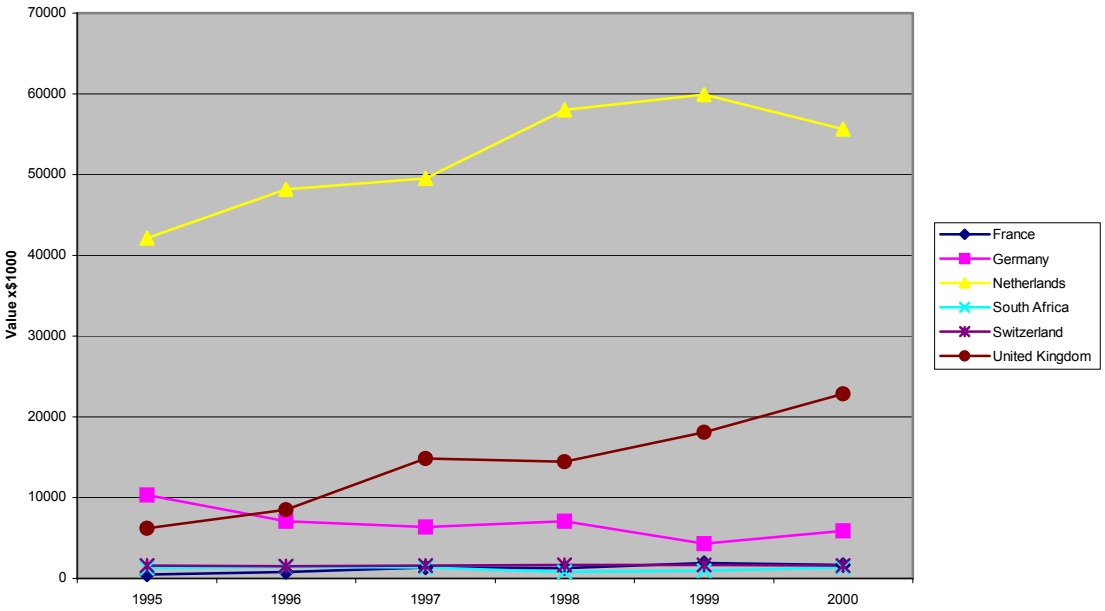



**Fig. 18. Flower Exports from Kenya to various destinations (1995 –2000)**

In the group of spices, vanilla, exported as a semi-processed product, is the star performer in the sector. It is particularly significant, since it is one of the few horticultural export crops for which small-scale growers in remote areas have a comparative advantage over large-scale agribusiness investors. The export value increased from about $2 million in 2000 to an estimated spectacular $17 million in 2003. High prices due to recent production failures in Madagascar, the main world market producer, stimulated further expansion of the area cultivated.

# 5. PRODUCTION AND MARKETING OF SELECTED HORTICULTURAL CROPS IN UGANDA

## 5.1 Production of important fruits

Fruits of significant importance and potential for export and processing include pineapples, passion fruits, apple bananas (Ndiizi), Gros Michel bananas (Bogoya), avocado, citrus, mangoes, papaya and jackfruit[5]. The production trend of these fruits is shown in Table 10. The fruits are produced in various districts of Uganda including Kabale, Kasese, Mbale, Kapchorwa, the lake basin and the north and north-eastern regions. Both fresh and dried fruits for the export market mainly come from Mpigi (which contributes about 31% of the fruit export tonnage from Uganda), Masaka (25%), Kayunga (31%), Mukono (17%), Luwero (5%) and Mubende (3%).

**Table 10. Production trends of major fruits in Uganda (1995-1999)**

| | Area x 1000 ha | | | | | Production x 1000 tonnes | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1995** | **1996** | **1997** | **1998** | **1999** | **1995** | **1996** | **1997** | **1998** | **1999** |
| Pineapple | 6.0 | 6.0 | 6.2 | 6.5 | 6.8 | 150 | 150 | 160 | 163 | 163 |
| Passion | 1.1 | 1.2 | 1.3 | 1.3 | 1.5 | 7.8 | 8.0 | 8.0 | 8.1 | 8.3 |
| Citrus | 2.0 | 2.1 | 2.1 | 2.1 | 2.3 | 24.0 | 25.0 | 24.0 | 26.0 | 26.0 |
| Papaya | 2.1 | 2.1 | 2.3 | 2.3 | 2.3 | 21.0 | 22.0 | 22.5 | 22.0 | 23.0 |
| Avocado | 2.2 | 2.3 | 2.3 | 2.5 | 2.5 | 22.0 | 22.5 | 23.8 | 24.0 | 24.2 |
| Mango | 3.9 | 4.0 | 4.0 | 4.1 | 4.2 | 39.0 | 40.5 | 40.0 | 42.0 | 42.0 |
| GM Banana | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 1200 | 1200 | 1200 | 1300 | 1300 |
| Apple banana | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 2200 | 2200 | 2250 | 2250 | 2300 |

*Source: UIA, 2001: Fruit and Vegetable profile*

### 5.1.1 Production and marketing aspects of Passion fruit

*a) General characteristics*

Passion fruit (*Passiflora edulis*) is a climbing vine that naturally grows up on trees or any other support available. The fruits may be purple (*P. edulis var edulis*) or may be yellow (*P. edulis var flavicarpa*). The local purple passion fruit and the Kawanda hybrid (a cross between the local purple and yellow passion fruit) are varieties with the most commercial potential for the fresh export market. The small local purple variety is adapted to high altitude; cool wet areas only and can tolerate frost. The yellow variety is more aromatic and acidic, has a hardier rind, is higher yielding and is adapted to the tropical lowlands and is not frost tolerant. Because of its more sour flavour, the yellow passion fruit is not preferred by the fresh market. The large Kawanda hybrid passion fruit has very favourable response from importers, supermarkets and consumers. It is more suitable for lowland warm humid areas, but will grow and fruit in the cool wet areas.

Passion fruit is successfully grown in Uganda and is being exported in small quantities. The fruit is either consumed fresh or used in making juice sole or blended with other fruits or juices. The fruit has a sweet taste and pleasant aroma and has become increasingly popular for children suffering from measles and older people with body dehydration complications. Passion fruit contains Vitamins A and C as well

[5] Jackfruit grows wild in Uganda but is a fruit tree of economic importance. The fruits are picked and either used at home or sold in the local markets and on roadsides to generate income.

as some mineral salts. About 1/3 of the fruit weight is juice, ½ is the shell and the rest is seed. The juice contains a little protein (2%) and an appreciable quantity of sugars (21%) while the seed contains about 23% oil of good quality. The shell can be processed to make pectin and the residue used for poultry or stock feed. Syrup, jelly and jam are other products that can be made.

*b) Area and producers*

Passion fruit is generally grown south of Lake Kyoga and then East, South and West of the country. Production of passion fruits has grown over the years with corresponding increased demand for local consumption and export. High quality purple passion fruits are produced in the high altitude (above 1200m) in the districts of Kasese, Kabarole, Bushenyi and Mbale where there is limited incidence of diseases. The Kawanda hybrid and the yellow passion fruits are produced in the southern belt (1000-1200m). Acreage is estimated at 560 ha with total productivity of 3,800 tons. It is estimated that there are about 200 passion fruit growers (75%) of whom are women in the identified districts.

*c) Farming system*

The crop is often intercropped with coffee, bananas and other crops. Of the total acreage, only 20 ha are for export production. There are various planting systems for growing passion fruit in Uganda: (1) trellis system of posts and wire; (2) on live trees or bushes; and (3) on large detached branches fixed into the ground. Growers have adopted various combinations of these systems to match their needs and available resources. Due to their high costs, trellis system are not common in Uganda for the small local purple passion fruit, despite the higher yields achieved using the system.

*d) Care and input use*

Cultural practices include pruning, mulching, fertilizer application, irrigation and pest and diseases control. During pruning, dead materials, yellow leaves and diseased leaves are removed. After fruiting, all laterals are pruned at the same time to encourage new growth. The area around the base of the vine (0.75-1.00m radius) is heavily mulched to keep it weed free and to maintain moisture. Inorganic fertilizer (NPK) is applied twice a year to improve yield. Occasionally, animal manure is applied around the base to improve plant growth and fruit production.

*e) Pests and diseases*

Three main diseases affect passion fruit in Uganda: collar rot, brown spot and passion fruit woodiness, and are controlled by using planting materials grafted on to resistant rootstocks, pruning, and chemical control.

*f) Yields and total production*

Passion fruit plants begins to flower 5 to 9 months after planting, and fruits are ready for harvesting 3 to 4 months after pollination. Peak Uganda production is during June-September and December-March. For plants grown on trees, growers can expect to get up to 10kg/plant/year for the small purple fruit. Yields vary depending on a variety of factors: training system, cultural management practices, soil composition, and climate. Trellis based systems generally give higher yields as shown in Table 11 below.

**Table 11. Yields of Passion Fruit (grown on a T-Bar Trellis System) in Uganda**

| | Yield (kg/ha) | Fruit weight (g) | Fruit length (cm) | Fruit diameter (cm) |
|---|---|---|---|---|
| Local purple | 2700 | 45 | 5.2 | 4.8 |
| Kawanda hybrid | 20900 | 77 | 6.4 | 5.5 |
| Yellow | 5300 | 56 | 5.4 | 5.0 |
| Local purple (grafted) | 3500 | 46 | 4.8 | 4.6 |
| Kawanda hybrid (grafted) | 19800 | 85 | 6.5 | 5.7 |

Source: ADC/IDEA Project (2001) Passion Fruit Commercialisation Bulletin

*g) Profitability of passion fruit*

Costs of production vary depending on cultural practices employed. Trellises add to the cost of production, as does the high use of chemicals. Propagation by seed from fruits of existing plants is cheaper than buying commercial seeds. Labour costs depend on methods of propagation, land preparation, trellising, pruning and harvesting. For smallholder producers of local purple passion fruit using tree branches for supports and family labour, there are little, if any, cash costs associated with production, and the net revenue is estimated at total sales revenue. A smallholder, with a 100 plants could expect annual earnings of Ush 1,000,000 (100 plants @ 10kg/plant/year @ Ush 1000/kg). Investment requirement for a farmer who uses trellises are as follows: Using posts/trellis wire Ush 3.3 million/ha including Ush 2.1m for poles, Ush 0.7m for wire and Ush 0.53m for planting material, this gives margins of about Ush 1.08-2.4million/ha.

*h) Post harvest treatment and processing of passion fruit*

For export, the fruits are sorted using size rings and packing the fruits in appropriate boxes. Damaged or bruised fruits, unripe or over-ripe, under-sized or fruits without stalks are removed. Flesh should be yellow/orange in colour, juicy, with brown/black seeds. Fruit colour should be 90% pink/purple on the day of shipment (with only small areas of green) and the skin should be smooth. Excessive stalks are trimmed and the fruits are wiped with a clean damp cloth (dipped in 1% sodium hypochlorite solution).

Passion fruit is stored at 7-10$^{o}$C and RH of 85-95%, which allows for a maximum storage life of 3 to 5 weeks. Passion fruit is susceptible to chilling injury, and because it is a high ethylene producer, it is not stored with ethylene-sensitive commodities.

For export, 2-kg boxes are generally used for small passion fruit, each containing 48 fruits. Fruit in each box should be of uniform colour and size. Boxes should be well labelled with name and address of the packer/dispatcher, nature of produce, the country of origin, class and weight.

For the local market, the current practice is to pack the fruits in sacks for transportation to Kampala. Fruits from Kasese and Mbale areas are transported by rail and road, respectively. This results in a lot of fruit getting damaged.

Passion fruits are locally processed for juice production that adds value to the raw fruit. Aseptically packaged passion fruit juice is produced through a process, which involves washing, slicing, the aseptic process systems (sterilization) and packaging.

For single strength juice, 5-kg and 20-kg aseptic bags are used and are placed in cardboard boxes for transportation.

Both men and women are involved in processing.

*i) Marketing and marketing channels of passion fruit*

Most of the passion fruits grown in Uganda are consumed locally, although some are exported to the neighbouring regional and international markets. The European market offers the biggest potential for Uganda's passion fruit exports. Europe imports are for the fresh market, and imports are highest in November and December during the holiday season. Bwindi Passion Fruit Farmers, Kingo Passion Fruit Growers and Mairye Estates are the major exporters of passion fruits from Uganda. Uganda exported 40MT of fresh passion fruit in 1997. It was predicted that Uganda fresh passion fruit exports to Europe and UK would increase to 500-1000 MT and 100-200MT/year, respectively, from 1998-2002. At these volumes, the value of Uganda exports of fresh passion fruit would have increased to US$0.78-1.0 million to Europe and US$ 0.38 – 0.414 million (fob) to the UK.

Wholesale prices in both the UK and mainland Europe for fresh passion fruit generally range between US$2.0 – 4.16/Kg. The large Kawanda passion fruit is sold loose in supermarkets in the UK, retailing for 45-70 pence each. The small passion fruit is more widely available in both wholesale markets and in retail supermarkets, and is generally sold loose and retails for about 19 pence each. Export revenue is estimated at US$ $7,769 per annum.

Local marketing of passion fruits is done in various open-air markets, in council markets and supermarkets (Fig. 20). The level of quality for local markets is highest for the supermarket fruits. There is a good local market for passion fruit. Currently, Uganda is selling passion fruit juice only to the local and regional markets. Fruit juice is mainly sold in form of concentrates and single strength juice to juice manufacturers and food processing companies. Price trade statistics for processed fruit juice are not available though there is potential for processing.

