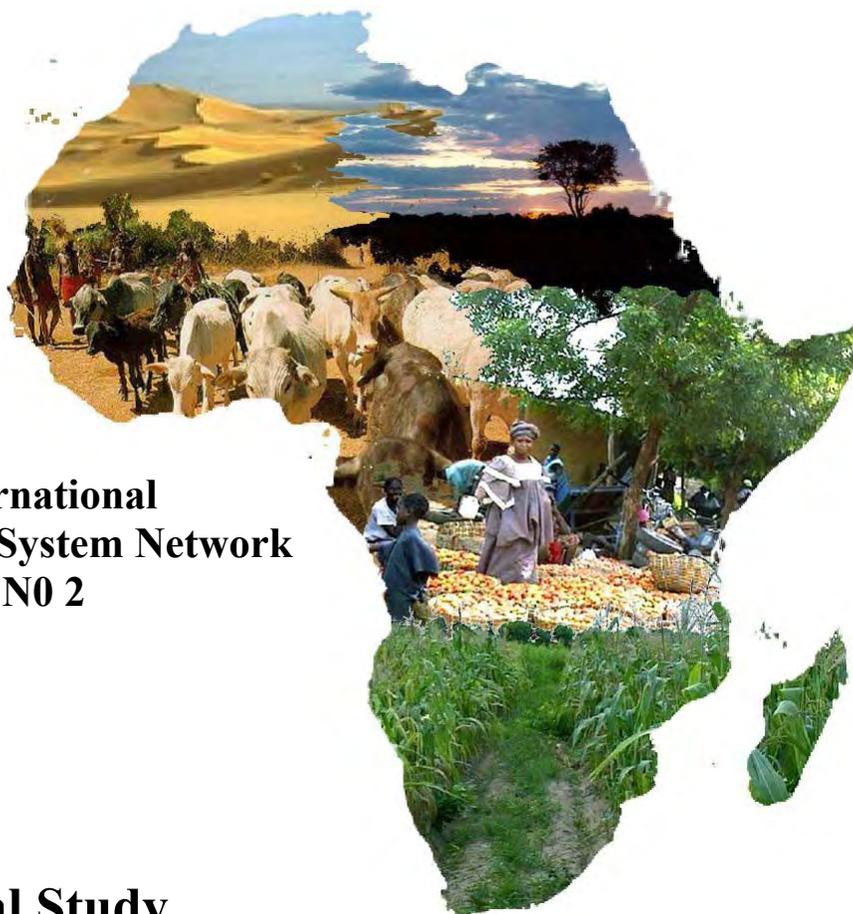


FEWS



Famine Early Warning System Network



**Chemonics International
Famine early Warning System Network
Task Order N0 2**

**Horticultural Study
in Lower and Middle Shabelle
Regions of Somalia**

September 27, 2004

Horticultural Study in Lower and Middle Shabelle Regions of Somalia

The Case of

**Expansion of Fruit and Vegetable Production and
Marketing in Greater Mogadishu**

By

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EXECUTIVE SUMMARY

Much of Southern-central Somalia consists of gently sloping coastal plains bisected by two major river systems, the Jubba and the Shabelle, that endow the otherwise semi-arid country with remarkable potential for irrigated agriculture – cereals, tree crops, fruits and vegetables. The Shabelle River takes a fortuitous southward bend just before reaching the Indian Ocean thereby increasing the opportunities for irrigated crops.

Crop agriculture was only second to livestock as Somalia's foreign exchange earner before the civil war that started in early 1991. It was estimated that the combination of these two sub-sectors used to employ more than 80 percent of the country's labour force (55 percent livestock and 25 percent agriculture). During the mid 1980s, the agricultural sector started to decline gradually before being further ravaged by civil war.

This study of horticultural¹ production in Lower and Middle Shabelle regions of Somalia is the first of its kind in Somalia after the civil war in 1991 (except the specialized study on bananas conducted recently for the European Union in certain areas of Lower Shabelle).

The terms of reference for the study included the assessment of current status of fruits in the Lower and Middle Shabelle, identification of opportunities and **constraints towards** expansion of production, assessment of feasibility for expanding marketing of fruits and vegetables in Mogadishu and estimation of expected improvement in food security for producers, market participants and consumers as a result of production, marketing and consumption of more fruits and vegetables.

There were few current secondary data and other reference materials available for this study. Moreover, it was extremely difficult to collect enough primary data due to the large size of the area to be covered and insecurity in some areas. A structured questionnaire was used for collecting data by experienced field enumerators. Data collection stratified the farmers into small, medium and large farmers.

The study showed that vegetable and fruit growers are more food secure than grain growers since they always have money to buy food crops in times of shortage. In Lower Shabelle about 140,000 people depend on banana and demand for banana is increasing. Other vegetables and fruits grown include grape fruit, lime, papaya and mangoes, with lime having the best returns. In the same region, six major vegetables, tomatoes onion, spinach, carrots, pepper and okra are grown in an area of about 657 ha. In middle shabelle similar fruits and vegetables are grown. The vegetables cover about 434 ha. The potential for increased production in both area and increase in productivity and quality exist in both regions.

¹ This study is composed of two parts; the first part is the main findings of the study and the second part is the overview of the technical and statistical information. FEWS NET and Agrosphere agreed to publish only the first part of the study. The second part is available on request for reference through Agrosphere.

Marketing of fruits and vegetables is currently a major problem in both regions due to poor roads and also very important due to many roadblocks where militia extort money from traders. A government in Somalia would enhance this aspect, which would stimulate production.

A number of problems limit production and marketing of horticultural crops. The most important constraints more or less in a priority order are lack of proper seeds and chemicals especially for vegetables, lack of training and extension services on production and processing, poor security that limits movement of produce and lack of support services such as credit, irrigation infrastructure, transport infrastructure and processing and cold storage facilities. Support in these five areas would promote horticulture farming and return it to the pre-war levels where agriculture was only next to livestock in income generation.

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ABBREVIATIONS

EU	European Union
FAO	Food and Agriculture Organisation
FEWS NET	Famine Early Warning System Networks
FSAU	Food Security Assessment Unit
Ha	Hectares
Qls	Quintals
NGO	Non-Governmental Organization
So.Sh.	Somali Shilling
UN	United Nations

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1. INTRODUCTION

1.1 The terms of reference for the study

The terms of reference for the study were:

- To assess the current status of fruits and vegetable production in the Lower and Middle Shabelle River areas;
- To identify opportunities and constraints towards expansion of production;
- To assess the feasibility of expanding the marketing of fruits and vegetables in Mogadishu's Bakaara market; and
- To estimate the expected improvements in food security for producers, market participants and consumers as a result of expanded production, marketing and consumption of more fruits and vegetables.

1.2 The study methodology

For the purpose of this study, the Lower and Middle Shabelle Valleys were divided into five major cropping areas, three in lower Shabelle (the areas around Afgoy, Marka/Bulo Mareerta and Qoriyoley-Kurten Waarey) and two in Middle Shabelle (the areas around Jowhar and Balad). This study sampled 51 villages in the five zones, 31 villages in Lower Shabelle, and 20 villages in Middle Shabelle.

