Banana Sector Study for Somalia

Agricultural Development and Diversification Strategy in Lower Shabelle

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0 Executive Summary

The study area in the Lower Shebelle Region covers 67,000 ha, of which 30-40,000 ha is potentially irrigable. The River Shebelle is the main source of irrigation water and 16,000 ha was being irrigated before the civil war. Currently, no more than 10,000 ha are being irrigated, mainly because the canal system has largely silted up. It is estimated that the total cultivated area is now around 30,000 ha, of which 20,000 ha is rainfed.

The Mission's approach to this study was to establish whether or not there was a possibility of Somalia reviving its international banana export trade, without the former benefits of preferential trading terms in the EU. If it is not a possibility, the objective was to consider what could replace the banana industry to utilise the irrigation water and soil resources for the maximum benefit of the people living there.

The Lower Shebelle Region used to be responsible for over 90% of the banana production in Somalia, but the civil war in 1990 caused the collapse of the banana export trade and subsequent neglect of the irrigation system has also led to a reduction in the area under bananas, which at present are only grown for the domestic market. SHEFA, the banana growers association, estimates that today, only 1,600 ha is in production in Lower Shebelle, compared with almost 5,000 ha in former times.

There are, unfortunately, many factors militating against success for Somali bananas in the international market. Because they have to be irrigated, Somali bananas are more expensive to produce than the rainfed crops of their main competitors in the Americas and South East Asia. Historically, yields have been low, about half that of other banana producing countries and with no government in power, there is also a real security risk to any lucrative business. At present therefore, it is not believed that the potential for bananas justifies any specific intervention or investment to increase production.

Grapefruits and watermelons were also exported in the past but the quantities were small and only justified on the back of the banana trade, filling up space on the banana boats and benefiting from preferential trade tariffs etc. Similar reservations apply to those regarding bananas, i.e. high production costs and lack of security. The future for these crops is also limited to the local market and also does not justify any development intervention to increase production.

Although the original reason for the development of the irrigation system was to produce commercial crops of cotton and bananas, it also (potentially) serves an estimated 40-50,000 smallholder families who subsist mainly on annual crops. Since there would appear to be little prospect of reviving the banana export trade to its former scale, the interventions proposed to replace it have concentrated on the smallholder sector and annual crop production, with the main objective being to increase food production.

Maize and sesame are the principal food crops grown in the irrigated areas, and the traditional cropping pattern is to plant 100% of the land with maize in the first rainy season (Gu-Apr/May/June), followed by a second crop of maize on plus sesame on the same land, with the second rainy season (Der-Oct/Nov/Dec). However, with an annual rainfall of 500 mm or less, spread over the two seasons, irrigation is vital for successful cropping in the area. Yields of irrigated crops are currently more than double that of rainfed ones

Rehabilitation of the irrigation system is obviously a top priority for increasing production, but other constraints which need to be addressed include the low yield potential of the local maize varieties and the major losses caused by maize stalk borer. Activities to deal with these three constraints constitute the main components of the proposed Agricultural Strategy. A fourth component is also considered worthwhile, that of continuing the trials and seed multiplication on alternative crops which could replace imported foods and thereby lower living costs. The oilseeds are of particular interest and trial work on upland rice and wheat should also continue, although some doubts about their chances of success as smallholder crops preclude recommending any major extension efforts at this stage.

Components of the proposed Agricultural Strategy are therefore as follows:

1. Rehabilitation of irrigation
2. Introduction of better maize varieties
3. Control of the maize stalk borer
4. Continuation of trials on crops for import substitution.

The benefits of the proposed strategy are estimated as follows:

1. As a result of rehabilitating the irrigation system the area of irrigated maize could increase from the present 11,200 ha to 32,091 ha, and the area of irrigated sesame could increase from 5,280 ha to 15,128 ha.

2. Maize production could increase from the present level of 28,000 m/t, to 42,775 m/t per annum, as a result of irrigation rehabilitation, and up to 53,113 m/t with the addition of efficient maize stalk borer control.

3. Sesame production could increase from 8,844 m/t to 13,276 m/t as a result of irrigation rehabilitation.

Based on the above production figures, the value of production after implementing the project is estimated to rise from US$ 8.5 million at current levels, to US$ 12.8 million after rehabilitation of the irrigation system and to US$ 14.0 million with the additional benefits of maize stalk borer control. The potential financial benefits from all interventions would therefore be US$ 5.5 million per annum.