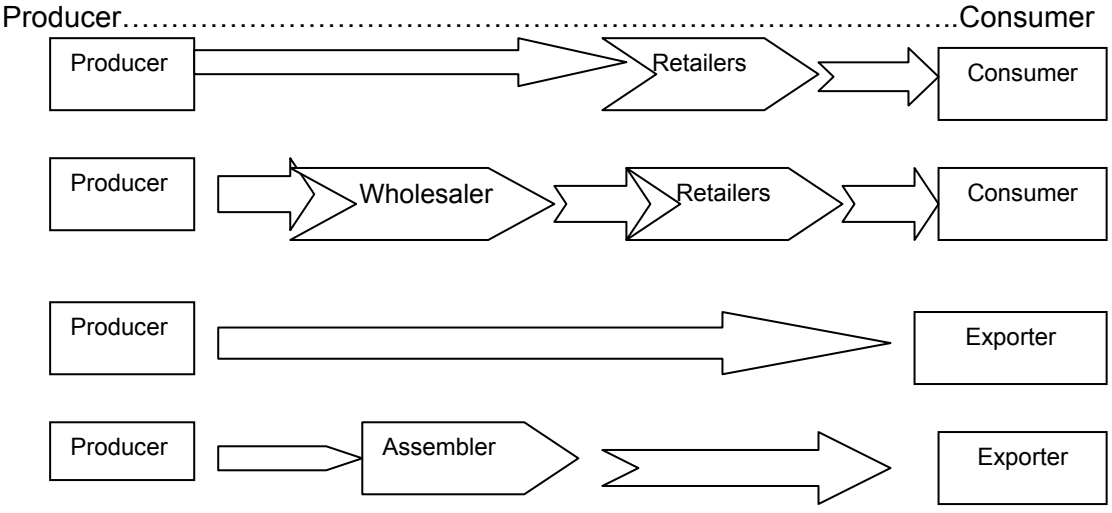



**Fig. 20. Simplified marketing channel for passion fruit in Uganda**

*j) Constraints in Passion fruit post harvest processing and Marketing*
While fresh passion fruit sales have increased to Europe, it remains a niche commodity. Low imports caused by low demand lead to high prices, which further constraint demand. Another perceived problem is the wrinkling of the skin that takes place during ripening: some supermarkets have been known to throw out ripe fruit because it is visually unappealing. Lack of information on demand in the foreign markets is another constraint to Ugandan producers. There are also many risks associated with food safety (mainly due to too much chemical use), over and undersupply, problems with continuity and quality, mostly with exports from Kasese and for the Kawanda hybrid variety.

### 5.1.2 Production and marketing aspects of Citrus

*a) Area and producers*
Oranges, mandarins, limes and sweet lime, are currently grown on a limited scale, under rainfed conditions mainly in the districts of Kamuli, Lira, Soroti, Tororo, Iganga, Kumi and Apac. A Survey conducted during the early 1990s showed concentration of citrus production in areas with a monomodal rainfall pattern. The total area under cultivation is estimated at 1200 ha producing some 14,400 MT of fruits (12 MT/ha). It is feared that the most serious disease of citrus, 'citrus greening' is already present in the country. There is a high potential for increased production mainly by getting more growers to engage in commercial production of citrus fruits.

*b) Farming system*
Most citrus production is from mixed cropping systems, where citrus trees are found scattered in the farm. Plantations are scarce and very poorly maintained.

c) *Agronomic practises*
The common means of citrus propagation is by T-budding of quality cultivars onto suitable rootstocks. The rootstocks used in Uganda are mainly Trifoliate orange, Cleopatra mandarin and Rough lemon.

*d) Input use*
Citrus responds well to fertiliser application. It is recommended to apply 56gm of Nitrogen per year per tree and to increase every year by 56gm to arrive at around 450gm in the $7^{th}$ or $8^{th}$ year and to maintain this level thereafter. The Potash (K) is applied at the same ratio as Nitrogen. Given that the Phosphorus content of the soil is low, in Uganda, half the ratio of N or K is applied.

*e) Pests and diseases*
A number of insect pests attack leaves, stem/bark and fruits. The most common are: Citrus scales, aphids transmit the tristeza virus, fruit piercing moths, leaf-cutting ants, caterpillars and mites. The common citrus diseases are: Scab, '*Alternaria' leaf spot*, foot rot, quick decline (*Tristeza virus),* Nematodes, and Greening (Mycoplasma). Copper compounds are generally used against most of these diseases.

*f) Yields and total production*
The average yield of citrus (mostly oranges) in Uganda is about 12MT $ha^{-1}$. The total production from about 1200 ha was estimated at 14,400 MT of fruits.

*g) Profitability of Citrus*
For a small holder producer, with no cash input requirements and who uses only family labour, net revenue is estimated at total revenue. A small holder, therefore,

can expect annual earnings of Ushs 25,000 – 50,000 per tree (1 tree @ 250 –500 fruits/tree/year @ Ushs 100/fruit).

*h) Post harvest treatment and processing of citrus*

Citrus fruits must be handled carefully during and after picking. They are pre-graded in the field; all rotten and damaged, too small and too big, hard green and overripe and badly spotted fruit are removed at this stage. Then the fruits are packed in bags, baskets or field boxes and taken to the market, or pack-house and (or) processing plant. At the pack-houses, the fruit undergoes several treatments including washing with soap, disinfection, drying, grading, sizing and packing. Wooden boxes holding about 30kg fruit or cardboard boxes holding 18-20kg fruit are used. Citrus fruit can be processed in several ways to get either single strength juice or concentrate of approximately $44^0$B.

*i) Marketing and marketing channels of citrus*

Market for the fruit exists internally and to neighbouring countries (200 metric tons were exported to Kenya in 1988). Most of the citrus fruit produced in Uganda is sold on the local market at a price range of Ushs 1,000 – 2,500/kg depending on supply. Production does not meet local demand since there are imports of oranges from South Africa.

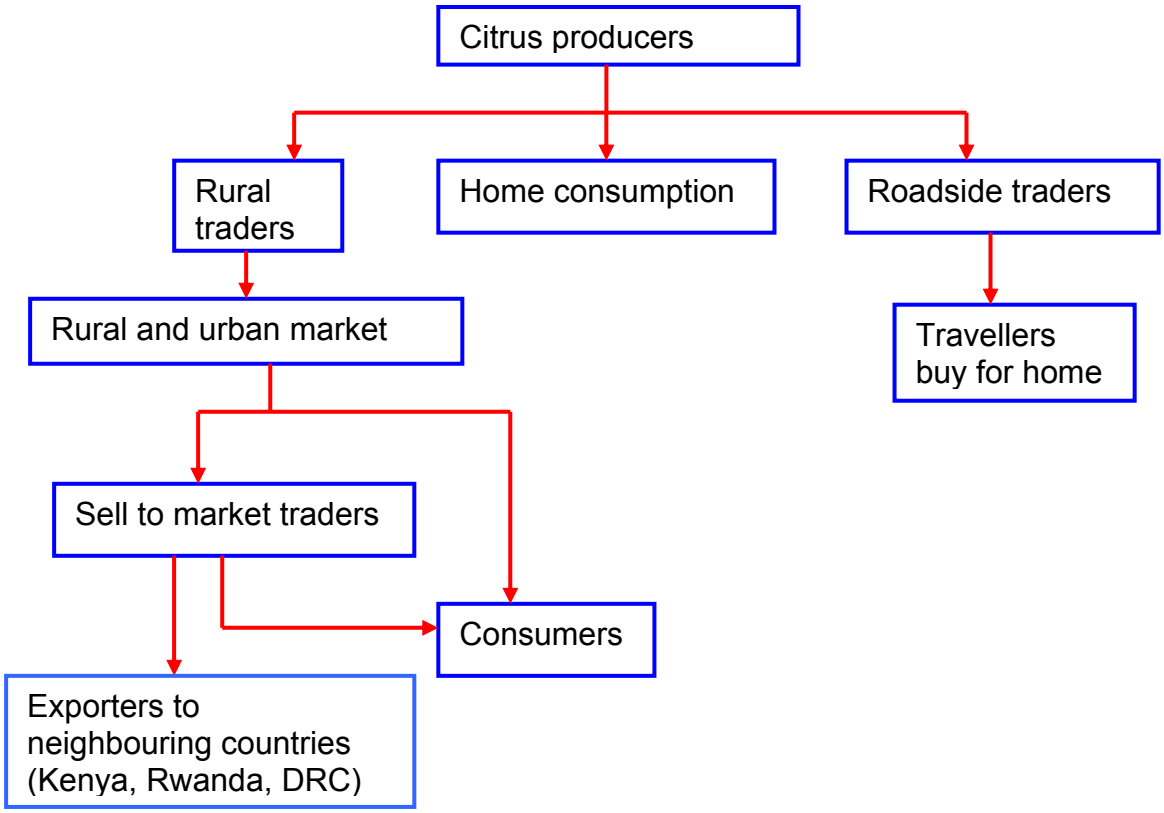



**Fig. 21. Perceived marketing channels for citrus**

*j) Constraints in citrus post harvest and marketing aspects*

Lack of organised production and poor infrastructure for handling results into low quality produce. Seasonal gluts experienced result in producers having to accept very low prices.

### 5.1.3 Production and marketing aspects of Avocado

*a) Area and producers*
Avocado fruit has become popular because people are getting aware of its nutritional value. Avocado trees are scattered in many parts of the country but more in deep soils of the lake region, western and eastern Uganda in the districts of Mpigi, Masaka, Kampala, Mukono, Iganga, Tororo and Mubende. Avocadoes are grown generally south and south west of Lake Kyoga. Estimated acreage was 100 ha in 1998 estimated to produce 10,000 MT. Of this acreage, only 30 ha are for export production. Avocado has been taken up as a priority fruit for development as a non-traditional export crop. A number of varieties are grown in most districts of Uganda. Local demand is high and there is potential for increased production.

*b) Farming system*
There are no commercial plantations at the moment. Trees are scattered in the farms. Intercropped with coffee, bananas and other fruit tree crops. Avocado has three races, which are adapted to different physical environments – The Mexican race is suited for warm temperatures, the Guatemalan race for the sub-tropical climate and the West Indian race for the tropical climate. The Guatemalan and West Indian races and their crosses are the most common races in Uganda and seem to grow well.

*c) Input use*
In Uganda, avocado is grown without much manure or fertiliser application. Most of the avocado trees do well, as the soils are fertile. In the absence of any fertilizer recommendation, the fertiliser doses cited for mango are followed. The manure/fertiliser are split into equal doses applied 2 to 3 times in a year, preferably during the on set of an ordinary season.

*d) Pests and diseases*
The most common insects of avocado are: scale insects, mealy bugs and mites. *Phytophthora* root rot, scab, anthracrose, *Cescospora, Verticilium* and sunblotch are the most common diseases of avocado. *Phytophthora* causes seedling blight, stem canker and root rot, which in turn are responsible for leaf fall, dieback and eventual collapse of the tree. Sunblotch is a virus disease transmitted by pollen. It causes white areas and streaks on fruits, leaves and stems, and reduces yield by 20% or more and it also lowers quality.

*e) Yields and total production*
Avocados will not ripen while still attached to the tree. Indications of maturity are when fruits start dropping off the trees. The fruits are clipped, not pulled, and are placed in plastic buckets or sacks and taken to the packhouse. Yields vary greatly with cultivar, tree age, and weather conditions. Production varies from 20-100 kg per tree for young tree and doubles for mature trees. Yields are on average between 5 and 10 MT $ha^{-1}$, though 15 MT is possible.

*f) Profitability analysis*
For a small holder producer, with no cash input requirements and who uses only family labour, net revenue is estimated at total revenue. A small holder, therefore, can expect annual earnings of Ushs 20,000 – 100,000 per tree (1 tree @ 20 – 100kgs/tree/year @ Ushs 1000/kg).

*g) Post harvest treatment and processing of Avocado*
In the packhouse, harvested fruits are cleaned, graded, sized and packed in flat trays for export. Avocados for local market sales are graded into big, healthy sizes, which

are sold to super markets; and the small scarred fruits which are sold to ordinary open markets. There is hardly any processing of avocado in Uganda.

*h) Marketing and marketing channels for Avocado*
The most popular varieties for the export market are *Hass* and *Fuerte*. Others acceptable include *Ettinger*, *Nabul*, and *Edrinol*. The less popular are *Lula Pallock,* which are (too large). Size requirements vary for different markets and accurate size grading is essential. UN/EEC standards stipulate that the minimum weight should not be less than 125gm and buyers prefer the weight to be guaranteed. The bright green colour, typified by *Fuerte*, which turns a deep purple/black colour on ripening, is acceptable in the UK and is reported to have a longer shelf life than other varieties.

Marketing of avocado within Uganda is not given much attention in respect to post harvest care of the fruits. At the retail market premises, the fruits are stored in wooded boxes, and displayed on wooden tables for selling. The unsold ones are always covered with papyrus mats, and not returned in the stock container. This prevents damage that may arise from storing and displaying. The price range is usually Ush 500 – 1,000/kg

The main players in the marketing process of avocadoes are the producers, the rural assemblers, wholesalers and retailers. Avocado is an important fruit in any grocery store. The avocado marketing channels are similar to those given for passion fruits.

*i) Constraints in avocado marketing*
The poor infrastructure and transportation is a cause of huge post harvest losses of avocado. Seasonal gluts experienced result in producers having to accept very low prices. Retail holders have hardly any store set at refrigeration temperature of about $5^0$C. If any, in most cases it is too small and is not well maintained, especially in markets. Lack of education programmes on post-harvest handling: such programmes must be made available to market handlers. Low production of packaging boxes in Uganda. The anthracnose disease is caused by the fungus Colletotrichum Spp. This is a greenish-black rot on the fruit, which begins as a small, dark skin discolouration and slightly sunken spots, and rapidly spreads into the flesh during marketing.

### 5.1.4 Production and marketing aspects of Mango

*a) Area and production*
Mango is a very popular fruit in Uganda. It is found in areas below 1500m. Different varieties of mangoes are grown in almost all the districts of Uganda. Production has been increasing over the years with increasing demand on the local and export markets. Types being grown at the moment include: Dodo, Ssejjembe, Namata, Asante, Kagogwa, Kona, Kent, Palmer, Keitt, Kensington pride, Ngoyen, Bire, Zillate, and Ssu. The new grafted varieties are being promoted because they are good for export. Acreage is estimated at 2500 ha giving about 25,000 MT. According to a recent survey Mangos seem to thrive best in the North West, North, and North East of Uganda in a belt stretching from Nebbi and generally North of Lake Kyoga but also the districts of Mubende, Luwero, Iganga, and Bushenyi.

*b) Farming system*
Many homesteads have at least one mango tree on their farm. Mangoes are found scattered in the cultivated or uncultivated parts of land. There are no commercial plantations of mango in Uganda.

*c) Agronomic practises*

Local cultivars are propagated from seed prepared from ripened fruits. Seedlings take some 6 years to bear and 15 years to attain optimum yield/commercial yield. Improved cultivars are propagated by vegetative propagation through grafting, but the poly embryonic types are propagated by seeds.

*d) Input use*

Traditionally, mangoes are grown without the application of fertiliser in Uganda although they require a high dose of N fertilizer in the early years, and a high dose of phosphates (P) and Potash (K) after they begin to bear fruit. Current recommendations are 80kg N, 12kg P and 80kg K/ha/year. About 1 kg of SSP and 5-7 kg of manure are mixed with the soil during transplanting.

*e) Pests and diseases*

Different types of insects attack mangoes at different times of the year and at different stages of fruit growth. The common insects are: Mango seed weevil, Oriental Fruit Flies, Scales of different types and thrips.

The most common diseases of mango are Powdery mildew *(Oidium mangiferae*) and Anthracnose (*Colletotrichum gloeosporioides*). Control of insect pests and diseases of mango may be achieved by frequent spraying with copper compounds, Zineb and Captan.