A structured questionnaire for both fruits and vegetables were prepared and tested in two villages near Afgoy. Experienced field enumerators were selected with the assistance of Dr. A.M. Abikar of FSAU Mogadishu and Prof. A. H. Shirwa. Former FEWS NET staff was used for data collection in the field. Two field enumerators were selected for each study zone. They interviewed village elders and the more experienced farmers to compile an inventory of the approximate number of farmers in each area both for fruits and vegetables. Farmers were then stratified by farm size. Three farmers were randomly selected from each stratum, (large, middle sized and small holders). The field enumerators then interviewed farmers to obtain information on production and marketing of fruits and vegetables. These data were analyzed for estimating of the area cultivated in each zone and average costs for production.

1.3. Assumptions

Information on crop yields and areas were estimated using conventional methods but not statistically valid techniques, based on the farmers' ability to estimate them. Due to absence of earlier data in these areas it was not easy to assess the correctness of information given by farmers. However, where data were clearly questionable, an attempt was made at adjusting them based on interviewer's experience.

Units of measurement on quantities traded are either sacks or boxes. No attempt was made to measure the actual weights of these common units since they are heterogeneous, but farmers gave estimates of their kilogram average equivalent.

Vegetable production is usually carried out on very small plots of land, making area estimations difficult. Only crop areas planted in onions and tomatoes could be measured with reasonable accuracy, since they are normally planted in bigger and regular plots.

2. THE HORTICULTURAL SECTOR IN SHABELLE

2.1 Introduction

Fruits and vegetables play an important role in Somalia's national economy. They offer the country favourable long-term opportunities for exports and foreign exchange earnings. Bananas used to be a major export crop before the civil war.

They also play a crucial role both in human nutrition and are a valuable source of income (cash crops). Fruits and vegetables are the main source of vitamins. Particularly striking is the rich content of vitamin C in guava, papaya and mangoes, higher than the level of Vitamin C in grapefruits and lime, which are conventionally regarded as main source of vitamin C. Furthermore, the three fruits, especially papayas, also contain plenty of vitamins A.

The table below shows the nutritional value of fruits grown in Somalia in comparison with other important food crops.

Table 1: Nutritional value of major fruits and other crops in Somalia (Per 100g edible substrate)

Name	Calorie Unit	Protein (g)	Fat (g)	Carb (g)	Vit.A Units	Vit.B1 (mg)	Vit.B2 (mg)	Vit.C (mg)	Calc. (mg)	Iron (mg)
Mangoes	63	-	-	15	1000	.03	.04	100	10	.50
Grapefruits	37	-	-	9	-	.04	.01	45	20	.50
Lime	35	-	-	8	-	.05	-	45	22	.05
Guavas	60	-	-	13	700	.05	0.04	320	15	100
Papaya	40	-	-	9	2000	.03	.03	120	20	.50
Bananas	122	1	.30	28	500	.05	.05	20	7	.50
Watermelon	23	-	-	5	30	.02	.02	5	5	.30
Sorghum	355	12	3.40	75	-	.45	.14	-	32	4.00
Maize	360	10	4.50	71	-	.35	.13	-	12	2.50
Rice (<i>Padi</i>)	360	8	1.50	-	-					
Beans	340	24	1.70	57	.50	.20	2.00	-	110	8.00
Ground Nuts	330	15	25	12	-	.50	.10	-	30	1.00
Sesame	590	20	50	16	-	25	.25	1.00	12	10

Source: Blanckburg/ Crower "Handbook for Agricultural and Nutrition, Vol. II, page 208-210.

As is well known to Somali farmers, horticultural crops are not only a welcome food but also are an important source of income. In addition, the return per hectare from horticulture is higher than that from other crops such as maize or sorghum.

A distinct advantage of fruit trees to small farmers is the long period of productivity. For example, mango and coconut trees bear fruit for several decades, thus ensuring the farmer a life-long source of food and cash.

However, the most important disadvantage is the long unproductive period of several years between planting and the first harvest. Considerable investments in terms of both, capital and labour, have to be made during the first unproductive years of cultivation. Papayas and bananas are remarkable exceptions.

Furthermore, fruit crops serve various positive ecological functions. They shade the ground, their roots fix the soil and thus prevent erosion, and they provide a habitat for various beneficial birds and insects. The ecological benefits, however, are offset by regular high water demand through irrigation, making the possibility of soil salinity a constant threat to the environment. A positive exception is mango and coconut, which require irrigation only during the first few years.

2.2 Horticultural production in Shabelle

In total, about 140,000 people are directly or indirectly dependent on the banana sub sector alone. Another 70,000 to 100,000 seasonal workers from neighbouring districts and Bay Region are seasonally employed both in bananas and other crops, such as watermelon. The economic importance of the banana crop is also increasing and there is high demand of about 6,000 to 7,000 metric tonnes each year.

The collapse of the banana production in the Shabelle valley occurred suddenly in the last quarter of 1997, as a consequence of unusually heavy flooding following El Niño and devastation of physical infrastructure. Virtually no bananas have been exported since October 1997.

It caused a loss of a vital source of income and therefore loss of food security to nearly a quarter million people. Seasonal workers and their families have suffered most from this collapse.

At the macro economic level, the shortage of hard currency and the poor status of roads have depressed formal trade in food and other commodities. However, the food security impact on other fruit and vegetable growers has not been as severe. Most fruits and vegetable growers also produce rain-fed maize and sesame. In periods of insufficient rainfall, limited areas are allotted to maize or sesame under irrigation. Vegetable growers are more food secure than grain growers since they have funds that can buy food in the event of shortages. Thus, vegetable and fruit growers enjoy better living standards than other crop farmers.

2.3 Characteristics of major fruits produced in Shabelle

i.) Grapefruit

The grape fruit tree, which is very susceptible to stagnant water, grows best on well drained soils. The tree is further sensitive to strong winds and to soil salinities. Rainfall should amount to at least 1200mm / year, and dry periods should not exceed 2 months, otherwise additional irrigation becomes necessary, as is the case in Somalia.

The fruit is rich in Vitamin C and it contains only moderate to little quantity of other nutrients (see table 1). Grapefruits cover an area of more than 1937 Ht. in Lower and Middle Shabelle. More than 62 % are grown in the Middle Shabelle plains within the Districts of Balad, and Jowhar, i.e. not further than 100 Km away from the main consumer centre, Mogadishu.

The production of grapefruits is a rather sophisticated enterprise, which not only requires considerable capital inputs but also strict management. Consequently it remains a typical crop for middle-size farms. The average size of these farms varies from 10 to 20 hectares. The largest farm is about 50 hectares.

The most important precondition to successful grapefruit growing is the regular supply of sufficient water. As the trees are most sensitive to stagnant water, it is an absolute necessity that the fields are well drained and perfectly levelled. Seedlings are usually provided by private nurseries, which are mostly located in the district of Afgoy. The recommended plant density is 156 plants per hectare.