1 Location of the Study Area

The field study was focussed on the main irrigable areas in the central part of Lower Shebelle river valley, within the districts of Merca and Qoreooley, from Sigaale village, north of the Genaale barrage to Bulo Marerta village in the south. This covers a gross area of around 67,000 ha with 30-40,000 ha of potentially irrigable land, which used to be responsible for over 90% of the banana production in the Lower Shebelle Region and over 50% of all Somali bananas. This is also the area covered by detailed studies in 1977/78 by Sir M. MacDonald & Partners for the "Genale-Bulo Marerta Project" which, in the absence of more recent studies, has been the main source of basic data on the area.

2 Background to the Agricultural Situation

Banana production in Lower Shebelle started in 1927, reaching 4,500 ha by 1939, with 32,000 tonnes exported. It was restarted after the war, peaking in 1965 when the area of the crop reached about 5,000 ha and 60,670 tonnes were exported. The subsequent decline was mainly due to economic reasons; removal of preferential import duties to Italy in 1969, post independence emigration of Italian farmers, partial nationalisation, etc.

Exports ceased at the end of 1990 with the start of the civil war, when many farms were abandoned or taken over by force, and only local sales were possible until 1994 when exports restarted and continued until 1997. Approximately 3,400 ha were in production at that time with exports reaching 26,983 tonnes in 1996. In 1994-95 there were 140 banana growers in the Shebelle Region. Towards the end of 1997, strong winds and flooding attributed to the El Nino weather phenomenon destroyed most of the banana plantations and exports ceased again until 2002, when a Libyan company purchased two trial shipments of 50,000 and 70,000 boxes, totalling 1,500 tonnes. At present there are 98 farmers registered as members of the banana growers association SHEFA (Shebelle Fruit Association), with 1,600 ha of bananas under cultivation and they were hoping to be able to export again in 2003 but a shortage of irrigation water has so far made it impossible to achieve the required quality.

Maintenance of the irrigation system by the banana farmers and exporting companies has been neglected since 1997, when the banana export market collapsed. However, some repairs have been undertaken recently to diversion structures and de-silting of canals, organised by NGOs and funded by the EC. Maintenance of the main canals by the banana sector was also essential for small-holder irrigation downstream, and now, as a result of the system silting up, very little water reaches the tertiary canals, resulting in a reduction in irrigated cropping and a corresponding increase in the rainfed area.

3 Soils, Climate and Water Resources

3.1 Soils

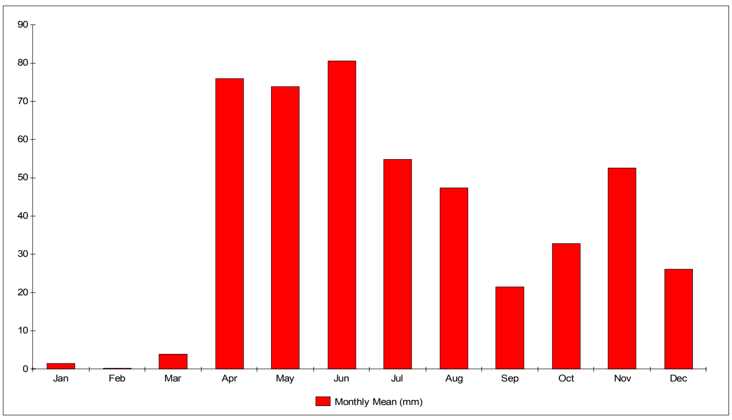
The soils over most of the area are of alluvial origin, fine textured and moderately fertile, with nutrients replenished annually by silt from the river carried in the irrigation canals and flood water. Small-holder crops are universally grown without any fertiliser, but it was very interesting to note during the field visits, that maize crops throughout the area, both irrigated and rain-fed, showed no signs of any nutrient deficiency. The fact that most farmers cannot cultivate all their land, coupled with low rainfall probably allows organic nitrogen to accumulate between crops.

Topography is generally level except for occasional small hills and depressions in old river beds. Soil profiles are deep, enabling quite long periods between irrigations and making it possible to grow sesame to maturity, largely on residual moisture after the main "Gu" season rains. The fine textured soils are slow-draining and liable to waterlogging. This characteristic might also explain why ox-cultivation is not practiced, because such soils can be very hard when dry and very sticky when wet. Poor drainage has also been reported to result in shallow rooting of bananas, making them vulnerable to wind damage.

3.2 Climate

The climate is semi-arid, and generally hot and humid with an average annual rainfall of between 400 and 600 mm. There are two rainy seasons, with the main rains in the "Gu" season (Apr/May/Jun), followed by the second rains in the "Der" season (Oct/Nov/Dec). From July to September, during the "Hagai" season, there are intermittent rains and January to March is the dry season "Jilal". The graph in Figure No. 1 shows monthly rainfall means, compiled from historical meteorological data given in the MacDonald report.