*f) Yields and total production*

Yields vary with cultivar and age of the tree. Individual trees may yield on average between 200-1000 fruits per year. Mango yields in Uganda currently average 10MT $ha^{-1}$. With the importation of improved cultivars it is hoped that these will increase to 15MT $ha^{-1}$.

*g) Profitability analysis*

For a small holder producer, with no cash input requirements and who uses only family labour, net revenue is estimated at total revenue. A small holder, therefore, can expect annual earnings of Ushs 50,000 – 250,000 per tree (1 tree @ 200 –1000 fruits/tree/year @ Ushs 250/fruit).

*h) Post harvest treatment and processing of Mango*

After harvesting, mangos are put into gunny bags, boxes or baskets and stored in houses or stores. No recommended storage conditions are observed. For export, mangos are washed before packing, sorted and graded according to size and ripeness. Mangos for export are manually loaded on trucks from the packinghouse. Firms dealing in export of mango products are: Interfruit, Suntrade Consultants, Uganda Organic Growers and Fruits of the Nile.

In the case of mangoes for market or local consumption, there is no grading, no protection against injuries. The major means of transport are cars and public transport to the market outlets within Uganda.

For processing, the fruits are washed in water immediately after picking. This washes off the sap that oozes out. Britannia company has started producing mango juice from local fruits. Juice production is done at local level by small-scale processors for sale and home consumption.

*i) Marketing and market channels for Mango*

Some of the varieties are suitable for the fresh fruit market and others for processing into juice and other products. Mango is currently being exported in small quantities to the U.K, Belgium and Holland.

For local market one may wait until the fruit becomes soft, but for export, they are picked when still green and firm.

The main players in mango marketing are the producers, local assemblers who double as wholesalers and retailers. Transportation of mango from the rural areas to the urban centres is an important aspect to consider while marketing.

*j) Constraints to mango processing and marketing*

There is no organised production and packaging of mangoes, which results into low quality produce. No recommended storage conditions are observed, after harvesting, mangos are put into gunny bags, boxes or baskets and stored anyhow in houses or stores. Poor infrastructure and transportation cause huge post harvest losses of mangoes.

### 5.1.5 Production and marketing aspects of Apple Banana

*a) Area and production*

Bananas are grown all over Uganda. The dessert varieties commonly grown are apple bananas (Ndiizi) and Gros michel (Bogoya). Apple bananas can be grown in most districts and there is potential for increased production through establishment of specialised farms. Several cultivars of “Ndiizi” (apple bananas) are produced in Uganda.

*b) Farming system*

Many producers have small plots of pure bananas, but also widely intercrop banana with other crops.

c) *Agronomic practices*

Production of apple bananas for export is done in plantations, which are well managed. Suckers or corms from existing healthy plants are used as planting material. There are various recommended arrays and spacing for planting fields; typical spacing is 7ft x 8ft (777 plants per acre) or 8ft by 8ft (680 plants per acre). At higher elevations, spacing is further apart.

*d) Input use*

Banana plants deplete the nutrient content of the soil, which needs to be replenished in order to encourage good plant growth and good yields. Occasional applications of NPK fertilizer is needed.

*e) Pests and diseases*

Apple banana is very susceptible to Panama disease, a fungal wilt that is on the increase in Uganda. Once the fungus infests land, it can be considered useless for the production of all susceptible bananas thereafter. Other pests and diseases include banana weevils and nematodes (best prevented before planting by using either a hot water or chemical treatment of the planting material) and leaf spot (best prevented by using intensive cultural practices: weeding, mulching, pruning, deflowering, etc.)

*f) Yields and total production*

Apple banana is ready for harvesting when the fingers are three quarters full maturity, approximately 15-18 months after planting, and 6 to 8 weeks after flowering. Annual yields of apple bananas are reported at 8 MT/ha but 13-15MT/ha is possible with intensive management.

*g) Profitability*

Costs of production for export production of apple banana are not available at present. However, most growers regard Ush 300/- per kilo as a fair cost.

An exporter, who purchases produce from outside growers and who rents a packhouse, needs US $ 15,000 to US $ 18,000 as an initial investment in order to attain an export level of 4MTs/month. US $ 5,000 is required to cover negative cash flow during the first four months, while $12,000 is required to purchase a truck (2 ton pick-up), $500 is required for equipment and $800 is required for communications equipment.

Costs for exporting apple banana are based on cost estimates using CIF price of US $ 4.00. Net margins look excellent at between US $ 1.50 and US $ 1.70 per kilogram. Shipments to ethnic specialist wholesalers earn a lower, but acceptable net margin of US $ 0.84 per kg.

*h) Post harvest care and processing of apple banana*

After harvesting and once fully drained, the hands of apple bananas are loaded onto trays, in a single layer, to prevent latex contamination and fruit damage. Padding with leaves is done to prevent damage during loading and transportation. For supermarket buyers, fruit is packed in one layer. The maximum time between harvesting and shipment should not exceed 24 hours. Ideally, apple bananas should be shipped on an evening flight on the day of harvest. Therefore harvesting should be highly coordinated with the airfreight time. A small quantity of apple banana is processed into dry chips and exported by NOGAMU and Fruits of the Nile.

*i) Marketing and market channels for Apple Banana*

The closest and more accessible markets for Uganda's apple bananas are Europe, the Middle East and South Africa. Current imports of apple banana are estimated at 400 tonnes into the UK, the main market for Uganda exporters, and 1,500 tonnes to the rest of Europe. Uganda exported 143 tonnes of apple banana in 1997, equivalent to 35% of the UK market. UK wholesale prices range between $5.04-7.63/kg. Prices in the rest of Europe are generally similar to UK prices.

Apple bananas attracts a high local demand and commands a high price. Small-scale producers with no access to the export market supply the local market. They are sold in the ripe and unripe form, for home ripening. Prices in the local markets vary from Ushs 1000 to 3000 per bunch.

The key players in apple banana marketing are the producers, the wholesalers, retailers and rural assemblers. Designated roadside trading of the fruit is also common along the main highways.

*j) Constraints to Apple banana marketing*

There is a fantastic opportunity for Ugandan ndiizi growers in the European market, but sales are currently limited by the high price of airfreight, which make ndiizi three to four times more expensive than Cavendish bananas. Lack of organised production and packing facilities are also major obstacles to obtaining sales contracts for ndiizi in Europe.

### 5.1.6 Production and marketing aspects of Pineapple

*a) Area and production*
Uganda has a large area having climatic conditions conducive to successful production of pineapples. The locally grown pineapple cultivar in Uganda is 'Sooth Cayene'. Pineapples are grown from Nebbi District and generally South of Lake Kyoga right through the Islands of Lake Victoria except for Kabale, parts of Kabarole and Kapchorwa Districts where it is rather cold. Production is concentrated in the districts of Masaka, Mpigi, Luwero, Mukono, Jinja, Iganga, Kamuli, Mbarara and Bushenyi. The total area under pineapple cultivation was estimated at 2000 hectare (1998) producing some 30,000 MT of fruit. Pineapple production has consistently increased over the years and there is always a glut in the market during peak harvest time. Organically produced pineapples have a better market in Europe.

*b) Farming system*
In Uganda, there are no large-scale pineapple growers at present and pineapple is produced exclusively as a smallholder crop. Pineapples in Uganda are generally grown sole or intercropped with banana, where the former is more common.

c) Pests and diseases
There are not many known diseases except for the development of brown-rust like patches called *Endogenous Brown Spot* (EDS). The major pests of pineapple include scales, mealybugs and nematodes.

*d) Yields and total production*
The average yield of pineapple was estimated at 15 MT/ha in1998. Better management can however result in higher yields.

*e) Profitability analysis*
For a smallholder producer, with no cash input requirements and who uses only family labour, net revenue is estimated at total revenue. A small holder, therefore, can expect annual earnings of Ushs 6,000,000 – 10,000,000/ha (1ha producing 20,000 plants @ sold at Ushs 300 -500/fruit).

*f) Post harvest care and processing of Pineapples*
Pineapples are judged mature when they have reached full size and a nice colour, depending on variety. For export purposes, the pineapples are cut with a knife to leave a sizeable stock; but for the local market they can be simply broken off. The products for the local market get no pre-treatment prior to marketing. Those for export purposes are, however, brushed before parking and are trimmed to leave a stock of 1 inch. Grading for local markets takes place at the retailers. Those for export are graded according to colour and size; and normally pineapples of 2 – 2.5 kg wt are exported. The export produce are directly packed into cartons and transported by trucks or pickups. At the airport the package is palletised.

Produce destined for the local market is put on pick-ups without any form of padding. All the loading and off-loading is done manually and this can amount up to three times before being loaded on the aircraft.

Pineapple generates substantive income to growers and the fruits gives several processing products and by products which include: canned products like juice, slices, jam, beverages and alcoholic drinks; fine clothes, ropes and fishnets; paper; meat tenderisers, beer clarifiers and biogas.

*g) Marketing and marketing channels of pineapples*
Pineapple is exported fresh or in dried form. Pineapple is mainly exported to U.K, Holland, Belgium, Omani, Switzerland and Japan. Organically grown Ugandan pineapples are sold at US$ 2.5 – 3.5/kg in these markets. Firms dealing in production and export of pineapples are: Interfruit, Suntrade Consultants, Uganda Organic Growers and Fruits of the Nile.

Uganda pineapples are sold in the neighbouring countries such as Kenya. Important supermarket chain (Uchumi) imports pineapples from Uganda for its customers. The rest of the pineapples are sold in the local markets.

The main participants in the pineapple marketing include the producers, the intermediate buyers and the retailers.

*h) Constraints to pineapple marketing*
The main problem stems from lack of facilities, both at the farm and the marketing end. This is often aggravated by lack of transport facilities, which leads to the heaping of fruits and consequential development of fermentation odour especially in over-ripe pineapples, which are intended for the local market. Ugandan pineapples weigh over 2.5 Kg while the demand in the export market is for 1-2 kg pineapples. Unreliable flights also can lead to great losses through abrupt cancellation of scheduled flights.

### 5.1.7 Production and marketing aspects of Papaya

*a) Area and production*
Many varieties of papayas are grown widely in all districts of Uganda producing different quality and sizes of fruits. There are limited specialised farms producing the fruit. Papayas are also produced exclusively for extraction of papain enzyme, which is a very high value export product.

*b) Farming system*
Orchard plantation of papaya is not common, and mostly papayas are grown in home gardens intercropped with coffee, bananas and other crops. However, there are some plantations in Kasese grown for harvesting latex which is processed into papain - a proteolytic enzyme which tenderises meat and can act as a clarifying agent in many food processing industries.

*c) Yields and total production*
It is estimated that approximately 2000ha are under papaya in Uganda, producing 20,000 ton.

*d) Profitability analysis*
The major costs of producing papaya for papain production include ploughing, labour (seed collection, nursery management, slashing, planting, clearing field ditches, spraying, fertilizer application, irrigation, weeding, and harvesting), fertilizers chemicals, processing, and miscellaneous charges. The total cost of production is estimated at Ushs 454,200/acre. A Ugandan producer of papain flakes can expect a gross margin of Ushs 325,800/acre. Latex yield should be at least 650kg/acre. Therefore one acre of production yields approximately 65 kg of papain flakes.

*e) Post harvest care and processing of papaya*
After harvest the fruits are sorted and carefully put into bins or boxes because of the fragile nature of the fruit. Compressions and impact bruises result from careless

handling or transportation over rough roads. Fruits for export are harvested earlier (deep green colour). Bruises, skin scratches are avoided by padding the boxes with shredded paper. Transportation from the packinghouse to the airport is by pick-ups. At the packinghouse, preliminary washing and sorting to separate cull fruits and ripe fruits (which are diverted to processing) from those suitable for fresh marketing.

For the local market, fruits are packed in baskets one on top of the other. To minimise damage containers are padded with dry leaves. Fruits are transported home in baskets. The same baskets are used to transport the fruits to the market. Some fruits are put in wooden boxes then manually located on pick-ups to market places in towns. In the market some fruits are stored in wooden boxes, others are displayed depending on the ripe stage. Once displayed the fruits are not returned into the boxes, they are covered with papyrus mats until the next day.

Post harvest treatment to control decay in papaya, include quarantine treatments such as: (i) Hot water treatment ranging from 20 seconds at 60$^{o}$C to 20 minutes at 46$^{0}$C or a hot treatment followed by a wax dip containing a fungicide; (ii) Fumigation with ethylene dibromide, (iii) Irradiation with gama rays, (iv) Treatment with vapour heat.

*f) Marketing and marketing channels for papaya*

Fresh papaya fruits and papain enzyme are the two marketable products from Uganda. Exports of papain from Uganda were reported by customs to be 223 MT in 1996. High-grade papain sells for US $70 - 90 per kilogram, while lower grade product sells for as low as US$10-US$12 per kilogram.

RECO Industries Ltd and Victoria Biotechnology Ltd are the only processors and exporters of papain enzyme from Uganda. Other firms involved in export of papaya are Interfruit, Suntrade Consultants, Uganda Organic Growers and Fruits of the Nile.

The foreign market requires papayas of a consistent small size.
Papaya for the local market is harvested 1/2 - 3/4 ripe, bruises and skin scratches are avoided as much as possible to prevent fungal infection. No treatment is applied apart from care to avoid damaging the fruits.

*g) Constraints to papaya marketing*

The following constraints are observed:

- Fruits undergo physical damage during transportation on rough roads;
- Short shelf-life due to dehydration;
- Lack of suppliers; the fruit is grown mostly for domestic market.
- Lack of capital to carry out transactions;
- Lack of technological know how in farming methods and postharvest handling;
- Lack of cold storage facilities.

## 5.2 Production of important vegetables

### 5.2.1 Production and marketing aspects of Okra

*a) Area and production*

Okra is a warm season crop whose production has steadily increased in Uganda for the last eight years. The edible portion of the okra plant consists of the young, immature pods, which must be harvested still soft (i.e. before the seeds are half grown). In Uganda the crop is adapted to almost all areas and soil types. However, only a small amount is grown by out growers (under 2 acres each) and a few "commercial farmers". These are mainly located in the Lake Victoria basin and Kasese (at Mobuku Irrigation Scheme). Okra varieties vary in plant height and in the length and colour of their pods. The recommended varieties for export from Uganda are 'Clemson Spineless' and 'Pusa Sawani'.

*b) Farming system*

Okra is a crop grown purely for commercial purpose, where export market is the main target. It is grown as a pure stand with few farmers intercropping okra with pulses. Okra seeds are directly sown into raised beds and later thinned out where plants are too close. The recommended spacing is 30cm between rows and 10cm between plants. The bed size is 1m by 40m, giving a plant population density of 1,200 plants/ bed or 150,000plants /ha. The crop does best under irrigation where moisture is controlled.