Weeding has to be done at least 2 times per season when the tree is young and 1 time per season after the tree has matured. Few farmers use machines for weeding. In most cases wage labourers are hired to do the job. Harvesting is performed almost exclusively by hired labour.

Normally two persons are necessary at a time, one to shake the branches to make the fruits fall down and another to collect and load on a truck.

At the age of 6 years a grapefruit tree starts to bear fruits. The most productive period is reached at the age of 10 years and lasts for another 15 years. After 30 years yields gradually decline. There are two harvest seasons, the first around April to June and the second around December to January. Most of the fruits are sold to the Mogadishu market, but some are transported to Hargeisa and Bosasso.

Varieties

There exist 7 varieties in Somalia, six of them with white or pink coloured flesh and 1 with red flesh. The white/pink coloured variety includes:

- i.) 2 types of marsh seedless (1 local and 1 imported)*
- ii.) David Seed Lowe*
- iii.) Little River*

- iv.) Shamba*
- v.) Thompson*
- vi.) Redplush*

The last three (Shamba, Thompson and Redplush), are best suited for marketing and are therefore mostly propagated at present. All white / pink varieties are preferably used for the production of fresh juice (*spremutu*) which is a very common drink in Somalia. It can be kept fresh for more than 24 hours. The variety with red coloured flesh “Ruby” is not very suitable for juice production, but its taste is quite popular.

ii) Lime

The commercial cultivation of lime trees started in Somalia in the mid 1960s in the Afgoy area. Today the main production area in the district of Afgoy (Lower Shabelle) and the district of Balad is where 90 % of the whole production is concentrated. The tree is highly susceptible to soil salinity. But it is rather resistant against all kinds of insects and diseases. The cultivation of lime tree is well suited for smallholders. The average size of lime plots accounts to around 2 to 3 hectares per farm. Farms with more than 5 hectares are exceptional.

iii.) Papaya

The Papaya fruit contains the biggest amount of vitamin. Its content of vitamins C is also above average.

Varieties

There exist two main varieties: the traditional tall trees, which had been introduced by the Italians and a dwarf variety which was introduced more recently, and which has gained ground to its convenient way of harvesting. This latter variety is said to be less sweet but the price is the same.

The cultivation is rather widespread among smallholders and medium sized farms, which range between a quarter to half an hectare. The seedlings of papaya are raised by the farmers themselves. The space between rows measures upto 4 x 2m. Regular and frequent irrigation is most important, during the first few months 1 to 2 times /week. After 6 to 7 months the tree starts bearing fruits and will go on fruiting for about three years. The tree carries fruit continuously and can thus be harvested throughout the year.

iv.) Bananas

The commercial cultivation of banana was introduced into Somalia by Italian farmers in 1930. Somali bananas are highly appreciated for their organoleptic quality. Production techniques and controls are undertaken to attain export quality. They are also the same reasons why this crop never spread to smallholders. After the military coup in 1969, the banana industry became a state controlled activity with the establishment of a National Banana Board. This had disastrous results in production and export. To rehabilitate and revitalize the industry, a special agreement was signed between the Ministry of Agriculture and the Somali fruit, an Italian company, at the beginning of the 1980's. This agreement led to the formation of a joint venture and in late 1980s, annual production reached around 140,000 Mt. Of these 90,000 Mt. were exported and 50,000 sold locally. Before the civil strife banana cultivation was concentrated in Lower Shabelle and Lower Jubba.

At this height plantations covered about 12,000 hectares in both regions, out of which 7,000 hectares in Lower Shabelle and 5,000 hectares in Jubba.

After the worst period of the civil strife, commercial banana cultivation, resumed in the Shabelle area. About 3,400 hectares were under cultivation before they were hit by floods in June and ravaged by extensive floods between October and December 1997 (FSAU-Focus of April 9, 1998).

Varieties

Originally the Jubba variety had prevailed by far, but it has been gradually replaced by the Poyo variety.

v.) Mangoes

The mango tree is a typical representative of the tropics. At temperatures below 19 degrees Celsius, growth and productivity decreases significantly. It therefore grows best in tropical lowlands 600 M. above sea level. The minimum amount of rainfall has to be at least 1,000 mm per year; otherwise artificial irrigation becomes necessary, as is the case in Somalia. The change of wet and dry season is favourable to the productivity. In Somalia where two rainy seasons occur: Gu (April – May) and Deyr (October – December) the tree bears fruits even twice a year. The big tree can have various positive ecological functions. Its extended root system fixes the soil and prevents erosion or flood damage. The huge dense top provides a habitat for many birds, insects and other animals like monkeys (which however are not always welcome to farmers); in addition it can serve as windbreak for other plantation crops, especially bananas.

The fruit is very rich in vitamins, especially A and C because of its high sugar content. It bears also more calories than most other fruits (except bananas and dates). It is thus a very valuable food.

Varieties

There exist numerous varieties of mango throughout the tropics. In Somalia alone, more than 10 varieties are cultivated. The most common ones are:

- i.) Borbo*
- ii.) Dodo*
- iii.) Shushunle*
- iv.) Mishariow(Buruqle)*

At present the most popular variety is “Borbo”. Its fruits are big, easy to slice, contain little fibre and have good taste.

The fruit of “Dodo”, the second most popular variety is slightly smaller than those of “Borbo”, is sweeter and produces excellent juice, but contains more fibre. Traditionally, mango has been, and still is, a typical smallholder crop. Farms with more than 100 trees are an exception.

After 1990, some private entrepreneurs, especially in Janale area (Lower Shabelle Region) invested in bigger plantations of up to 20 to 50 hectares. These are in general, no longer located along the river banks but in the hinterland, away from the river.

3. FRUIT PRODUCTION IN SHABELLE REGION

3.1 Production in Lower Shabelle

a. Afgoy area

i. Grapefruit

The average yield of a fully productive tree is around 1.5 boxes / plant per year. The average weight of each box is around 35 Kilograms. On the basis of an average farm gate price of So.Sh 73,000 per box, the estimated average gross returns per ha / year would thus amount to So.Sh. 17,082,000 or U.S \$ 923 per hectare while the cost per hectare from seedling upto fruiting would only amount to So.Sh.10, 169,952 or (U.S \$5, 23) giving a gross margin of U.S \$ 3, 88 per hectare per year.

ii. Lime

Even though there are two peak seasons (June and December), lime trees yield more or less all the year round. The average yield comes to 1.5 sacks / plant / year, and the weight of one sack of lime is around 50 Kilograms. At an average farm gate price of So.Sh. 187,500 per sack or U.S \$ 10, the total revenue per ha / year would therefore be So.Sh. 132,187,500 or U.S \$ 696 which is high compared to other crops.

iii. Papaya

The tree starts bearing fruits after 6 to 7 months (and 8 to 9 months for the tall variety) and will continue fruiting for about three years. During the course of one year a tree produces around 2 boxes of 50 kilograms each. The number of trees per hectare is around 800. At an average farm-gate price between So.Sh.40, 000 and 50,000 per box or U.S\$ 2, the gross return per hectare is about So.Sh. 64,000,000 per year or U.S\$ 5,684, which is high. However, due to limited demand, farmers only grow a few trees in their farms.