Figure 1. Banana Sector Study Area – Monthly Rainfall Means



Source: "Genale - Bulo Marerta Project" report by Sir M. MacDonald & Partners, 1978.

Given that even local varieties of maize, the staple crop, will take 100 or more days to mature and require at least 500 mm of water over the growing period to produce reasonable yields, it is obvious that irrigation is vital for successful cropping in the area. Farmers quote yields for rain-fed maize in the region of 0.6 – 0.7 t/ha, and 1.0 - 2.0 t/ha for irrigated maize. With such a marginal rainfall situation, serious drought periods are to be expected, with crop failure a constant risk in non irrigated areas. Flooding is also common, either by the river overflowing, or from rainwater accumulating in low lying areas. Strong winds are a further feature of the climate, necessitating the use of windbreaks to prevent damage to banana plants in particular, while increasing evaporation rates and exacerbating the effects of dry periods.

3.3 Water Resources

The River Shebelle is the main source of irrigation water, supplemented by some use of groundwater from boreholes, when river levels are low. Prior to construction of the Genaale barrage across the river in 1925, rainfed cropping of food crops was the norm for most of the area and irrigated agriculture was limited to areas near the river. The Genaale barrage feeds three main canals and together with three more barrages and associated canals subsequently constructed further down stream, the total (theoretically) irrigable area amounts to 40,000 ha. In practice less than half of that area is likely to be under irrigated cropping in any one year. MacDonald's report estimates that 16,000 ha were being irrigated in 1977/78, with an additional 678 ha under preparation (see Table 1 – Estimated Land Use). It is thought that today, no more than 10,000 ha is irrigated, as result of siltation, collapse of the banana market, illegal occupation of farms etc..

High water levels in the River Shebelle correspond to the Gu & Der rainy seasons, with the Der flow during August–December being larger and more reliable than the earlier Gu flow of May-June. The river has been known to dry up completely during the dry "Jilal" season. Water quality can be poor at the start of the Gu season, with high salinity levels from the first rains in the Ethiopian highlands and, because of this, it is usual to delay the start of irrigation by two weeks. The Gu maize crop is normally not irrigated until after it has germinated with the first rains.

4 Land Use

Table 1 shows the land use situation in 1978 when more of the cropping was irrigated as well as a "rough" estimate of the current situation. This strategy study has not had the resources to update the map or figures on land use with any degree of accuracy, but some indication of the major changes were obtained from local farmers and NGO workers.

Table 1. Estimated Land Use in the Study Area, 1978 & 2003 (ha)

LAND USE (ha)	1978					2003				
	Gross Land Area	Non Cultivated Area	Planted Area Irrigated	Planted Area Rainfed	Total Planted Area	Gross Land Area	Non Cultivated Area	Planted Area Irrigated	Planted Area Rainfed	Total Planted Area
Uncultivable land	17,450	17,450	0	0	0	17,450	17,450	0	0	0
Non-irrigable crop area	15,565	10,487	0	5,078	5,078	15,565	10,487	0	5,078	5,078
Irrigable annual crop area	27,010	15,498	11,512	0	11,512	31,380	8,458	8,000	14,922	22,922
Bananas - irrigated	6,870	2,803	4,067	0	4,067	2,500	900	1,600	0	1,600
Other fruits - irrigated	515	210	305	0	305	515	315	200	0	200
TOTAL	**67,410**	**46,448**	**15,884**	**5,078**	**20,962**	**67,410**	**37,610**	**9,800**	**20,000**	**29,800**

Sources: 1978 figures - "Genale - Bulo Marerta Project" report by Sir M. MacDonald & Partners.
2003 figures – Mission estimate - see notes on the land use table below
Note: Banana area in 1978 includes 647 ha under development at that time.

Notes on the land use table:

1. It is assumed that the area of uncultivable land remains unchanged at 17,450 ha. This is made up mainly (75%) of wooded scrub land, often sandy with rough topography, as well as areas of old river beds, permanently flooded land and riverside vegetation.

2. Less than 40 % of rain-fed and irrigable areas was actually used for cropping in 1978, the remainder being either left fallow or occupied by tracks, irrigation canals, bunds, windbreaks etc.. However it is believed that the population could have doubled since then, and it is reasonable to assume that more use of the fallow land has been necessary to feed the extra people. The total area estimated for annual cropping in 2003 has therefore been increased by approximately 70% over the 1978 figure (see also Section 5 on population estimates).