*c) Input use*

For good crop establishment, a pre-planting application of commercial fertilizer is usually desirable. This is very important for depleted soils. In case of NPK, 40 to 60 kg/ha or split application by side dressing with 20-30 kg/ha is recommended. Where available organic manure can be added.

*d) Yields and total production*

All harvesting is done by hand because pods are tender and bruise easily. To obtain high yields and good quality okra, it is essential to harvest efficiently every two days. Harvesting always corresponds to the best marketing season in Europe (December to May). Yields vary depending on varieties but on average, a grower is expected to harvest between 5 to 8 MT/ha.

*e) Profitability*

The small farmer producing fresh okra can expect a net margin of UShs 191,400/acre/crop (Table 12). Since okra can be cropped three times per year, its annual gross margin is triple this figure. An exporter can expect to have a net margin of UShs 393,600, for a 400 kg shipment.

**Table 12. Projected gross margins for Ugandan small farmers producing fresh Okra (UShs/acre/ crop)**

| Description | Ushs |
|---|---|
| Yield[1] (kgs/acre) | 2,000 |
| Sales price (UShs/kg) | 350 |
| **Total Revenue** | **700,000** |
| **Expenses** | |
| Seed/plants | 36,000 |
| Land Cultivation[2] | 69,500 |
| Fertilizers[3] | 50,000 |
| Chemicals[4] | 84,000 |
| Labour[5] | 204,100 |
| Processing[6] | 65,000 |
| **Total expenses** | **508,600** |
| **Gross Margin** | **191,400** |

[1] Yield per crop. (Note that three crops are possible per year for okra). The yield given here is a conservative estimate for irrigated production using good seed and basic level of inputs and weed control.
[2] Two times tractor ploughing @ Ushs 25,000 each, plus making 65 ridges @ Ushs 300.
[3] 2 bags of NPK @ Ushs 25,000
[4] 3litres of Ambush @ shs 12,000/l + 4 kgs of Dithane @Ushs 12,000/kg
[5] Slashing (Ushs 10,000/acre) planting (Ushs 19,500,65 ridges @Ushs 300/ridge); clearing field ditches (Ushs 6,000, 2 times @ Ushs 3,000); fertilizer application (Ushs 4,000 , 2 bags @ Ushs 2,000/time); spraying (Ushs 16,500, 66 knapsacks @ Ushs250/each); irrigation (Ushs 20,000 monitoring irrigation @ Ushs 20,000 per acre);weeding (Ushs 68,100 for first weeding; Ushs 19500 for second weeding, Ushs 16,200 per acre for three times); harvesting (Ushs 60,000, 5kgs per person per day @ Ushs 1,500/day)
[6] Grading, packing and weighing (Ushs 30,000, 100kg per person per day @ Ushs 1,500/day);
[7] Miscellaneous (5 percent of revenue, total Ushs 35,000/acre.)

*f) Post harvest care and processing of Okra*

Harvested okra must be bright green, intact, firm, sound and free from dirt, foreign materials, pest and diseases. It is graded by hand, and all pods that show discolouration, bruising, blackening of ridges, chemical residues or insect damage are removed. The market usually requires pods of the same variety showing similar shape, skin colour, flavour and texture. The pod must be 6 – 9cm in length with fresh green stalks, readily snap at the tip and free from shrivel. The pods should be free from blemishes and damage caused mechanically or by pest should not exceed 5% of the surface area.

For the export market, all pods meeting product specifications are loose packed in lidded cardboard boxes with no staples. The materials selected for packaging should be conform to EU regulations and should be easily recyclable. Net weights depend on importers requirements and vary from 2 – 5kg. Labelling is important and includes: name and address of exporter, product type and variety, country of origin, net weight of package (kg) and grower identification code.

*g) Marketing and market channels for Okra*

For the local market, okra is delivered in baskets and polythene bags. It is carried on the head, bicycle or truck depending on the distance to the market. Under these circumstances, the produce suffers from high temperatures. In bulk transportation, especially where PE bags are used, poor ventilation and air circulation reduces the shelf life of the product. On trucks, okra is often bundled together with other goods and often lacks sufficient cushioning to prevent excessive bruising. The average retail price in the local market ranges between Ush 350 – 1000/kg.

Exports of fresh okra have steadily increased over the last eight (8) years from 52 MT in 1997 to 130 MT in 1998, but gradually afterwards.

The European market offers the most potential for the Ugandan product. Most okra produced in Uganda is exported to the United Kingdom and the Netherlands, the two largest markets within the EU. Other potential markets in the EU are Germany, Spain, France and Belgium. Most demand is from "ethnic" communities (Caribbean, African, and Asia), where prices are generally lower. The average price offered to producer's ranges from $3.28/kg to $5.36/kg in the EU and between 2.85 – 9.60 pounds /kg in the UK.

The key players in the marketing of Okra in Uganda are mainly producers, who may be outgrowers, exporters, retailers and consumers (Fig. 22).

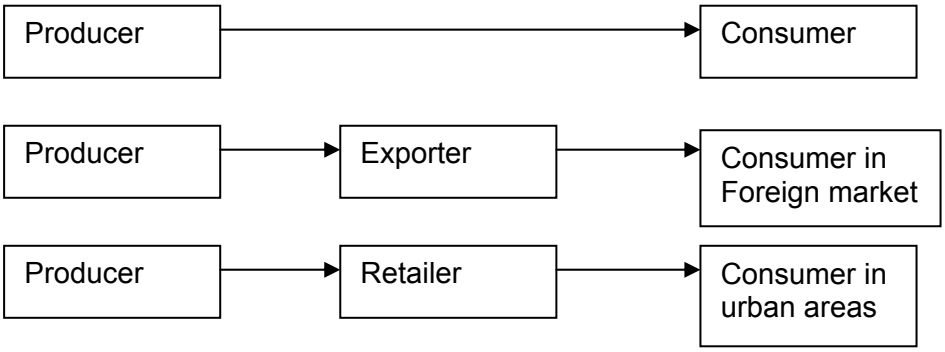



**Fig. 22. Simplified marketing channel for Okra in Uganda**

*h) Constraints and Potentials in Marketing of Okra*
There is a good export market opportunity of okra that Uganda can take advantage of. The main constraint is quality of the Ugandan okra: Ridge blackening and dry stalks are particularly common problems. Lack of appropriate handling facilities also affects efficient marketing of okra.

### 5.2.2 Production and marketing aspects of Hot Pepper

*a) Area and production*
The most common pepper in Uganda is derived from Scotch Bonnet, mainly referred to as the "Caribbean" type. This has a rich unique flavour and is used mainly as a condiment. The scotch bonnet hot peppers are mainly grown for the export market with the largest volume coming from Kasese. Nevertheless, the crop can grow well in other parts of the country. Most growers in Uganda use transplants. Pepper seed is usually germinated on seedbeds or in seed boxes.

*b) Farming system*
Hot pepper production in Uganda is mainly rainfed. If natural rainfall is lacking, supplementary irrigation (either drip or furrow) is required. It is mainly grown as a sole crop, but in relatively small plots.

*c) Inputs use*
It is recommended for Uganda soils to add organic matter before transplanting. This is worked into the soil to derive maximum benefits. The plants must start off and grow rapidly after transplanting or they start blooming and set fruit while they are too small. Therefore, a balanced nutrient level is required for maximum production. In general,

fertilizer application at the following rates is recommended: 60-100 kg nitrogen, 10 kg phosphorus, and 100 kg potash.

*d) Pests and diseases*

Hot pepper is subject to damage from many insects, nematodes and fungal, viral and bacterial pathogens. In addition, weeds and several physiological disorders such as nutrient deficiencies can cause yield losses. A number of diseases that reduces both yield and market value of the fruit include bacterial spot, blight, phytophthora root rot and grey leaf spots.

*e) Yields*

The yield varies considerably depending on a number of factors. The average expected yield is 8 to 12 MT/ha. Under irrigation 20 – 50 MT/ha can be achieved.

Trials at Mubuku Irrigation Scheme, Kasese, estimate yields of 8.8 MT/ha and a gross margin of U Sh 209,300 (500,000/ha) for small growers.

*f) Profitability Analysis*

Most production in Uganda is done on a small scale, therefore the basic requirements are land and seed. Looking at estimated cost of production, it requires an estimated Ug shs 1,000,000 per acre. A reasonable number of farmers in Kasese have cultivated areas larger than one acre in size. The costs of production and gross margins for hot pepper production in Uganda are given in Table 13.

**Table 13. Projected Gross Margins for Uganda Small Farmers Producing Hot Peppers (UShs/hectare)**

| Description | Ushs |
|---|---|
| Yield[1] (kgs/ha) | 8,500 |
| Sales price (Ushs/kg) | 350 |
| **Total Revenue** | **2,795,000** |
| **Expenses** | |
| Seed/plants | 150,000 |
| Land Cultivation[2] | 200,000 |
| Fertilizers[3] | 400,000 |
| Chemicals[4] | 360,000 |
| Labour[5] | 1,118,500 |
| Miscellaneous | 222,850 |
| **Total expenses** | **2,451.700** |
| **Gross Margin** | **523,300** |

[1] Annual yield. A conservative estimate for irrigated production using good seed and basic level of inputs and weed control.
[2] Two times tractor ploughing @ Ushs 75,000 each, plus ridge making.
[3] 16 bags of NPK @ Ushs 25,000 each
[4] 20 kgs of Dithane @Ushs 12,000/kg + 10 litres of Diomethoate @ at 12,500
[5] Labour

- Nursery management (Ushs 40,000 for 21 days); slashing (Ushs 25,000/ha)
- Planting (Ushs 42,000: 28 mandays @ Ushs 1500)
- Clearing field ditches (Ushs 15,000, 5times @ Ushs 3,000);
- Fertilizer application (Ushs 96,000; 8 workers/ha at 2000/- 6 times);
- Spraying (Ushs 224,000, 896 knapsacks @ Ushs 250);
- Irrigation (Ushs 100,000 monitoring irrigation, 20 hours a week @ at 250/= per hour for 20 weeks);
- Weeding (Ushs 219,000; 21workers/ha @ at 1500/= for 7 times);
- Harvesting (Ushs 318,750, for 2,125 boxes @ Ushs 150);
- Grading, packing and weighing (Ushs 63,750 kg per person @ Ushs 1,500/day)
- Miscellaneous (10 percent of total costs)

*g) Post harvest care and processing*

Most harvesting starts in the last week of November and continues until end of May, the window for best prices in the EU market. Uganda can grow hot pepper year round, but it becomes expensive to irrigate during the dry months. The pepper is picked by hand with intact stalks to reduce the incidence of disease.

Since most production is geared towards export, standards have been set in order to supply the right quality. The fruits should have similar shape, skin colour, flavour and texture.

Pepper for export is generally packed in 5 kg carton lidded boxes (with no staples). Sometimes importers require mixtures of red and yellow peppers. Boxes are labelled with: name and address of exporter, producer type and variety, country of origin, class/grade, net weight of package (kg) and a grower identification code. No hot pepper processing is done in Uganda.

*h) Marketing and market channels for hot pepper*

Uganda exports Scotch Bonnet peppers mostly to the United Kingdom and Holland. The EU market demand is estimated at 500 – 800 MT/year and Uganda has the potential to produce 200 – 250 MT/year. Imports from Uganda are highest during the winter when supply from within Europe is low. Uganda has steadily increased its share of the UK market for Scotch Bonnet pepper at the expense of the traditionally large suppliers in the Caribbean (St. Lucia, Dominica, Grenada, Barbados and Jamaica).

Ugandan export volumes have increased from a very low level in 1991-95 to an average of 8 tonnes per month in 1997 and 54 tonnes per month during the peak season and 18 tonnes per month during the off season in 2000. Uganda production ranges between 200 – 250MT/year. The Ugandan product quality, price and availability have all been well received by importers.

Prices have remained relatively stable over the last three years. Wholesale prices in the UK are generally about 2.00 pound sterling per kilogram, although higher quality product can generally earn 10 to 20 percent above this amount.

Generally Ugandans are not hot pepper consumers; therefore there is a very small hot pepper domestic market, mainly of foreigners who are mostly Indians.

The market channels for Hot Pepper are similar to the earlier described channels for okra.

*i) Constraints and potentials for hot pepper marketing*

Competition is fierce with many countries supplying various hot pepper types to all major markets. Therefore unreliable market for smallholder producers is a major constraint. This is further exacerbated by overproduction that threatens prices. When this happens, the importers cut back on orders until stability returns, often leaving speculative growers with unsold peppers.

### 5.2.3 Production and marketing aspects of Onion

*a) Area and production*

The onion and garlic are among the most widely consumed vegetable crops in Uganda, along with tomatoes, cabbages, and some indigenous vegetable species. Areas between 1500-2100m above sea level are considered the most suitable for

production and the highest production comes from Kigezi, Kasese, Rakai, Mbarara, Kiboga, Mbale and Tororo districts. The total area under cultivation is estimated to be 37,000 ha, with a total production of 147,000 MT and an average yield of 4.0 MT/ha (Table 14).

*b) Farming system*

Onions are usually grown as sole crops under rainfed conditions in Uganda and the average size of gardens is about 0.2 ha (0.5 acres). It is produced only from imported seed. Suitable varieties recommended for Uganda conditions are pungent (hot) 'Red Creole Hybrid', 'Bombay Red' and the mild flavoured 'Texas Grano' variety.

*c) Agronomic practices*

Sowing is done by hand either in nurseries at a seed rate of 1.75 kg/ha (0.175/$m^2$) or direct seeded on raised beds at 3.5 kg/ha (0.35 g/$m^2$). Growing season vary in length from 5 months at 1500m a.s.l to 9 months at 2100m a.s.l. Areas below 1500m are considered to be the most suitable as two crops can be satisfactorily produced per year.

*d) Input use*

The sources of plant nutrients are wood ash and farmyard manure, usually incorporated into the soil before planting. Supplemented during plant growth with one or two applications of NPK fertilizers. Sulphate of ammonia, SSP and sulphate of Potash applied at a rate of 560 kg/ha of mixture followed by a top dressing of 45kgN/ha at 3 months stage was found to be beneficial (Will, 1970).

*e) Pests and diseases*

The onion thrip (Thrips tabaci) is the only serious onion pest with economic importance in Uganda. The most commonly occurring disease of economic importance is Purple Blotch which causes heavy losses in the field and in storage.

*f) Yields*

Onion yields vary with variety. Texas Grano yields 13 – 16MT/ha of dried bulb, while Red Creole and Bombay Red yield 9 – 11 MT/ha (Will, 1970) on average. 'Red Creole', 'Bombay Red' and 'Texas Grano' have become the most common commercial varieties grown. The yellow and brown varieties are not yet attractive to local markets.