iv. Bananas

The average yield amounts to 300 qls / ha / year. The producer receives an average price of So.Sh.112, 500 per quintal or U.S\$ 6. The gross return per hectare is around So.Sh. 33,750,000 or U.S\$ 2,368 / ha / year for export quality bananas.

v. Mangoes

On average a fully productive tree “Borbo” type yields about 1,000 fruits per year, while the “Dodo” variety produces 1,200 fruits per year. This equals roughly to 3 to 4 quintals / tree / year. The results of “Dodo” variety are about the same as those of “Borbo” “Shushunle” and “Mishariow” and produce about twice as many fruits as “Borbo” and “Dodo” but their weight is only half as much. Under the above assumption of a 1,000 pcs / year and the average farm-gate price of So.Sh. 600 per piece, the average gross return amounts to So.Sh. 600,000 per tree per year, or U.S\$ 32.²

Table2: Current estimated area, average yield by crop in Afgoy area

Crop	Area under cultivation	Yield/Year	Production (tonnes)
Grapefruits	622ha at 156 plants/ha	1.5 boxes of 35 kg /plant	5,094
Lime	100ha at 470 plants/ha	1.5 sacks of 50 kg/plant	3,525
Bananas	300ha	300qls/ha	9,000
Papayas	80ha at 800 plants/ha	2 boxes of 50kg/plant	6,400
Mangoes	1450 trees	1000pcs/tree	483

b. Marka area

i. Grapefruit

The average yield of a fully productive tree can be estimated at 1.3 boxes per plant per year. Normally farmers plant about 156 trees per hectare.

² Exchange rate: 1 US \$ = 18,750 So Sh in Sept 2003

At an average farm-gate price of So.Sh 90,000 / box, the average gross return per hectare per year would be So.Sh 18,252,000 or U.S\$ 961, while the cost per hectare from seedling up to fruiting would be So.Sh. 10,900,000 or U.S\$ 577 giving a gross margin of U.S\$ 384 per hectare.

ii. Lime

The average yield comes to 1.5 sacks of 50 Kg / plant / year, and the content of one sack of lime is around 1800 to 1900 limes. The farm-gate price per sack is around So.Sh. 200,000. The total revenue per ha / year would therefore be So.Sh. 540,000,000, or U.S\$ 7,421 per hectare, which is high compared to other crops.

iii. Bananas

On average, bananas yield about 250 qls / ha / year; hence the producer earns an average price of So.Sh.54, 000 or U.S\$ 3 /ql. The gross return per hectare is around So.Sh.18,900,000 or U.S\$ 995 / ha / year, which is far below average returns in the region and is largely explained by the lower quality of the bananas as reflected by the low prices realized at the farm-gate.

iv. Mangoes

A fully productive “Borbo” or “Dhodo” mango tree yields about 1,000 fruits per year; which is roughly equal to 3 quintals / tree / year. Both types “Dodo” and “Borbo” have the same results. With 100 plants / ha and under the above assumptions of 1,000 plants / ha / year, the average gross return comes to So.Sh. 800,000 / tree / year or U.S\$ 42 per tree at an average farm gate price of So.Sh 800 per piece. This is equivalent to \$4,200 per hectare.

Table 3: Current estimated area, average yield by crop in Marka area

Crop	Area under cultivation	Yield/Year	Production (tonnes)
Grapefruits	79ha	1.3 boxes of 35kg/plant	560
Lime	20ha	1.5 Sacks of 50kg/plant	705
Bananas	600ha	250qls	15,000
Mangoes	10,230 trees	1,000pcs/tree at 3pcs/kg	3,410

c. Qoriyoley-Kurten Warey area

i. Grapefruit

A fully productive tree yields an average of around 1.7 boxes / tree, and normally farmers plant 156 trees per hectare. At an average farm gate price of So.Sh105, 000, the average gross returns per ha / year would be So.Sh.27, 846,000 or U.S\$ 1, 467. And the cost per hectare, from seedling upto the time of fruiting amounts to So.Sh. 10,169,952 (U.S. \$ 532), giving a gross margin of U S \$ 933.

ii. Lime

At a farm gate price of one sack for So.Sh. 145,000 (U.S \$ 8) and the average yield being one sack of 50 kg/plant/year; the total revenue per ha / year, would therefore be So.Sh. 68,150,000 (U.S \$ 3,587), assuming a plant density of 470 per hectare.

iii. Bananas

The average yield of bananas in the district amounts to 200qls / ha / year. An average price of So.Sh.145, 000 (U.S\$ 763) / ql, is earned by the producer. Under the above assumptions the gross margin per hectare would be So.Sh. 43,500,000 or U.S\$ 2,289 / ha.

iv. Mangoes

The results of both types being the same; the two types of trees, “Borbo” or “Dhodo” averagely yield about 950 fruits /tree per year which is roughly equal to 3 quintals / tree / year. Under the assumption of an average farm gate price of So.Sh 800 per piece the average gross return would amount to So.Sh. 760,000 / tree / year or about U.S\$ 40 / tree, or per hectare.

Table 4: Current estimated area and production by crop in Qoriyoley/K Warey area

Crop	Area under cultivation	Yield/year	Production (tonnes)
Grapefruits	36 ha	1.7 boxes of 35kg/plant	334
Lime	40 ha	1 sack of 50kgs/plant	940
Bananas	700 ha	200-qls/ht	14,000
Mangoes	1100 trees	950pcs/tree	348

The table below summarizes estimated fruit production in the lower Shabelle region.

Table 5: Current Summary of fruit crops production in Lower Shabelle (Tonnes)

Crop	Marka area	Afgoy area	Qoriyoley/K/Waarey area	Total Lower Shabelle
Grapefruits	560	5,094	334	5,988
Lime	705	3,525	940	5,170
Bananas	15,000	9,000	14,000	38,000
Papayas	-	6,400	-	6,400
Mangoes	3,410	483	348	4,241

3.2. Production in Middle Shabelle

a. Balad area

i. Grapefruit

A fully productive tree averagely yields 1.5 boxes of 35 kg / plant each year and normally farmers plant 156 trees per hectare. At an average farm gate price of So.Sh 105,000 / box the average gross returns per ha / year amounts to So.Sh. 24,570,000 (U.S \$ 1,293) /hectare. The cost per hectare from seedling to fruiting would amount to So.Sh.10, 169,952 (U.S\$ 535) giving a gross margin of U.S\$ 758 per hectare.

ii. Lime

The average yield is around 2 sacks of 50kg / plant / year, and the content of one sack of lime is around 1800-1900 pieces of lime. The farm-gate price being So.Sh.170,000 / sack, or U.S\$ 894 / sack. The total revenue per ha / year would therefore be So.Sh.612, 000,000 (U.S\$ 8,410 per hectare) which is high compared to other crops.

iii. Bananas

Averagely bananas yield about 200qls / ha / year in the district. The farm-gate price is around So.Sh.145, 000 (U.S\$ 8). Under the above assumptions the gross revenue per hectare would be So.Sh. 29,000,000 (U.S\$ 763) per ha / year.

iv. Papaya

During the course of one year a papaya tree produces around 2 boxes of 50 kgs, and the number of trees per hectare, is around 800. With an average farm-gate price So.Sh.