3. The collapse of the banana export trade, plus the shortage of irrigation water, has led to a reduction in the area under bananas, and SHEFA, the banana growers association, estimates that only 1,600 ha is in production during 2003. Much of the unused former banana area is now being utilised for irrigated annual copping, by the owner, or rented out to smallholders or farmers from rain-fed areas. In this estimate the balance of the former banana area has therefore been added to the land available for annual cropping.

4. Deterioration of the irrigation system has meant that a greater proportion of the "irrigable" land area is now mainly rain-fed. CEFA's Senior Somali Agronomist, estimates that only 30-40% of the previously irrigated area is irrigated today, compared with the time before silting up of canals, and that even much of that area will only be irrigated once, when the river is at its highest. Accordingly, estimates for irrigated annual cropping in 2003 have been reduced by a third and the balance added to the rain-fed area estimate.

5. Areas of other perennial fruit trees, principally mangoes, coconuts, grapefruit and limes, are also assumed to have declined, as result of lack of export opportunities and water shortages. There are many reports of trees being cut for firewood, plantations being neglected and little replanting. A reduction of one-third of the area has been assumed for the purpose of this land use estimate.

Although these figures for current land use are necessarily only rough estimates, it is felt that some attempt had to be made to indicate the probable baseline situation, so that indicators can be identified, for the evaluation of future development activities.

5 Farming Population

There does not seem to have been a significant movement of people out of the area since the civil war in 1990. Some smaller villages have been abandoned as their inhabitants have moved into larger settlements for added security and there are some reports of adult men moving out of the area to look for work, leaving the families behind to carry on with the farming. Many of the banana labourers' villages which were sited on the commercial farms have been abandoned, partly because of the lack of work and also because the collapse of the canal system has prevented drinking water reaching them. Most of these people are also said to have moved into small towns like Genaale, Shelembot, Qoreooley, Bulo Marerta and Golweyn as well as Merca, the district capital.

In 1978 the village population of the two districts making up the study area was 112,316, made up of 23,905 families, excluding the town of Merca and most of the villagers can be assumed to be farming families. An accurate figure for the current population is unknown, but during Phase 11 of this study, the field staff of CEFA assisted by carrying out a survey to <u>roughly</u> update these figures, the results of which are presented in Table 2.

Table 2. Number of Families in Qoreooley & Merca Districts, 2003

Qoreooley District		Merca District	
Village	No.of Families	Village	No.of Families
Qoreooley	6,000	Genaale	4,259
Gaiw erow	700	Segaale West	600
Farhane	1,150	Segaale East	192
Cardi Cali	700	Maduulow	n/a
Furuqley	550	Waagade	567
Bandar	480	Degw ariri	1,000
Jeerow	800	Khamisow	770
Maduulow	520	Majabto	215
Garas Guul	500	Buulo Muuse	57
Tugaarey	300	Golw eyn	2,000
Bulo-Koy	100	Bulo Marerta	3,000
Jasiira	350	Mushaani	976
Haduman	570	Uguunji	1872*
Bulo Sheikh	470	Shalambood	1017 *
Manya Murug	465	Bufow	275
Farkeerov	250	Bulo Arundo	180
		Bulo Jameo	77
		Malabele	850
		Busley Da'ud	1200
Total	**13,905**		**16,218**

Source: Village elders, farmers and CEFA field staff – June 2003
* 1977 figures from MMP report. 2003 figures not available

This suggests that the total number of families in the two districts in 2003 is 30,123. On this basis, using the same average family size as the Macdonald report (4.65), the total population in 2003 would be 140,071.

However, application of an arbitrary 2.5% annual growth figure to the 1977 population figure of 112,316 over the last 25 years, gives a current estimate of 200,000. Obviously, at this stage, the population as an indicator of the likely number of beneficiaries from any development intervention can only be approximate and for the purpose of this study it is assumed that the population has increased by 70% since 1977, with at least 40,000 families.

Temporary migrants into the area include nomadic or semi-nomadic livestock owners who bring their animals in for dry season grazing near the river and seasonal labourers from Bay and Upper Juba looking for casual work. The numbers of seasonal migrants was estimated to be 94,000 in 1977, but it seems likely that this would have declined in more recent years, with the collapse of the banana export trade, although there is still work to be had on tomatoes and other vegetables.

6 Land Tenure

In 1977 it was reported that 80% of families owned their own farms and more than 10% of those regularly rented extra land. Rental of extra irrigated land by farmers on rainfed areas is still common and the mission was also told that landless former banana workers are often given small plots, a quarter ha or so, rent-free, on former banana farms, in preference to leaving the land idle and being allowed to go back to bush.