**Table 14. Harvested area, production and yield of dry onions in Uganda**

| YEAR | AREA HARVESTED (X 1000 ha) | PRODUCTION (X 1000 MT) | YIELD (MT/ha) |
|---|---|---|---|
| 1988 | 5 | 30 | 3.75 |
| 1989-1991 | 11 | 50 | 4.476 |
| 1999 | 31 | 124 | 4.000 |
| 2000 | 34 | 137 | 3.998 |
| 2001 | 37 | 147 | 4.000 |

Source: FAO production year books (1992; 2002)

*g) Profitability Analysis*

The major costs of producing onions include ploughing, labour (seed collection, nursery management, slashing, planting, clearing field ditches, spraying, fertilizer application, irrigation, weeding and harvesting), fertilizers, chemicals, processing, and miscellaneous charges. The total cost of production is estimated at Ushs

1,800,000/ha. A Ugandan producer of onions can expect a gross margin of Ushs 4,000,000/ha.

*h) Post harvest care and processing of onions*

After harvesting, the bulbs are loaded in baskets and transported to storage places in homes from where they are normally spread out to dry in the sun for about a week.

No real commercial storage is practiced in Uganda. The objective of the various marketing systems used over the years has been to dispose off the crop as quickly as possible. Many growers store produce for planting and consumption by hanging them in the kitchen, where the heat and smoke apparently contribute to drying.

Grading into two or three grades is recommended but not always practiced by growers (Will, 1970; Kyamuhagire, 1992). Bagged onions are often manually cradled on trucks, which are often padded with old banana leaves to prevent excessive damage to the bottom sacks. The temperature on the trucks is not controlled, but may coincide with ambient temperature. Relative air circulation is achieved since most trucks are open. The next offloading stations are the key market centres from where both retail and wholesale handling takes place (Kyamuhangire, 1992).

*i) Marketing and market channels for onions*

Market data on the supply and demand position of onions is difficult to assemble as part-time production by small farmers is difficult to quantify and market prices are very difficult to predict. In general, average prices range between U Sh 500 – 2000/ kg (US$ 0.4 – 1.20/kg). Onion prices remain stable during the months immediately after harvest then steadily rise upwards.

Currently, the country is not exporting onions, instead it is importing onions from Kenya, Tanzania and South Africa.

The key players in the marketing of onions in Uganda are producers, retailers, wholesalers and consumers (Fig. 23).

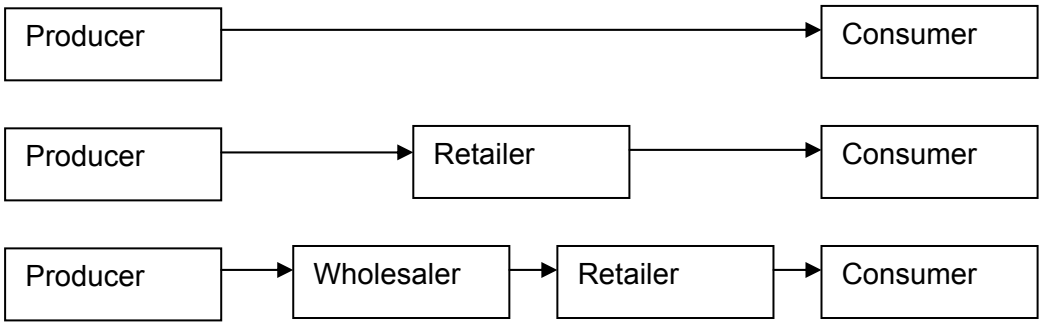



**Fig. 23. Simplified marketing channel for Onions in Uganda**

*j) Constraints in marketing of onions*

Low yields, seasonal fluctuations in supply and prices, inadequate marketing systems, post harvest losses and little or no research are the major limitations to onion production in Uganda. The bulk of onions seed used is imported mostly from U.K., USA, Europe, South Africa, and Kenya. The cost of onion seed is prohibitive. Imported hybrid seed costs up to about US$20/kg depending on the source and supply. In the areas where the dry season is short and variable, there is difficulty in drying the bulbs after harvest.

The main injury comes from irregular drying temperatures, which often lead to scald. Onions thus affected are very susceptible to rot. Lack of good storage facilities at the farm level is also quite a problem especially in view of the unpredictable weather. At times it may be necessary to pile up the onions in a small corner before they are sufficiently dry which often results in rotting. Lack of reliable transport facilities soon after packaging often necessitates onions to stand in sacks for days, which may result in rotting. Losses due to bruises during transportation do occur due to the bad roads. Major losses are however incurred during storage due to diseases like soft rots.

Production of poor quality onion has hindered the expansion and reduced the attractiveness of onion to potential growers. Onions coming from Kenya are considered to be of the highest quality given that they are clean, dry and sorted to almost one size. As a result, the prices of onions from Kenya are sold at a price 14% higher than onions from Uganda.

### 5.2.4 Production and marketing aspects of Cabbage

*a) Area and production*
The cabbage is one of the most widely grown vegetables in Uganda. It is a valuable part of the diet in the urban areas and important vegetable for internal trade. Total vegetable production in Uganda including cabbage was 344,000 MT in 1990. The area under cabbage production was recorded as 77ha producing some 2,601MT. The average yields of cabbage are estimated between 20 – 34 MT/ha. Cabbages are grown in all districts of Uganda. Kabale district has the highest production of 525T (20%) from an area of 15 ha. Mbarara, Kasese and Bushenyi districts also produce significant quantities. Mpigi, Masaka, Kabale and Kabalore districts are also important producers.

*b) Farming system*
Cabbages are usually grown as sole crops under rainfed conditions in Uganda. Mostly women and the youth grow cabbage on small plots ranging from 100 sq metre to 0.25 ha, in home gardens or on borrowed land especially in the swamps. They are produced only from imported seed. The common cultivated varieties of cabbage in Uganda are:"Drumhead" (large), "Sugarloaf" (large), "Copenhagen market" (medium) and "Red drumhead" (small).

*c) Input use*
Cabbage is a heavy feeder. Where available organic manure is applied and worked in the soil at land preparation or at planting. Because cabbage is generally a full – season crop, producers split the recommended fertilizer application rate of 650 kg/ha NPK, applying some as a broadcast after crop establishment and the reminder as a sidedressing as plants begin to form heads.

*d) Pests and diseases*
Cabbage suffers from many pests and diseases. The most troublesome diseases in all areas of production are Fusarium, clubroot, black leg, black rot and downy mildew. Of the insects affecting cabbage, aphids, the larvae of several moths or butterflies, and the cabbage root fly are some of the most serious pests. These insect pests and diseases are controlled routinely with various chemicals.

*e) Profitability Analysis*
The total cost of production of cabbage is estimated at Ush 14,814,600/ha. These costs include seed (USh 16,500), land preparation (USh 175,000), fertilizers (USh,

720,000), chemicals (Ush 600,000), labour (Ush 3,732,000), and 5% of revenue of miscellaneous expenses. A Ugandan producer selling one head of cabbage at Ush 300 – 500 (at a spacing of 45cm x 45cm, number of heads/ha is 49, 382) can expect a gross margin of Ushs 6,648,180 to 16,484,580/ha/season.

*f) Post harvest care and processing of Cabbage*

Cabbage heads are harvested when firm and well sized. Sometimes the producers delay harvest and allow head size to increase or harvest early and sacrifice some yield to gain some price advantage. Cabbage is cut selectively by hand and trimmed to the desired number of leaves. It is field packed or moved in bulk to a packing shade for grading and packing. Cabbage for market is usually packed in sacks, and loaded on to trucks for transit.

*g) Marketing and marketing channels for Cabbage*

Most cabbage grown in rural areas is for home consumption but excess is placed in stalls constructed along the main throughways and sold at roadside markets. Youngsters may also carry the cabbages on bicycles to the neighbouring towns for sale to market vendors who retail them to customers. Market gardening of cabbages is carried out near the large towns of Kampala, Jinja, Mbale, Mbarara, etc, where relatively larger acreages of cabbages are grown basically for sale to these towns. There is currently no production of cabbages for export in Uganda. In addition to provision of food, cultivation of cabbages provides ready income to the farmer.

The key players in the marketing of cabbage in Uganda are producers, retailers, wholesalers and consumers (Fig. 24).

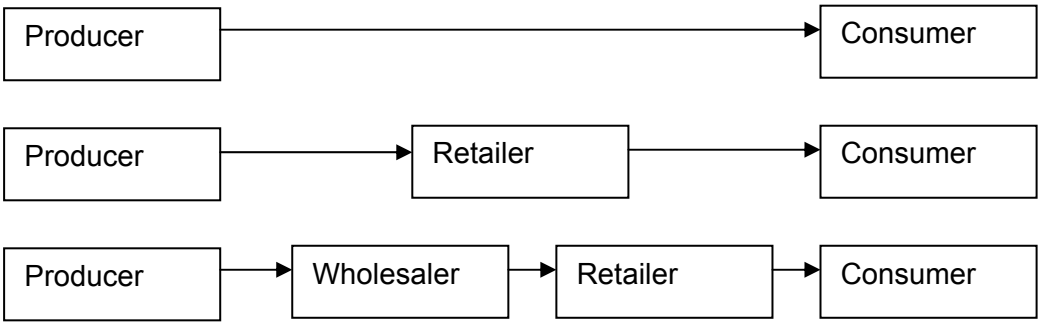



**Fig. 24. Simplified marketing channel for cabbages in Uganda**

*h) Constraints to cabbage marketing*

Poor quality produce, postharvest handling, distribution and marketing, and inadequate storage facilities set severe limitations to sustainable production and marketing. During rainy seasons, there is a large supply of cabbage, resulting in a market glut and low prices, while in the dry season, the supply is limited to the few grown in the swamps and in the highland areas of Kigezi where it rains regularly. Other constraints like lack of capital, poor rural access roads, lack of transport affect production and marketing of cabbages.

### 5.2.5 Production and marketing aspects of Tomato

*a) Area and production*

Tomato growing is one of the most promising areas for horticultural expansion and development in Uganda (MAAIF, 1998). Tomatoes are among the vegetable crops

grown in the country for both home use and domestic markets and can be grown all year round. The tomato is an important cash crop for small-scale growers with a potential for increasing income in rural areas, improving the living standards, and creating employment opportunities for women and youth. The biggest producers are the districts of Mpigi, and Hoima, Mbarara, Wakiso, and Mukono (Ssemwanga Centre, 2002). The yields of tomatoes range from 600 kg/ha to 7,125 kg/ha, with an average of 3625 kg/ha). The tomato production trends are given in Table 15 below.

**Table 15. Harvested area, production and yield of tomatoes in Uganda**

| YEAR | AREA HARVESTED (ha) | PRODUCTION (MT) | YIELD (MT/ha) |
|---|---|---|---|
| 1989-1991 | 2000 | 10,000 | 5.835 |
| 1999 | 2000 | 13,000 | 6.500 |
| 2000 | 2000 | 14,000 | 6.667 |
| 2001 | 2000 | 14,000 | 6.667 |

Source: FAO production year book (2002)

*b) Farming systems*

Production of tomatoes in Uganda is concentrated in mountain systems of Mbale and Kabaale districts and in the Banana-Coffee farming system in the Lake Victoria crescent in southern Uganda (Beek et al 1993). Tomatoes are grown as a sole crop, under rainfed conditions as unstaked or pruned plants. Grower tomato plot size range from 0.04ha to 0.6ha. The most common varieties grown include “Money maker”, “Marglobe”, “San-marzano”, and “Amateur”, Rodade.

*c) Input use*

Most soils in Uganda are slightly acidic and tomatoes do not grow well on acidic soils. Lime is therefore applied on the soil surface after first cultivation at a rate of 2.5 MT/ha. Where manure or compost is available, they are applied at land preparation. Inorganic fertilizers are applied at rates of 80, 90 and 62 kg/ha.

*d) Profitability analysis*

The total cost of production of tomato is estimated at Ush 1,462,562/ha/season. These costs include seed (USh 15,000), land preparation (USh 70,000), fertilizers (USh, 200,000), chemicals (Ush 360,000), labour (Ush 500,000), and 5% of revenue of miscellaneous expenses. A Ugandan producer selling one kg of tomatoes at Ush 330 can expect a gross margin of Ushs 888,688/ha/season (at yields of 7.125 MT/ha).

*e) Post harvest care and processing of tomatoes*

The majority of tomato growers sell their tomatoes on-farm. Selling on farm enables growers to reduce losses that could be incurred during transit. Apart from sorting and grading no other post harvest care is done on tomatoes. Growers pack tomatoes in boxes weighing 50kg or baskets of 15kg.

*f) Marketing and marketing channels for tomatoes*

The price range for on-farm sales is USh 7,000 to 30,000/box (USh 150 – 600/kg) with an average price of Ush 16,000/box (Ush 330/kg), while the price range per basket is Ush 1,000 to 10,000 (Ush 66 – 660/kg), with an average price of Ush 5,000 (Ush 330/kg). The price range at markets is Ush 10,000 - 45,000/box (Ush 200 – 900/kg) with an average market price of Ush 25,000/box (Ush 500/kg) while per

basket it is Ush 6,500 (Ush 430/kg). The marketing channels are similar to that of onion and cabbage.

*g) Constraints*
Many farmers do not have access to effective transport to distant markets at the required time. Market prices vary and are very unstable due to the short shelf life of tomatoes. A slight increase in supply rapidly pushes the prices down. Tomato growers believe that application of Diathen m-45 (Mancozeb) enhances shelf life of tomatoes by hardening the skin. Thus the producers increase both the dosage and application rates of this chemical on tomatoes especially immediately before or during harvesting. Tomatoes are therefore taken with fresh fungal residues to the market for sale. At the markets it has been observed that middlemen and some consumers insist on buying only tomatoes with visible chemical residues, so the tomatoes are usually sprayed again after reaching the market.

## 5.3 Production of important spices

### 5.3.1 Production and marketing aspects of Vanilla

*a) Area and production*
Vanilla is a climbing vine of the orchid family, which produces green beans under favourable conditions. Only one cultivar of the commercial species, *Vanilla planifolia,* is currently grown in Uganda. There are more than 20,000 vanilla growers and the number is rapidly increasing.

*b) Farming system*
Vanilla is often intercropped with other crops such as coffee and bananas. It can also be established as a sole crop, but a shade and trellis system is required. It requires a light shade (two-thirds to one-half of normal sunshine), a support to grow on (trees such as *Jatropha circus* or *Glyricidia*), high rainfall (more than 1,250mm/year), high humidity and a short dry season (2-4 months) to stimulate flowering.