45,000 per box or U.S\$ 2, and under this assumption, the gross revenue is about So.Sh.72,000,000 / ha / year (U.S\$ 3,790)

v. Mangoes

The average yield of a fully productive tree of the “Borbo” or “Dhodo” type is about 1,300 fruits / tree per year. This roughly equals to 5 quintals / tree / year. The results of “Dodo” variety being the same as those of “Borbo” and assuming an average farm gate price of So.Sh 600 per piece, the average gross return would amount to So.Sh. 780,000 / tree / year or U.S\$ 47

Table 6: Current estimated area, average yield by crop in Balad area

Crop	Area under cultivation	Yield/year	Production(tonnes)
Grapefruits	1,200ha	1.5 boxes of 35kg/plant	9,828
Lime*	570ha	2 sacks of 50 kg/plant	26,790
Bananas	470 ha	200qls/ha	9,400
Papaya	245ha	2 boxes of 50 kg/plant	19,600
Mangoes	1,614 trees	1,300pcs/tree	8,070

* Including other citrus fruits

b. Jowhar Area

i. Lime

The content of one sack of lime is around 1,800 pieces of lime and the average yield is around 2 sacks of 50 kg / plant / year. At a farm-gate price of around So.Sh.170, 000 / sack, (U.S\$ 8, 94/sack), the total revenue per ha / year would therefore be So.Sh.153, 000,000, or U.S\$ 8,411 which is high compared to other crops.

ii. Papaya

In one year a Papaya tree produces around 2 boxes and the number of trees per hectare, is around 800. With an average farm-gate price of So.Sh. 45,000 per box (U.S\$ 2.37/box), the gross return amounts to So.Sh. 72,000,000 / ha / year or So.Sh .45, 000 / tree (U.S\$ 2 /per tree.)

iii. Mangoes

On average a fully productive tree of “Borbo” or “Dhodo” type yields about 1,500 fruits /tree per year, the results of both types being the same. This is roughly equal to 5 quintals/tree/year. Assuming an average farm gate price of So.Sh. 500 per piece, the average gross revenue amounts to So.Sh. 750,000/tree/year (U.S\$ 41).

Table 7: Current estimated area, average yield by crop in Jowhar area

Crop	Area under cultivation	Yield/year	Production (tonnes)
Lime	71 ha	2 sacks/plant	1,337
Papaya	14 ha	2 boxes/plant	1,120
Mangoes	4,853 Trees	1,500 pcs/Tree	2,426

A summary of fruit production in the middle Shabelle region is shown in the table below.

Table 8: Current summary of fruit crops production in Middle Shabelle (Tonnes)

Crop	Jowhar	Balad	Total
Grapefruit	-	9,828	9,828
Lime	1,337	26,790	28,127
Bananas	-	9,400	9,400
Papaya	1,120	19,600	20,720
Mangoes	2,426	8,070	10,496

4. VEGETABLE PRODUCTION IN LOWER AND MIDDLE SHABELLE

Cultivation of vegetable in Somalia goes back, probably to colonial times. There is strong belief that Italians, Arabs and Indians introduced vegetables for their daily needs and to a lesser extent for commercial purposes. Production practices and crop handling grew among the casual labourers utilized by Italians and Asians in Somalia during the colonial era. Thereafter, the trained labourers were attracted to vegetable cultivation by their profitability.

Prior to the civil strife in Somalia, about 21 species of vegetables were under cultivation. The civil disorder from 1990 to 2000 brought about the disappearance of some profitable crops.

Crops like eggplant, cauliflower, melons, parsley, beans, chicory, beats, endive, celery, fennel, cabbage, spinach beet, cucumber are among vegetable crops which disappeared from farmers' fields. Only herb spices and few crops are under cultivation for the daily needs of every household. But when international peace keeping forces arrived in Somalia, high value vegetable crops were once again in high demand.

The following is a list of vegetable crops known by vegetable growers in Shabelle:

Table 9: Commonly grown vegetables

1. Tomato	(<i>Yanyo</i>)
2. Onion	(<i>Basal</i>)
3. Carrot	(<i>Karooto</i>)
4. Lettuce	(<i>Ansalaato</i>)
5. Peppers-sweet & Hot	(<i>Beberoni & Basbaas</i>)
6. Cucumber	(<i>Qajaar or Khajaar</i>)
7. Watermelon	(<i>Qare</i>)
8. Radish	(<i>Baqal or Bagal</i>)
9. Eggplant	(<i>Melensaano</i>)
10. Okra	(<i>Baamiye</i>)
11. Pumpkins	(<i>Bocor</i>)
12. Spice	(<i>Kabsaro-kaamuun-Riixaan</i>)
13. Beets	(<i>Barbabiyyetola</i>)
14. Cabbage	(<i>Kawolo</i>)
15. Spinach beet	(<i>Koosto</i>)
16. Melon	(<i>Batiiq or Batiikh</i>)
17. Fennel	(<i>Finocchio</i>)-Italian
18. Parsley	(<i>Prezzemolo</i>)-Italian
19. Celery	(<i>Sedano</i>)-Italian
20. Endive, Broad leaf	(<i>Endivia Scarola</i>)-Italian
21. Chicory, Large Root	(<i>Cicoria</i>)-Italian
22. Khardal	(Arabic)

Source: FAO-1989. *Traditional Vegetable Plants in Somalia*. FAO, Rome; Ministry of Agriculture, Mogadishu, Somalia.

Note: Names in brackets are in Somali, Italian, Somali-Italian or Arabic

4.1 Conditions for vegetable production

Land allotted for vegetable production lies along both sides of the river Shabelle. Irrigation water is abundant throughout the year. But river Shabelle carries low water levels during the months of January, February and March. Symptoms of salination are seen across the irrigated fields of vegetable crops during the dry periods of the year. This period was found to be the highest peak demand for vegetables at the markets.

Furthermore, high temperatures coupled with high degrees of pests and diseases affect production of vegetable crops. Effective pest control and vigilance is required in the dry periods of the year. This period coincides with pasture scarcity. Livestock and wildlife in search of feed often destroy vegetable crops during the dry periods of the year. Depending on growers' experience, both manure and inorganic fertilizers are applied on

vegetable crops. Synthetic fertilizers and pesticides are applied only to crops of high value. However, manure is applied to both low and high value vegetable crops.

At the onset of Gu-rains in April, dry manure is applied to land when the rain is expected. But specialized growers may add Nitrogen, Phosphorous and Phosphate (NPK). Vegetable crops are sown in the first week of May. If the date of sowing does not coincide with the Gu-rains, about 25 to 50% of seedlings are lost because of tremendous heat.