*c) Involvement of smallholder farmers*
It is estimated that there are more than 7,000 smallholder vanilla growers and this number increases every day (ADC/IDEA, 2003). Sixty percent (60%) of these growers are found in Mukono district but production is increasing in Bundibugyo, Jinja, Iganga and Mpigi districts.

*d) Agronomic practices*
Vanilla is propagated using stem cuttings. Commercial propagation is typically done with long cuttings, 120 – 200cm long with at least 12 nodes stuck directly in the field. Planting in the field is done at the beginning of a wet season. Plants are spaced at 2.5-3.0m between rows and 1.5-2.0 m apart within a row (resulting in about 1,500 plants/ha).

*e) Input use*
Mulching with compost is carried out three times a year to provide nutrients and to keep the soil light and moist. Dry materials, including coffee husks are used as mulch. Buyers prefer vanilla, which has been produced using organic fertilisers.

*f) Pests and diseases*
Vanilla has few pest and disease problems in Uganda. Fusarium root rot is the most common disease affecting vanilla. While chemical control using copper fungicides

can prevent and control the disease, good management practices are more effective and environmentally friendly.

*g) Yields*

A mature plant of 4 to 5 years can produce 80-100 beans/year. Each plant can yield 2-3kg per year if well managed, but on average a typical smallholder gets 1kg/plant/year. This means, for a pure stand, it is possible to obtain yields of 3,000kg green beans/ha. This yields about 500 to 600 kg of cured beans, depending on the quality of the green beans and curing procedure.

*h) Profitability analysis*

Vanilla has a high labour requirement during pollination periods. Smallholders usually grow it more successfully with 100-500 plants than on plantations. Investment requirements for establishing 100 vanilla vines are not usually more than Ush 250,000 or 2,500/plant (Ush 200,000 for planting material and Ush 50,000 for support tree cuttings). Nursery propagation requires a simple shade structure and either pots or bags Vanilla is a highly paying crop as shown by the gross margin of over 70 million Ushs (see Table 16).

**Table 16. Projected Gross margins for small-scale vanilla production in Uganda (Ush/ha)**

| Description | Ush |
|---|---|
| Yield Green Beans (kg/ha) | 3000 |
| Producer price (Ush/kg) | 40000 |
| **Total Revenue** | **120000000** |
| | |
| Expenses/Variable costs | 3000000 |
| Vanilla cuttings (1,500 cuttings @ 2000/cutting, depreciated over 5 year) | 750000 |
| Support Trees (@ at 500) | 500000 |
| Mulch | 1500000 |
| Labour (4 people @ Ush 1500/day x 250days/year) | 40000000 |
| Pollination and security | **45750000** |
| **Total variable Costs** | 74250000 |
| GROSS MARGIN (Ush/ha) | |

*i) Post harvest care and processing of vanilla*

After harvesting, the beans are graded according to size and processed. Mature green vanilla beans have a high moisture content and no distinctive aroma. In order to convert the raw beans into highly aromatic, dark brown vanilla beans required for export, specific postharvest processes are carried out which reduce moisture content to 22-30%, and promote the chemical changes responsible for vanillin production and colour changes. Specialised processors who purchase green beans from growers carry out processing.

Beans are processed or “cured” either through a traditional method or through a much quicker process called rapid curing. After curing using either method, the beans are conditioned for 3 months by placing them in hermetically sealed containers. Prior to export, the moisture level should be reduced to 22-28%.

Due to low labour costs it is more effective to use the traditional curing method in Uganda. The majority of overseas buyers only want traditionally cured beans. Production and traditional processing methods of the type used in Uganda produce Bourbon-type vanilla.

For most world trade, the grades of whole and split beans are subdivided according to size (length) and then put in bundles, each containing 70-100 beans and weighing between 150 and 200 gm. The bundles are packed into waxed-paper lined boxes, which hold between 20 and 40 bundles. The tins have traditionally been packed into wooden boxes, each holding six tins. More recently 50kg cardboard boxes have been introduced.

There are currently 10 vanilla processors, who export good quality vanilla to USA, Canada and Europe. The aggregate global demand of vanilla is estimated at 5000 MT/year. About 10 multinational companies dominate the procurement of processed vanilla beans from producing countries. McCormick and Zink& Triest, the biggest vanilla traders, are already buying from Uganda through various agents

*j) Marketing and marketing channels for vanilla*

Vanilla exports have increased consistently from 5MT in 1993 worth US$0.4 million to 75MT valued at US$ 9.4 in 2002 (Table 11 ). Prices for Ugandan cured vanilla range on average between US$ 12 for splits to 30/kg for high quality black vanilla pods. Prices paid to exporters of cured vanilla have increased from about US$ 20/kg to US$ 250/kg in the period 1990-2003. Although prices vary tremendously depending on quality, the Ugandan exports are expected to increase further to over US$ 20 million in 2004. Uganda is the 3$^{rd}$ largest vanilla exporter to the USA, after Madagascar, and Indonesia.

Uganda is the only vanilla producing country in the world with two cropping seasons in a year: the bimodal type of rainfall allows two crops a year. Vanilla is a high value crop with low weight that compensates for the land-lockedness of Uganda. Vanilla is the fastest growing smallholder crop in Uganda.

At current export levels, Uganda is supplying only 3% of the world demand, but it is certain that she could increase exports to 100MT of cured beans annually or to 4-5% of current world demand.

Prices paid to growers for fresh green beans have increased from Ush 1,500in 1990 to about Ush 40,000 in 2003. The costs of production and gross margins for Uganda are given in Table 10.

*k) Constraints to Vanilla marketing*

The major constraint facing the Uganda vanilla industry is low production, security and smuggling. Vanilla production is very low compared to demand. In addition, there is an increasing shortage of good quality planting materials, especially as more districts take on vanilla growing.

Vanilla growing has been characterised by rampant thefts of vines and beans in the recent past. Thefts lead to harvesting of immature beans with resultant adverse effects on quality. Smuggling of vanilla beans and vines to neighbouring countries (i.e. Kenya, Rwanda, DRC) is also on the increase.

### 5.3.2 Production and marketing aspects of Ginger

*a) Area and producers*
Ginger (*Zingiber officinale*) is grown on a small scale in most parts of southern Uganda. Commercial production is limited to areas near Kampala. Mpigi and Mukono districts are the largest producers of ginger, producing an estimated 30 MT/year. In Mpigi, the Ntangawuzi and Vegetable Growers Association (NVGA) is made of 600 farmers and owns a ginger-processing factory. The crop has remained a by-the-way crop due to its long maturity period, lack of a big local market, and an unexploited export market.

*b) Farming system*
Ginger is grown as a sole crop or intercropped with bananas which provide light shade. However, ginger can be grown without shade. As a sole crop it is often the first crop taken on newly opened land.

*c) Input use*
Ginger is an exhausting crop and benefits greatly from the application of manures at planting and NPK fertilizers during growth.

*d) Pests and diseases*
Among the major diseases of ginger reported are leaf spots, Pythium spp which cause a serious soft rot of the rhizomes, and bacterial wilt cause by Pseudomonus solanacearum. It is advisable that setts are treated with a fungicide before planting. The major pests of ginger are root-knot nematodes and shoot borers, which attack the crop and cause serious losses.

*e) Profitability of ginger*
No data available

*f) Past harvest care and processing of ginger*
Ginger is harvested manually using a hoe approximately 9 – 10 months from the time of planting. During the harvest, care is taken not to break the rhizomes into very small pieces. After removal from the ground, sticking soil is removed by hand in sandy soils, this is enough but with sticky clay soils the rhizomes are washed.

If ginger is to be marketed fresh, the farmer usually cures it by sun drying in the field for 2 – 3 days. This allows a dry crust to be formed on cut ends of the rhizome, which stops excessive moisture loss and microbial attack. The ginger intended for processing is dried for 5-6 days.

After curing, the fresh ginger is transported to the home of the farmer in baskets and is either heaped in one corner of a room/store or put in sacks ready for transport to the local market. Ginger is also dried and sold in the dry form.

*g) Marketing and marketing channels for ginger*
The procedure for harvesting the crop intended for the export market is not different from that of domestic market. Before packing, the crop is sorted according to size and packed in fibreboard boxes of 7 – 10 kg.

In the local market, the crop is stored either on the floor of the stall, in wooden boxes or in sacks. The price offered for ginger varies according to buyer, season, the point of transaction (market or farm gate), the distance to market and other conditions.

As far as quality of the produce is concerned, the Ugandan exporters have not found any handling and transport problems with ginger.

The ginger marketing channel is quite direct and involves the producers, the wholesalers and the retailers. Individuals linked to the ginger producing areas mainly do the wholesale trading since they are familiar with the producers. The demand for local use is low.

*h) Constraint to ginger marketing*
The variety grown in Uganda is pungent but lacks the fine aroma and the rhizomes are small. There is a small local market hence no motivation to produce much ginger. The export market has not been explored adequately by potential exporters. Shrivelling and sprouting limit storage to about one month whether relative humidity is very low or high.

## 5.4 Floriculture industry in Uganda

### 5.4.1 Some characteristics of the sector

Commercial floriculture in Uganda is dominated by the export production of roses and plant cuttings. The demand for roses is higher than for most other floriculture products and is still increasing. Historically, Uganda started being involved in the production of flowers in 1993. Since then, there has been a rapid growth of the flower industry and it has emerged as a major non-traditional agricultural export with volumes of 4160MT valued at US$ 22 million *fob* for 2001/2002, from approximately 100 ha of production comprising mainly roses and chrysanthemum cuttings as was explained earlier in Chapter 4.

### 5.4.2 Production and marketing aspects of flowers

*a) Area and Producers*
There are currently 20 flower farms with a total area for roses being 140ha (IDEA 2003) under plastic/green houses for controlled growth. The fast growth is fuelled by a strong Euro and positive demand of Uganda roses in Europe, particularly from large UK and German supermarket chains. Outdoor production is negligible and concentrated in growing summer flowers and ornamental plants. The main floriculture products being successfully exported profitably are small to intermediate roses and plant cutting, mainly chrysanthemum and small amounts of celosia species, Sweethearts, intermediates (floribundas). Most of the flowers are grown around Kampala, Mpigi, and Mukono districts mostly along the Kampala-Entebbe road for ease of access to water from Lake Victoria and Entebbe International airport, the main mode of transportation of flowers out of the country.

*b) Farming system*
Flowers are usually grown in green houses as pure stand under irrigation. They do best under controlled growing environment in relation to water, temperature and humidity.

*c) Involvement of smallholders*
Smallholder farmers living in the vicinity of flower farms are engaged in the flower industry mainly as a source of labour to the farms. Local labour is mainly used for activities such as planting, spraying for pests and diseases control, harvesting, grading and packaging of flowers. Most of the operations are done manually despite

the intensive nature of flower farming. The existence of flower farms has boosted economic activity of nearby trading centers and has triggered a growth of industries supplying packaging materials, chemicals, hardware, food, fuels, electricity, stationery and fertilizers.

*d) Yield and total production*

Yields of flowers in Uganda are higher than those obtained in Kenya and Tanzania due to the hot and humid climate. For instance, for cut roses Uganda produces 180-200 stems/$m^2$/year of "First Red" (a T-hybrid) compared to 120-140stems/$m^2$/year in Kenya. Under good management Uganda can achieve 5-10% higher yields than Kenya or Zimbabwe due to the climate advantage.

Roses attain Dutch annual yields in 8-9 months with higher yields but shorter stems in Uganda. Three types of roses currently grown are T-hybrids (long stem, big flower head), sweethearts (short stem, small flower head) and floribundas (intermediate). Within each of these types there is a wide range of varieties available in a wide range of colours. The actual choice depends on adaptation to the climate and the projected market trends.

Twenty-seven (27) varieties of roses are being commercially grown in Uganda, the majority of which are sweetheart types (Table 17). The area established and yields reported from Uganda are given in Table 12. For many of these varieties higher yields are attainable. The estimated marketable yields for sweethearts range between 1.36-1.94 million stems/ha/year.

Some small and intermediate rose varieties produce yields of more than 350 stems/$m^2$/year and give reasonable quality over 5 years or more in Uganda. These varieties account for more than 80% of rose exports.

Trials with chrysanthemum cuttings started in 1995, through joint ventures with Dutch companies, and very high yields of cuttings under Ugandan conditions were obtained. As a result, three international companies have set up successful farms in Uganda.

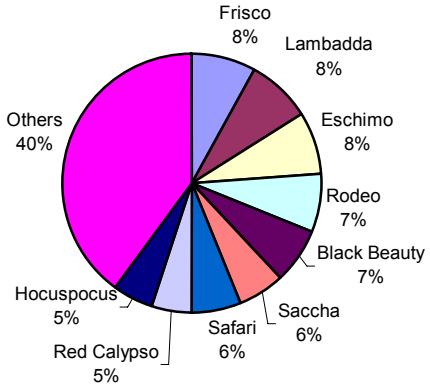
*e) Inputs use and Supply*

The whole bulk of inputs i.e. fertilisers, planting materials, chemicals, packaging materials, equipment, greenhouse plastics, netting, etc. required for floricultural production are imported and are obtainable from many foreign companies which have set up business in Uganda.

**Table 17. Rose Varieties Grown in Uganda**

| | Varieties | Ha | stems/m2/yr |
|---|---|---|---|
| 1. | Amore | 0.50 | 310 |
| 2. | Baronesse | 0.50 | 225 |
| 3. | Cream Propyta | 0.50 | 230 |
| 4. | Dream | 7.80 | 235 |
| 5. | Escada | 0.25 | 310 |
| 6. | Escimo | 3.10 | 310 |
| 7. | Frisco | 11.50 | 310 |
| 8. | First red | 12.75 | 130 |
| 9. | Golden gate | 2.70 | 180 |
| 10. | Konfetti | 1.50 | 150 |
| 11. | Lambada | 5.90 | 190 |
| 12. | Nicole | 0.50 | 85 |
| 13. | Noblesse | 0.50 | 180 |
| 14. | Orange Unique | 0.50 | 220 |
| 15. | Rodeo | 4.85 | 325 |
| 16. | Royal Dream | 0.25 | 235 |
| 17. | Sacha | 2.65 | 260 |
| 18. | Souvenier | 4.75 | 235 |
| 19. | Starlite | 0.25 | 170 |
| 20. | Tinike | 0.25 | 160 |
| 21. | Alsmeer Gold | - | 175 |
| 22. | Corvertte | 0.80 | 140 |
| 23. | Europa | 0.50 | 220 |
| 24. | Laminate | 0.50 | 230 |
| 25. | Indian Ferma | 0.13 | 85 |
| 26. | Rumba | 1.20 | 105 |
| 27. | Vanilla | 0.80 | 250 |
| | TOTAL | 65.93 | |

Source : Bank of Uganda – Uganda Flower Industry Study Report, January 2000.




Source: ADC/IDEA PROJECT (2004)

**Fig. 22. Export share of rose varieties from Uganda to Flora Holland Auction (2003)**

*f) Profitability of Flower Production*

Profitability of rose farming ranges between US$1578/ha and US$5773/ha depending on farm size (Table 18). The capital investment required is quite high, but a well-managed farm, can attain substantial returns on this investment in only a short period of time. The investment requirement for a six-hectare Ugandan rose farm, completed in two phases, ranges between US$21.5/m2 for wooden and US$41.2/m2 for metal structures. Other building investment include: grading and packing area, pre-cooling area, cold store, materials storage, offices, pump room, workshop, store for fertilisers and pesticides, and staff housing. Farm equipment requirements include refrigeration, irrigation equipment, spraying equipment, defoliating equipment, generators, rose scissors, buckets, trolleys, grading equipment other hand tools and vehicles (including a refrigerated truck)(Table 19).

**Table 18. Profitability of Rose farming in Uganda**

| Description | **Farm A (4ha)** | **% cost** | **Farm B (9ha)** | **% cost** |
|---|---|---|---|---|
| Gross income US $ | ***78620*** | | ***228000*** | |
| No stems exported | 870000 | | 3000000 | |
| Income per stem | 0.090 | | 0.076 | |
| Stems/m2 | 22 | | 33 | |
| Marketing costs: | | | | |
| Freight | 26,952 | 37 | 62,600 | 36 |
| Handling & commission | 11,253 | 16 | 29,770 | 17 |
| Sub-total marketing | 38,205 | 53 | 92,370 | 53 |
| Direct costs: | | | | |
| Chemicals/fertilizers | 7,663 | 11 | 18,500 | 11 |
| Packing materials | 3,351 | 5 | 10,500 | 6 |
| Fuel | 924 | 1 | 1,680 | 1 |
| Motor expenses | 523 | 1 | 850 | 0 |
| **Total direct costs** | **12,461** | **18** | **31,530** | **17** |
| Indirect costs: | | | | |
| Salaries and wages | 9,546 | 13 | 27,174 | 15 |
| Electricity | 483 | 1 | 1,789 | 1 |
| Communications | 464 | 1 | 1,400 | 1 |
| Repairs/maintenance | 1,516 | 2 | 1,800 | 1 |
| Depreciation | 8,300 | 11 | 18,675 | 11 |
| Other | 1,333 | 2 | 1,357 | 1 |
| **Total indirect costs** | **21,642** | **30** | **52,145** | **30** |
| ***Total costs*** | ***72,308*** | | ***176,045*** | |
| Cost per stem | 0.08 | | 0.06 | |
| Net profit | 6,312 | | 51,955 | |
| Net profit per stem | 0.007 | | 0.017 | |
| Net profit/ha | 1,578 | | 5,773 | |

Assumption: Interest averages US$ 12,000/month for a six hectares farm
Source: ADC/IDEA Project (2001)

**Table 19. Investment requirement for establishment of six hectare rose farm in Uganda**

| | Cost in US $ | % of total | Cost/ha |
|---|---|---|---|
| Land purchase | 50,000 | 4 | 8,333 |
| Land preparation | 56,000 | 4 | 9,333 |
| Greenhouse structures – wood | 150,000 | 12 | 25,000 |
| - (metal) | | | (196,000) |
| Plastic | 75,000 | 6 | 12,500 |
| Irrigation infrastructure | 80,000 | 6 | 13,333 |
| In-field irrigation-drip lines, valves etc | 36,000 | 3 | 6,000 |
| Electrical installation + generator | 60,000 | 5 | 10,000 |
| Plants | 450,000 | 35 | 75,000 |
| Buildings | 150,000 | 12 | 25,000 |
| Cold store – 100 $m^2$ | 80,000 | 6 | 13,333 |
| Vehicles truck, pick-up, tractor/trailer | 30,000 | 2 | 5,000 |
| Tools and equipment | 60,000 | 5 | 10,000 |
| Office equipment | 14,000 | 1 | 2,333 |
| TOTALS | 1,291,000 | 100 | 215,167 |
| Cost/$m^2$ | | | 21.5 (wooden) 41.2 (metal) |

Source: ADC/IDEA Project (2001)

Assumptions:

1. Figures in US $ Exchange rate US $ 1 to Ushs1,800/=
3. Rose plants costed at 6 plants/m2
4. Working capital requirement is estimated a US $ 20,000/ha

Only three farms are growing and exporting chrysanthemum cuttings. Mums are short day flowering plants that require 16 hours of daylight in order to keep in the vegetative phase so that they keep on producing shoots. Supplementary lighting provides an additional 4 hours per day, from 10 p.m. to 5 a.m. Cuttings consisting of 5.5 – 7.5 cm shoots with 3 leaves are picked 2-3 times a week for 16-20 weeks. Each plant can produce on average 28-33 cuttings/production cycle. This results into yields of over 30 million cuttings/ha/year. With contract prices ranging from US$ 0.02 to 0.004/ cuttings, gross revenues of US $ 0.6 – 1.2 million have been achieved.

Summer flowers are relatively low value cut flowers used in bouquets annual flowers used in mixed bouquets. They include flower types like *Amaranthus* spp, *Ammi majus*, *Bupleurum*, *Callistephus*, *Carthamus*, *Delphinium*, *Euphorbia* and *Mollucella*. All summer flowers are grown from seed in the 'open' field i.e. without the need to protect them from weather conditions, as it is the case in the greenhouse/shade cloth.

Harvesting starts 10-14 weeks once the crop has emerged. All seeded annuals are cheap to grow, and about 80% of the direct costs of production are incurred at and after harvest. Gross margins of selected annuals are given in Table 20.

**Table 20. Gross Margins for selected Summer Flower Production in Uganda (US$/ha)**

| | Callistephus Chinensis (white) | Euphobia marginata Snow top | Celocia spicata Flamingo feather |
|---|---|---|---|
| Revenue | | | |
| Actual Production (stems/ha) | 210469 | 430769 | 200000 |
| Exportable production (stems/ha)[1] | 168375 | 344615 | 160000 |
| Sales Price (US$/stem) | 0.12 | 0.19 | 0.23 |
| Total revenues | 20521 | 66338 | 36900 |
| Expenses | | | |
| Production cost | 8466 | 11577 | 10500 |
| Freight costs[2] | 10103 | 20677 | 9600 |
| Packaging[3] | 1010 | 2067 | 960 |
| Commission[4] | 4104 | 13268 | 7380 |
| Total Cost (US$/ha) | 23683 | 47589 | 28440 |
| GROSS MARGIN (US$/ha) | -3162 | 18749 | 8460 |

Source: ADC/IDEA (1998) NTAE Investment Opportunity Forum
[1]20% production is assumed to be of non-export quality
[2] box (300 stems) = 10kg, freight cost of US$1.80/kg (including bond fee and handling)
[3]300 stems/box, box costs US$1.80
[4]20% of sales price received

*g) Post harvest care of flowers*

Rose flowers are sorted by quality and size according to market specifications. Quality is of utmost concern. Roses are judged based on freshness, flower uniformity, stem length, freedom from pest and disease, growth disorders and vase life.

Rose flowers should be bunched in (10s, 20s, 25s, 50s) according to market specifications, and stems in each bunch are trimmed to the same length. Grading of bunches is done by stem length (including the bud); and the minimum stem length in a bunch should be indicated. The permitted difference in length should not be more than 10% of the shortest stem in the bunch or batch, with a maximum of 5 cm.

Packing roses into boxes is done on the same day of flight, and is done inside the cold store. Prior to packing in boxes, stems are trimmed and bunches wrapped in kraft paper. Depending on variety, each box contains 18-30 bunches (360-600 roses) with a weight of about 15-17 kg. Boxes are pre-cooled and transported to the airport via refrigerated truck.

Chrysanthemum cuttings are 5.5 – 7.5 cm length shoots consisting of three leaves. They are picked 2-3 times a week for a period of 16-20 weeks. Harvesting is done with a knife, which measures the right size of a shoot. Sorting, grading and packing are done at the same time in the field, according to market specifications. Between 50-52 cuttings are packed in clear perforated polythene bags which are packed in 5kg cardboard boxes. Boxes are transported to the packhouse where quality control is carried out. Quality is based on freshness, uniform length, freedom from pests, diseases and chemical damage and chemical residue. A good quality cutting should be able to keep for at least 3 - 4 weeks before sticking.

Post harvest care of summer flowers involves cooling in a store for 2 – 12 hours to remove field heat. Use of clean water containing a bactericide and flower preservatives is recommended. Bunching follows and the number of stems per bunch, and the number of bunches tied together is usually specified by the buyer or the market. After bunching some flowers going to supermarkets require sleeving.

*h) Marketing and marketing channels for flowers*

Flower marketing is specialised since the producers are involved in marketing. All farms make marketing arrangements with importers or export directly. The European market is the major outlet for roses and other flowers grown in Uganda. The main destinations of Ugandan flowers are the Netherlands, Germany, United Kingdom, France, Norway and Sweden. Small quantities are occasionally shipped to Gulf Countries and South Africa. Other possible markets that Uganda could favourably tap include Kenya, Rwanda and Austria.

Marketing strategies for Uganda cut flower exporters include Dutch auctions, direct marketing to UK and German supermarkets and through import/export companies (Fig. 23). As an ACP country, Uganda benefits significantly from preferential tariffs to the European Community markets.

The Dutch auctions remain the most important 'customer' of many Ugandan exporters, although some exporters sell direct to importers elsewhere in Europe. The Aalsmeer Flower Auction (VBA) and Flora Holland (VBH) are the two biggest flower auctions in Europe and the biggest importers. Most flowers sold on the Dutch auctions are re-exported to other European countries, principally, to Germany.

The Teleflower Auction (TFA), set up by East African Flowers, is a major buyer of roses from Uganda, and there are a number of specialist importers/wholesalers who buy from Uganda and other East and Southern Africa countries for re-conditioning and sale either through the auctions or to direct buyers.

Rose flower prices depend on quality, season and source. On average, prices range between 0.12 – 0.25/stem.

Summer flowers are relatively low value cut flowers used in bouquets. Their distribution structure varies widely, but they are mostly traded through auctions (in the Netherlands) or through importers/wholesalers. In the case of Uganda, a local producer would find a market with domestic cut rose producers. Prices vary widely, but are highest during periods of low supply. The best exporting window for Uganda is the period October to March.

There is almost no open market for chrysanthemum cuttings and it is impossible to grow this product for export unless a contract has been agreed with a major distributor. Contract prices range from US$0.02 to US$0.04 per cutting. With yields of over 30 million cuttings/ha/year, gross revenues of US$600-1,200,000 have been achieved.

When chrysanthemum cuttings arrive in Europe, they are rooted and established within a period of 3-4 weeks and sold to Chrysanthemum cut flower growers, or they are planted in pots and sold as potted plants. Chrysanthemum cuttings are sold to only a few specialist distributors who sell them as potted plants.

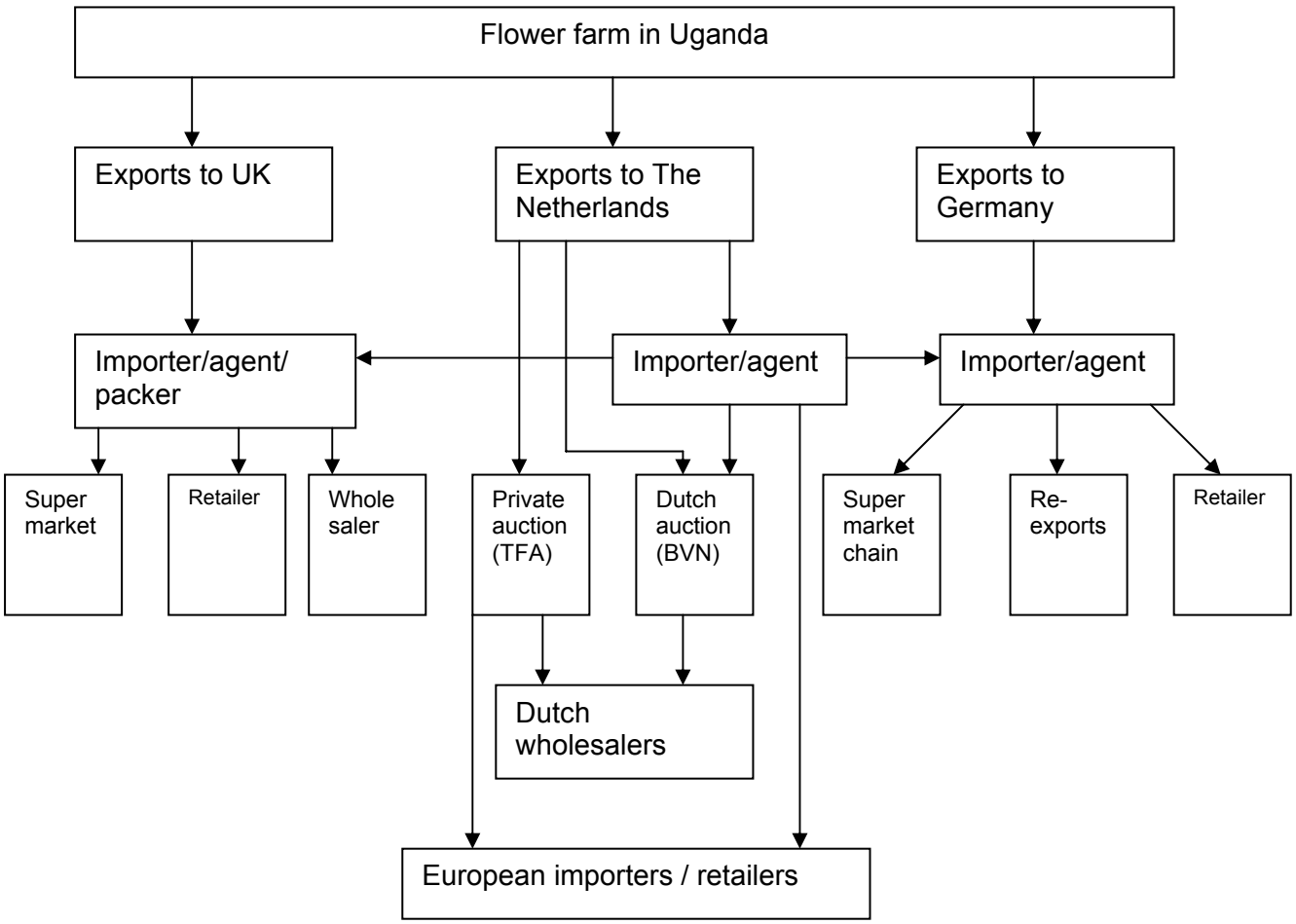



**Fig. 23. Cut flower Product flows in the European supply chain**

*i) Constraints in flower Production and marketing*
The flower industry faces a number of problems. The major constraints are highlighted below:

(i) *Lack of direct market*s. This has been identified as the most outstanding problem limiting expansion in floriculture. All flower exports were designed to supply Dutch flower auctions managed by Dutch growers. Due to stiff competition, the Dutch growers developed strategies to keep non-Dutch growers out of the market by under pricing their own products compared to the imports. The non-Dutch growers are naturally disadvantaged in terms of the grade and prices they obtain at the auctions.