Farmers are cautious in using irrigation. Usually they apply irrigation water ten days after the first river cresting. Otherwise, about 50 to 60% of the emerging seedlings will be affected by the high concentration of salts. The first weeks of May and June-July are suitable periods for planting vegetables. Sowing time could be extended up to October, but dry winds coupled with high degree of infestation (insects and pathogens) hinder successful vegetable production. During the period November-December, most of the vegetable fields are idle due to the following reasons, based on farmers' experiences:

- Excessive heat in the soil and air affects the emerging seedlings and reduces plant stands.
- Seedlings are exposed to salinity
- Soil runs out of fertility.
- Seasonal crop planting is affected by the high temperature.
- Weed density is increased in the subsequent cropping season
- Leaves become tough and thick;
- Carrots and beets are not juicy etc.

In spite of the above difficulties, experienced growers irrigate the field at night so as to cool the soils' microclimate; thereafter, the crop is sown. Vegetable crops, like coriander, peppers, Swiss chard, tomato, okra, eggplant, watermelon and melons grow well between November and April.

4.2 Area under cultivation

Except for tomatoes and onions, most vegetables are grown in very small plots. Table 10 shows the estimated area under various vegetables grown in Middle and Lower Shabelle by areas.

Table 10: Summary of current area (hectares) under vegetable crops

A: Lower Shabelle

Crop	Afgoy	Marka Area	Qoriyoley Area	Totals
Tomatoes	56	350	80	486
Onions	21	50	20	91
Spinach-beet	17	-	-	17
Carrots	23	-	-	23
Sweet-Pepper	16	10	5	31
Okra	9	-	-	9

B: Middle Shabelle

Crop	Jowhar Area	Balad Area	Total Region
Tomatoes	64	163	227
Onions	8	99	107
Spinach-Beet	-	5	5
Carrots	6	7	13
Sweet-Pepper	17	60	77
Okra	2	3	5

4.3 Characteristics of major vegetables produced in Shabelle

i.) Tomatoes

Tomatoes are grown under irrigation; rain fed and water recession of the flooded land at the Shabelle and Juba regions. Every household in urban and agricultural villages uses tomatoes as a principal ingredient for sauces, for staple dishes of cereals or other starchy foods.

Varieties

i.) Local Cherry:

Small, with tough skin, these are tolerant to leaf curl virus, drought condition and are mainly grown under flooded land or rainfed cropping systems. They are very tasty and good in making soup.

ii.) Shalamboot variety:

They are a little bit fleshy and larger than Local Cherry. They are adapted in irrigated areas of Shalamboot and Jennale area.

iii.) Roma VF, San Marzano

These varieties are exotic, developed originally in Italy. They were introduced in Somalia by U.N Agencies. They are large with good fruit-flesh, but susceptible to leaf curl virus.

iv.) Money-maker

They were introduced for research purposes in Somalia and are characterised with larger and fleshy fruit. They are also susceptible to leaf curl virus.

The first week of March, marks the beginning of tomato seeding in Shabelle. Seedlings are transplanted 30 days after emergence. April and May are favourable periods for transplanting irrigated tomatoes. After the transplanting operation, the crop is irrigated three or four times before the first fruit pickings.

Harvesting starts 60 to 70 days after transplanting and continues up to two months with successive yield reductions. Yield of tomatoes varies from 0.5 to 9.0 tons / Ha depending on the crop management, varieties and environmental factors.

Irrigated tomatoes are usually sold at auction markets after 15th of June upto the end of August. Households rarely preserve tomatoes for later use.

ii.) Onions

Onions and tomatoes are two vegetables that each urban household commonly use in their daily meals. Onions are grown for their bulbs and for green sprouts.

Varieties

Seeds are either obtained directly from East Africa seed companies or other foreign companies. Common onion varieties known by farmers are listed below:

- i.) Texas Grano*
- ii.) Texas Grano 503*
- iii.) Red Creole*
- iv.) Bombay Red*
- v.) Cipollino*

Onions grown for their dry bulb are sown by broadcasting into 300m² of nursery at the onset of the Gu rains, preferably the first week of April. Forty-five days after seedling emergence, seedlings are transplanted into the field. Irrigation is done five to eight times depending on rainfall frequency and distribution

Onions for dry bulb are harvested 120 to 130 days after transplanting. As for onions for salad, gradual thinning harvests are done 30 days after emergence.

Red onions are said to be less perishable than white onions, but the latter ones are preferred for their tender taste.

iii.) Pepper

Peppers are normally grown under irrigation and are readily available at any time of the year at local markets. They are classified as “sweet” and “hot”.

Varieties

The following are common varieties of peppers at Lower Shabelle:

- a.) Sweet Peppers*
 - i.) California Yellow Wander*
 - ii.) Yellow Wander*
 - iii.) California Wander*

b.) Hot Peppers

i.) Cayenne Long Slim.

Peppers are characterised by slow growth. At early stages of crop establishment, weeding needs to be carried at intervals of 4 to 5 days till the crop attains its firm establishment. Harvesting starts 60 days after transplanting and continues up to one year.

iv.) Carrots

Carrots are one of the most preferred vegetable roots by the urban people. The crop is grown under irrigation at Afgoy and Marka districts. It is mainly consumed at the production site and to a larger extent in Mogadishu.

Varieties

Different cultivars from various foreign seed producing companies are grown, such as:

i.) Chantenay

ii.) Nantes coreless

iii.) Nantes

The first week of May and all of July are regarded favourable periods for planting. Sowing can be extended beyond July up to October.

Harvesting starts 80 days after emergence. It continues for up to one month depending on market demand. Carrots yield approximately 30 kg/12 sqm, or approximately equivalent to 25 tons/ Ha.

v.) Lettuce

Lettuce is mainly grown in the Afgoy area under irrigation. Lettuce is usually sown in mixed stands with carrots or onions, but rarely in pure stands.

Varieties

Different types of lettuce are grown as leaf vegetables. The most important ones are:

i.) Great Lakes 118

ii.) Great Lakes 659

iii.) Flat Leaf Lettuce

May and July are suitable periods of lettuce planting, but sowing time could be extended up to October. If sowing is done in July, leaves become tough, leathery, thick and bitter.

vi.) Cucumber

The crop is grown under irrigation in Afgoy district and is rarely consumed in producing areas. The Mogadishu market absorbs cucumber produced during the dry season. Cucumbers are eaten as raw salad and also cooked.

Varieties

The following are cultivars among the vegetable growers:

- i.) *Chinese cucumber*
- ii.) *Italian cucumber*
- iii.) *Victory F1 Hybrid.*

vii.) Watermelon

The watermelon is a dry season crop in Shabelle regions. They are largely grown either in rainfed or under residual soil moisture of the flooded land and to a lesser extent under regular irrigation. Depending on the weather, one or two irrigations are sufficient for the crop.

Varieties

Seeds are supplied by foreign seed companies, the most common in the Lower Shabelle being:

- i.) *Charleton Grey*: they weigh 8 to 10 kg. Fruits turn white towards maturity. They mature at 90 to 100 days.
- ii.) *Crimson Sweet*: At maturity fruits are round with green and white stripes. Fruit weight may reach 4 to 6 kg. It is tolerant to pests and diseases.
- iii.) *Sugar Baby*: Matures earlier than Charleston Grey. Melons are small in size with dark green skin.