(ii) *Borrowing*. Banks like the East African Development Bank (EADB), Development Finance Company, Gold Trust Development Bank and Uganda Commercial Bank (UCB) play a vital role in this sector. However, the formalities in obtaining loans are long and complicated. Interest rates on long-term loans are high whereas inflation is low. The borrowing conditions are therefore not conducive to investors.

(iii) *Inadequate/poor infrastructur*e. Most flower firms are located in rural areas where facilities like roads, electricity and water are poor. Investors tend to over-borrow in order to meet the cost of these facilities since flowers are perishable commodities and therefore need proper preservation to maintain quality. The problem is aggravated by the lack of facilities at Entebbe airport. Access roads from the main roads to the flower sites need constant maintenance. Infrastructural investments

undertaken by individual farms include installation of generators to supplement Uganda Electricity Board supply, to cater for power cuts and irregular supply, use of cell phones for communication and development of own water supply such as boreholes.

(iv) *Inadequate Airport facilities*. The cold storage house, completed in April 1998, is not operating efficiently because of management problems. It functions basically as an offshore facility at the old airport and yet handling, customs documentation, clearance, and health inspections have to be done at the new airport. Flowers are roughly handled by the Entebbe Handling Services (ENHAS). Lack of easy air connections and the low cargo traffic calling at Entebbe are serious problems. In some situations, farms have been forced to charter aeroplanes to transport their commodities before spoilage. Handling charges by ENHAS are high - according to UFEA, at US$0.07 per kg, compared to US$0.03 at Nairobi. Airfreight charges are also high compared to regional rates - US$1.7-2.3 per kg in Uganda, compared to US$1.4 per kg in Kenya.

(v) *Taxation.* Although import taxes have been reduced, Value Added Tax (VAT) is still charged on items the producers consider plant and equipment.

(vi*) Management*. The technical management aspect involves the use of technically qualified personnel. These have had to be hired from Kenya, Israel and the Netherlands at high fees. Even then, performance has fallen below expectations, a critical loss considering the initial lack of knowledge on the part of the promoters. The situation is beginning to improve as more Ugandans have gained experience.

# 6. CONCLUSIONS

## 6.1 The role of horticulture in economic development and poverty alleviation in Uganda

This sector study has shown that horticulture in Uganda can contribute to economic development and poverty alleviation through foreign exchange earnings, employment opportunities, income generation and rural development.

*Foreign exchange earnings*
Horticulture is an important and increasingly reliable source of foreign exchange earnings and economic growth. The export earnings from the horticultural sector have been growing spectacularly over the last 5 years.

*Employment opportunities*
Although exact figures are lacking it is concluded that the horticulture industry generates a significant number of jobs in Uganda. The country's 20 floriculture farms directly employ more than 4,000 permanent staff; about 3,000 small-scale farmers grow fresh fruits and vegetables for export; and more than 20,000 smallholders grow vanilla (usually on less than 0.2 hectares). Even a larger number of smallholders is estimated to be involved in production of fruits and vegetables for the domestic and regional markets. Also the input supply, transport, marketing, packaging and handling operations are estimated to generate a significant and growing number of jobs. The sector provides opportunities and careers for agricultural graduates and diploma holders. The development of commercial horticulture farms creates opportunities for outgrowers to be involved in the sector.

*Income generation*
The potentials of the horticultural sector to significantly contribute to poverty alleviation through income generation activities in both rural and urban areas are considered to be very high. This holds especially in the following ways:

- Contribution to wages of rural communities involved in fruits, vegetable, and spice production for the local and regional markets.
- Increased income for smallholders farmers in the rural areas to be involved in fruits and vegetable production for the local and regional markets and cultivation of spices;
- Contribution to wages of workers in the peri-urban and urban areas to be employed in flower production, and general horticultural sectors as input supply, transport, marketing, packaging and handling.

*Rural development*
Horticultural production contributes to rural development in terms of: wages to the rural and urban economies, provision of jobs, incomes, and public services, widening of the tax base, and human resource development through training, researchers, technicians and supervisors. In addition, roads, schools, health centres and electrification have been set up or extended to where commercial horticultural farms have been set up.

Although commercial farms are usually more competitive in the export sector than small-scale growers, the latter can compete in some areas. The ever-increasing quality, hygiene, and traceability requirements of the worlds supermarkets means that opportunities for smallholder production of fresh fruits and vegetables are very limited; modern farms with year-round irrigation, hygienic pack houses, and cold chains are essential. Furthermore, because flowers, plants, fruits, and vegetables

generally require significant investment capital, they are also usually reserved for commercial farms. There are, however, outgrower opportunities on these farms. In addition, small-scale farmers in many parts of the country can produce vanilla, cocoa, and papain, and their potential as cash crops to supplement coffee has been largely untapped. Further, small-scale growers in remote areas have a comparative advantage in vanilla over large-scale commercial farms.

## 6.2 Potentials

The horticulture sector in Uganda has great potential in the following areas:

*Export growth*
There is significant growth potential for export of Ugandan horticulture. Uganda has a relatively low market share for almost all horticultural products, and, because buyers generally like to spread their supply base over several countries, Uganda has an opportunity for rapid growth. The value of horticultural exports can grow to US $75-100 million FOB by the end of the decade, based on products that are already being exported in relatively small quantities. In the long run, according to IDEA estimates, existing exports could be increased by at least ten times to US$300 million with sufficient investment. This growth would require private sector investments in modern production units; private and public investment in training and research; and public sector investment in facilitating services at the airport, roads etc.

There is significant growth potential for exports of Ugandan floriculture. Currently, EU floriculture imports are valued at more than US$1 billion and are growing 2-4% per annum. Uganda has less than 2% of market share. Because of its abundant supplies of water, lower production cost per stem, and year-round uniform production conditions, Uganda has distinct competitive advantages over other African and Southern hemisphere countries for certain types of roses, gerbera, foliage, tropical flowers, and chrysanthemum plant cuttings. Additionally, the market for tropical flowers and foliage is largely untapped and has tremendous growth potential. Recent improvements in codes of practice, quality assurance, airport handling, and private sector research have had a positive impact on the image of Uganda, and have fostered many new market linkages.

*Vanilla production*
There is great growth potential for exports of vanilla from Uganda. Vanilla is the highest value crop ever grown in Uganda. Although the exorbitant world prices for vanilla are expected to decline in 2002, vanilla will remain a very attractive crop for smallholders in the future.

*Growth of regional and domestic markets*
There is great potential for increasing regional exports of horticultural products from Uganda into neighbouring countries of Kenya, Sudan, DRC, Tanzania, and Rwanda. Further urbanisation processes will also give a boost to the development of the domestic market for horticultural products.

*Processing*
Although processing of fruits and vegetables is almost non-existent in Uganda, there is good long-term potential for it. Small market niches exist for solar-dried banana, pineapple, mango, papaya, and chili as well as passion fruit juice and concentrate. Uganda is still too small a supplier to invest in the promotional efforts needed for product differentiation. However, as quantities increase and quality becomes more

consistent, there will be a need to differentiate Ugandan products in the market place in order to add value.

*High-value niche markets*
Because of Uganda's dependence on airfreight for extra-regional horticultural exports, the sector is restricted to very high value products that can support the cost of airfreight. Uganda is therefore not competitive in the high volume markets for bulk fruits and vegetables. However, despite this disadvantage, because of Uganda's natural resources, climatic, and geographical advantages, competitive advantages do exist in a number of niche markets.

The industry has great potential in the organic niche market, given Uganda's predominantly organic production that has evolved rather by default due to lack of agricultural inputs. There is a vibrant organic movement world-wide that is prepared to pay premium prices for organically produced products.

*Growth and expansion of existing products*
Although diversification and identification of new products is useful, in the short term Uganda should focus on achieving maximum growth of existing products. Current qualitative and quantitative market indications suggest that there is no real need to find "new products and new markets." Products currently exported that have growth potential are small/intermediate roses, gerbera, tropical flowers and foliage, plant cuttings, fresh chilli/hot pepper, passion fruit, okra, baby vegetables, vanilla, sun-dried tropical fruit, and some others such as papain from papaya. Maintaining adequate continuity and quality of product are the horticulture industry's most significant issues.

*Variety development and seed production*
Development, multiplication and dissemination of high yielding varieties of horticultural crops and production of seeds and planting materials.

*Quality improvement and control*
There are few institutional or legal barriers to the main markets for Ugandan products. Though MAAIF does need to continue reforming and streamlining the registration process for agricultural chemicals, essential controls on imports and exports of products are in place under MAAIF and do not need major modifications. There are no serious market constraints facing these horticultural crops, except the need for continuity and quality of product.

## 6.3 Challenges

Like most agricultural sub-sectors, horticulture is affected by several constraints that have limited optimal and efficient utilisation of resources including those within reach of the smallholder farmers. The main constraints are highlighted below:

*Lack of improved varieties*
There is no organisation involved in quality seed production or planting materials of fruits and vegetables and their distribution either in the private or public sector. The availability of quality seeds of desired varieties has always been uncertain. Some farmers retain seeds but do not preserve them properly. Limited awareness about appropriate nursery management has not been widely undertaken. Private nurseries for production and supply of quality planting materials are scarce.

*Land preparation*
Land preparation is generally done using manual tools like the hoe and occasionally with oxen and as such not deep enough to allow good root development. In addition, land is rarely ready in good time due to inadequate tools for preparation.

*Limited use of recommended technologies/inputs*
Planting vegetable on raised beds is the recommended technology but is hardly practiced. Rotation of different crops on a piece of land is hardly practiced. This is causing severe incidence of soil borne diseases. Other diseases and pests are experienced due to poor crop management. Insecticide and pesticide use is limited, which is good since this limits the chance of residual effects. However, where they are used, the safety measures are not observed. Further, application of pesticides is conducted according to a fixed time schedule, ignoring the level of incidence and degree of damage. This results in marketing of fruits and vegetables, contaminated with chemical residues.

Inorganic and organic fertilizer use is not common. However, continuous mining of the soils has resulted in reduced inherent fertility hence low yields. It is important to note that input use in commercial activities such as floriculture enterprises is done according to existing recommendations. The cost of inputs is relatively high making it very difficult for resource-constrained farmers to afford them. Some of the chemicals used in floriculture are 10-30% higher in Uganda compared to Kenya and Zimbabwe prices.

*Poor post-harvest management/Quality Control*
Harvesting, sorting, packaging and transportation are not done in a proper manner. As a result, there is high incidence of post harvest losses, especially for the perishable commodities. This has made producers make do with low prices to their disadvantage. Quality control in horticultural production is not organised centrally. The lack of assurance of quality by producers has continuously led to them contending with very poor prices. In some cases, if a grower or exporter does not give the customer the agreed quality of product, they are simply not paid.

*Extension service*
The extension service delivery has been decentralized to the district. At the district level, the District Agricultural Officer is the head of extension services and is supported by one Deputy District Agricultural Officer and 5 – 8 Subject Matter Specialist (SMS). One of the SMS is responsible for horticultural crops. There is one Agricultural Officer in each county. There is one Agricultural Assistant per 1000 farm families who has to deal with all aspects of farming including livestock, plantation crops, food crops and horticulture. The situation is made worse by poor facilitation of the extension workers. In essence, the impact of extension services on production of horticultural crops is not visible.

Though many of the companies attempting to develop horticultural exports lack the appropriate experience, communication skills, and selling talent, current public sector investment in education and training in horticulture is negligible. Feasibility studies, business planning, and financial management are specific areas that will need intensive technical assistance for years to come. The USAID ADC/IDEA Project has focused intensively on horticultural training, but this is only a beginning. Customized training in target crops is an area where joint private, public, and donor activities can pay large dividends. Government could provide grants to organizations such as the Uganda National Vanilla Association (UNVA) to increase their extension services in return for a formal commitment to Government to implement specified elements of its strategy.

*Limited access to information*
There are no technical bulletins or handouts for reference by farmers on general aspects of production of horticultural crops. There exists insufficient market information for export. Currently, the collection of export statistics is incomplete and inadequate.

*Poor Infrastructure*
Most of the infrastructure needs to be improved to effectively support the horticultural sector growth and expansion, such as roads, competitively priced and reliable power, and an efficient airport.

*Finance/credit*
Finance and credit are perennial problems for agribusiness investors, due to the intrinsic risks involved. Procedures and processes to access the financial services have not been streamlined even for those who can afford.

*Lack of Expertise/Technical skills*
Although the daily cost of labour is highly competitive, labour efficiency is low at all levels. Most investors have no understanding of the benefits and techniques of a permanent training policy. At national level, training is also weak. Makerere University offers (since 2004) horticulture as a separate degree course, but has limited facilities and equipment to run it properly. In the related area of horticultural research and technology transfer, there is minimal public sector capacity at present.

*Lack of private sector investment*
Investment in new farms and processing facilities is essential. For example, only one of the vegetable exporters has cold chain facilities and there are only two professional packhouses (plus a few rudimentary ones that do not meet international standards). In addition, if export quantities increase significantly, major improvements will be needed in chemical application techniques, water quality, and packhouse hygiene. Also, based on experiences in Kenya and Zimbabwe, specialized products require investment in integrated production and market systems by large-scale commercial growers with links to organized groups of outgrowers.

Although the GOU has been responsive to industry lobbying, has shown public support for the industry, and has promoted investment in the sector, there is still room to improve implementation of taxation and investment incentives. Furthermore, public sector investment in infrastructure would encourage private sector investment.

*Limited research in horticultural sector*
Despite its importance to the Ugandan economy, NARO focuses relatively little of its research on horticulture, largely because it is not considered an important food or cash crop for the majority of farmers. However, farmer associations such as the Uganda Flower Exporters Association (UFEA) have developed strong research capacity. Government support to these initiatives are required.

NARO has an important role to play in producing “elite” stocks of seed and plantlets for some target crops that have been developed in Uganda and cannot be sourced from overseas suppliers, e.g., unique varieties of hot pepper and passion fruit. However, multiplication of these materials should be carried out commercially by private sector nurseries, accredited and monitored by NARO/MAAIF. Evaluation of new varieties should be a joint effort between NARO and the private sector. Finally, NARO should continue its work on Integrated Pest Management and upgrade its expertise on organic techniques.

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