About 1 kg of seed is sufficient for one hectare of land area. Seeds are planted onto 2 x 1m mounds and thinned to one plant/mound. December to January is the most suitable period of watermelon sowing.

In non-flooded areas, where flood recession agriculture is not practised, one or two irrigations are given to the crop at early stages of growth. At later stages irrigation frequency is reduced. Under residual soil moisture, the crop matures satisfactorily without any additional water, and it matures earlier than in regular irrigation.

Harvesting starts 90 to 95 days after emergence. Around 10 to 12 tons/ Ha are harvested depending on crop management, cultivator and environmental factors.

viii.) Swiss Chard

There are four types of Swiss chard grown for leaf vegetable at Shabelle area:

- i.) Ford Giant*
- ii.) Spinach Locules*
- iii.) Argento*
- iv.) Bieta Verde Costa Bianca*

5. MARKETING OF HORTICULTURAL PRODUCTS

5.1 Demands for Horticultural Crops

For the purpose of this study, consumers can be broken into three main groups: households, restaurants and hotels and institutions.

The consumption behaviour of these three groups shows differences, which influence their demand for fruits and vegetables. Most households that buy fruits and vegetables are found in the towns rather than in the rural areas.

The bulk of the demand for fruits and vegetable comes from the large population living in Mogadishu (estimated to around 1.5 million).

Urban demand closely correlated with income, is limited at the moment because incomes are low and the marginal propensity to consume food staples – not fruits or vegetables is high.

This means that a small increase in income translates into large increase in demand for fruits and vegetables. With the future re-establishment of a national administration and the expected expansion of job opportunities for the unemployed, it is hoped that their purchasing power would increase and their demand would grow dramatically. Furthermore, with the re-establishment of law and order and restoration of security in the country, demand for fruits and vegetables would expand to the large regional markets in Somaliland, Puntland and Bay-Bakol.

Consumers in these markets are presently cut off from the consumption of fruits and vegetables due to high prices or low supply caused by the poor road infrastructure and the many “tax”-collecting roadblocks that raise costs between production and consumption areas.

International class hotels and restaurants are designated as separate consuming units because they pay higher attention to variety and quality of horticultural products. Since the city of Mogadishu does not attract any tourists in general or foreigners in particular due to insecurity, hotel and restaurant demand can be considered negligible for the time being.

On the other hand the number of restaurants and bars in the city, particularly those catering to local clientele in the main market of Bakaara, has increased dramatically in recent years. These restaurants are large consumers of fruits and vegetables, particularly tomatoes, onions and other vegetables for the preparation of local dishes and selling fresh fruits such as papaws, mangoes, bananas and other fruits. Most of the people working in the market and surrounding areas eat at least one meal in these restaurants every day and the many bars in the city prepare juices from fresh grapefruits, mangoes, guava and other fruits.

These restaurants prepare thousands of meals for their customers daily. The demand by this category would probably continue to increase in the near future because of the continuing flow of population from the rural to the urban areas.

As for institutional demand in Mogadishu, there are a number of orphanages, military barracks, boarding schools (funded by some humanitarian organizations, particularly Muslim NGOs) where thousands of meals are prepared daily. These institutions are unlikely to increase their demand for fruits and vegetables due to their limited budgets.

The only possibility to increase the demand of this last group is the willingness of the humanitarian agencies to increase their services to the many people in need of food assistance, particularly the large community of internally displaced people and the large number of orphans left by civil strife.

5.2. Marketing of Horticultural Crops

In the aftermath of the civil war, agricultural production suffered more than other sectors due to the total collapse of all agricultural infrastructures. Before the civil war, most of agricultural production was dominated by the public sector. With the demise of all government services, systematic agricultural production, marketing, management and extension services came to a total standstill. However, as agricultural production picked up slowly, horticultural production and marketing took the lead.

The displacement of many people to their original home areas, the return of many families from the Diasporas and the change in food preferences, particularly in major urban towns such as Mogadishu, Bosasso and Hargeisa, have generated a higher demand for fruits and vegetables. Since most of the fruits and vegetables are produced in southern part of the country, marketing links with the more stable northern markets has grown.

Due to its proximity to the agricultural heartland of the south, Mogadishu has been and remains the biggest market for fruits and vegetables. However, due to low levels of income, rampant inflation, absence of government institutions and hotels that used to buy the bulk of local fruits and vegetables, demand in Mogadishu remains weak, unpredictable and far below potential. The distance between Mogadishu and Afgoy, the main source of fruits, is only 25 Km. Nonetheless, it often takes several hours to cover this short distance due to insecurity and illegal road blocks along the road.

After Mogadishu, secondary demand centres include Baidoa, Kismayo, and Belet Weyn in the south, Hargeisa, Bosasso and Garowe in the north and Galkayo in the central

regions. Due to poor road networks, careless handling and poor packaging, insecurity, unreliable transport system, illegal levies, fruit destined for these markets reach their destinations in poor condition with high cost. As the system of governance in the country collapsed, costs of production, maintenance, and security, repair of agricultural infrastructure and marketing of agricultural products have skyrocketed. While these costs have risen, the revenue generated from the sale of these products has declined due to lower purchasing power among the population.

There are very limited employment opportunities and the very little income one receives is spent on basics, such as food, shelter, water and medicine – not fruits and vegetables.

Unless peace and security can be restored, and with it the promise of economic growth, the end result is less production, lower quality production and less incentive for farmers to produce more for the market.

Similarly, there are few lucrative incentives for marketing fruit and vegetables. Horticultural marketing occupies about 10,000 people involved in small-scale trading in the Bakaara market alone. Of these, the author interviewed around 100 traders stratified by gender, sub-sector of vegetable or fruits and size of working capital. More than 60% of the operators interviewed were women mostly engaged in the vegetable sub-sectors, while the male traders were mostly involved in the fruit sub-sector. The average working capital was around So.Sh. 400,000 (US \$ 21.3) and it was very difficult for many of them to raise additional capital. The average daily income was around between So.Sh.15, 000-20,000 (1 US \$/day).

Table 11 shows the seasonal price fluctuations of selected vegetables in Bakaara market in Mogadishu. The seasonal price changes are largely as a result of changes in the supply situation of the crops through the year, rather than demand.

Table 11: Pattern of seasonal price fluctuations at Bakaara market (So.Sh./unit)-2002

Crop	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec
Tomatoes	30-35	30-35	40-45	40.-50	30-35	30-35	30-35	30-35	30-35	30-35	30-35	30-35
Onions	4000	4000	4000	4500	4500	2000	2000	3500	3500	5000	3000	3000
Spinach	2000	2000	4000	4000	3000	2500	1500	1500	2000	2500	3000	2000
Carrots	3000	3000	3000	3000	4000	3000	3000	2000	2000	2000	1500	2500

Source: A.M.Abikar, FSAU Mogadishu, 2003

6. CONSTRAINTS IN THE HORTICULTURAL SECTOR

6.1 Production constraints

Increased production of horticultural crops in the study area is constrained by following factors in order of importance:

- The absence of a national seed company. Different varieties of seeds from a wide range of sources all over the world are used in Somalia. Most of these

different types of seeds have not been researched and experimented in Somalia and could be inappropriate for local conditions. Farmers are tempted by their cheap price and have little consideration for the adaptability of these seeds to the local environment since high quality seeds are not easily available.

- The absence of a regulatory environment for pesticides and fertilizers. Different varieties of pesticides and fertilizers currently used in the country could be harmful to the environment. Some of these harmful chemical inputs have been banned in other countries.
- The absence of public extension services in the country that used to provide farmers expertise, know-how and appropriate technology required to increase yields, conserve the environment and soil. This has led to insufficient knowledge of modern crop husbandry by farmers.
- The absence of facilitating land tenure system and security.
- Total lack of public-sector financial services and credit for small-scale farmers.
- The absence of support from the international community, particularly the humanitarian organizations, such as the UN and the NGO community.
- Lack of irrigation facilities, particularly water pumps including irregular supply of fuel.
- The absence of river water management, canal rehabilitation and maintenance in the case of irrigated agriculture, and transport infrastructure, especially feeder roads.
- Diseases and pests.
- Goats and hippos destroying the young plants.
- Transport problems in certain areas and certain times (rainy seasons).
- Thieves who harvest crops at night (some farmers argued that theft is even the biggest problem).
- High production costs and lack of proper technology, in general.

6.2 Marketing constraints

Increased marketing of horticultural crops in the study area is constrained by the following factors:

- Poor infrastructure, particularly transportation, which has increased the cost of marketing the produce.
- Rampant inflation and unstable market conditions coupled with very low levels of income and purchasing power which inhibits purchase of horticultural produce.
- Lack of supporting infrastructure (lack of advertisement, processing, cold storage, packaging, handling and credit facilities) and alternative export markets.
- Low demand for some types of fruits and vegetables particularly from local institutions, hotels and private restaurants.
- Lack of security at the farm, distribution channels and in markets due to unauthorised bribes and extortion.
- Non-existence of extension services, government regulation and policies to promote and direct production and marketing

- Fluctuation of prices of farm inputs and produce has discouraged many farmers to produce excess output for an unpredictable market.
- Difficulties in compliance with export market regulations on pesticide and fertiliser use (particularly, the European market) that restricts export opportunities.
- Absence of marketing associations.

7. RECOMMENDATIONS

The whole production, management, marketing and export system for horticultural production requires support as a way of promoting the livelihoods of farmers, handlers and traders in the five horticultural areas in Middle and Lower Shabelle. It is very difficult to decide where, how and when to start as all problems require urgent attention.

However, with all the above limitations, limited and well-targeted interventions in the following areas could contribute to increased horticultural production in the study area:

7.1 Horticultural production

- The provision of extension services, credit facilities and export market promotion advice.
- Establishment of nurseries, including distribution of seed and seedlings;
- Provision of pesticides and training in their proper and safe use;
- Provision of sprayers;
- Establishment of a proper water management system;
- Training on planting techniques,
- Rehabilitation of feeder roads for transport of horticultural produce;
- Assistance in processing fruits and vegetables internally;
- Investment in packaging and conservation plants and equipment;
- Research into market opportunities abroad and active promotion of Somali exports.

7.2 Horticultural marketing

- Improvement of security
 - Establishment of farmer security services for escorting products to the markets.
 - Establishment of farmer associations and co-operatives to improve the marketing structures and systems, negotiate for better prices with middlemen, transporters and security providers.
- Support for peace-making efforts through farmers' associations at the community, regional and national levels for the establishment of a national government:
 - With a government, a national agricultural and marketing policy can be established.

- The security of the whole country will be improved, thus enabling the farmers to work their farms unhindered. The cost of production and marketing will be reduced.
- Improvement of product quality, packaging and distribution
 - Use of improved, tested seeds and environmentally acceptable pesticides.
 - Support from the international community for support of locally produced packaging and conservation materials.
 - A revival of local markets and demands to accelerate production and marketing.
 - The expansion of horticultural markets in major urban towns.
 - Opening of new markets abroad.
- Provision of chilled storage facilities in the main markets, particularly at Bakaara market in Mogadishu.

8. CONCLUSION

Fruits and vegetables play a crucial role in human nutrition. They provide a valuable source of income as well as economic and ecological benefits. Fruits play a particular role in Somali's economy, because there are no other agricultural products which offer the country favourable long term prospects for export and thus for foreign currency earnings. Bananas, for instance, have for years been the most striking example.

The two study regions, lying North and South of Mogadishu have an approximate population of more than 1 million people. Horticultural production in these two regions is not evenly developed. In Middle Shabelle, farmers in only two towns, Balad and Jowhar, produce small quantities of fruits and vegetables. By comparison, thousands of hectares are under horticultural crops in Lower Shabelle region, the biggest, the most populated and the richest region in Somalia. Almost all six districts in Lower Shabelle region produce fruits and vegetables, both for local consumption as well as for sale to the larger markets in Mogadishu and the more stable areas in the north.

Agricultural production in Middle and Lower Shabelle regions is improving, but remains below pre-war levels. Fruits originally meant for export, such as bananas, mangoes, watermelon, are now only grown for the local market. Most farmers are close to subsistence and therefore produce little surpluses, despite the proximity to the major Mogadishu markets. In this regard, a good number of farmers have discontinued growing some essential and important vegetable crops. For example, before the civil war, farmers used to grow 22 varieties of vegetables in Lower Shabelle. Currently, only a handful of these crops are grown. The rest have totally disappeared due to lack of proper technology, and market outlets.

Out of the 12,000 hectares of bananas grown before the civil war, only 1,600 hectares in the whole country are currently cultivated. New banana plantations have also re-emerged.

Watermelon is another fruit that has seen a substantial increase in production in the past few years due to increased demand in local markets.

Currently, agricultural production in the Shabelle Valley is improving, but not yet close to the pre-war levels. Cash crop fruits previously for the export market, such as bananas, watermelons, grapefruits etc, are now grown for the local market only. More land is being cultivated, although the overall production as well as the quality of produce is low. While a new breed of farmers has started a renaissance in farming activities, they are not very experienced.

The horticultural sector suffers lack of proper seeds and chemicals especially for vegetables, lack of training and extension services on production and processing, poor security that limits movement of produce and lack of support services such as credit, irrigation infrastructure, transport infrastructure and processing and cold storage facilities. Lack of handling and storage facilities, particularly in the main markets is critical. Vegetables, particularly the easily perishable ones, are sold at lower prices in the evening because the traders have no facilities within the market place for overnight chilled storage. A programme to address these problems will go a long way in enhancing production and marketing of horticulture crops. This would ultimately improve the incomes and food securities of the concerned farmers and other participants in the chain of production, processing and marketing.