Some farms, especially the state farms and larger commercial farms, which were taken over during the civil war, are still occupied illegally, while others have been given back to their owners. Other farms are occupied by relatives of the owners or by former employees acting as caretakers for absentee owners, several of whom are still living outside the country. The banana growers association, SHEFA, has 98 members with a wide range of farm sizes up to 300 ha or so, but the average is said to be 30-40 ha.

7 Farming Systems

7.1 History of Commercial Farming

After construction of the first barrage across the River Shebelle, in 1925, it was possible to undertake large scale irrigated farming for the first time, with the first commercial crop being cotton, grown mainly by Italian settler farmers, which reached 3,000 ha by 1929. Production declined in subsequent years due to pest and disease problems and although reintroduced in 1950, there is no longer any cotton grown in the area. Groundnuts and castor were encouraged during war-time but areas had declined to 500 ha of each crop by the 1950’s. Only limited areas of groundnuts are now found, on the lighter soils, and no castor. Most of the Lower Shebelle area has close-textured soils which are unsuitable for groundnuts. The Lower Shebelle Region used to grow more than 2,000 ha of rice, producing more than 50% of Somalia’s total production, but this was mostly on State farms and no rice is growing at present, although the Italian NGO - CEFA (Comitato Europea per la Formazione e Agricultura) is now promoting upland rice through smallholder Rice Growers Associations (RGAs).

The only commercial crop of importance since then has been the banana, production of which started in 1929/30. Small areas of other perennial crops, mainly found on the banana farms, include limes, mangoes, grapefruit, papaya and coconuts. There have been some exports in the past, to Italy and Middle Eastern countries, of limes, mangoes and grapefruit but the volumes were never very significant and at present they are only grown for the local markets. On several farms, tomatoes, onions and watermelons are important cash crops for the local markets.

7.2 Banana Farming

In spite of the poor state of the irrigation system the Mission saw a number of mature plantations still being cared for, and a few new fields being planted. However there were also many fields of abandoned bananas which had died off for lack of water.

7.2.1 Land Preparation and Planting

Land for bananas is ploughed by tractor and banana suckers are planted in the bottom of furrows for ease of irrigation, at a planting density of around 2,000 plants per hectare. The first bunches are harvested 9-11 months after planting and the plant continues to produce successive stems for a period of 3-4 years or so before it has to be replaced. Land preparation and planting is the main expense for a banana farmer and 3-4 years is a relatively short lifetime. Six years would be normally regarded as an economic minimum. Poor drainage which results in development of a surface root system, and nematode infestation, are said to be two of the things limiting the lifetime of the plant, both factors making plants liable to uprooting by the strong winds which are a feature of the area. The Cavendish type of banana called "Poyo" is the main variety grown for export, with plantains planted round the edges as windbreaks. Casuarina and other trees are also used as windbreaks.

7.2.2 Irrigation

The planting/irrigation furrows silt up very quickly and basin irrigation is practised thereafter. When river levels are low, farmers may use boreholes, pumping groundwater for irrigation but the water quality is poor and salinity build-up is always a danger. Drainage is a major problem on most farms, contributing to salinity, which is another factor said to limit the lifetime of the plant. The current poor state of the irrigation canals is a major constraint on production and farmers were unable to meet a potential export order for April 2003 because the bananas did not mature properly due to water stress.

7.2.3 Pests and Diseases

Major pests are the root burrowing nematodes *Radophilus similes*, and the banana weevil *Cosmopolites sordidus.* The MacDonald report states that the level of nematode infestation was higher than had been seen in any other banana growing countries. Carbofuran has been the principal chemical used to control soil pests. The generally dry climate however, means that there are few problems with fungus diseases and even Sigatoka is unknown, which is a major problem in other banana producing countries.

7.2.4 Fertiliser Use

In spite of the nutrient value of the silt carried in the irrigation water, fertiliser to supply N,P & K is regarded as essential for maximum production, particularly potassium and nitrogen, but at present these are generally not widely available. For optimum production, around 900 kg of fertiliser per hectare each year would be required. The Libyan company which has contracted to purchase bananas for export in 2003 is reported to have imported fertiliser for the banana farmers, both urea and potassium sulphate, to be supplied on credit.

7.2.5 Labour Requirements

Labour requirements are estimated to be 220 man-days/ha for the first year, the year of crop establishment, and around 450 man-days/ha per year thereafter. In addition to planting, hand labour is needed for weeding, pruning, trash burning, chemical and fertiliser applications, irrigation, harvesting and packing/loading. At its peak the banana industry is said to have employed 10,000 permanent workers and over 100,000 seasonally.

7.2.6 Banana Yields

The pruning system is aimed at producing 1.5 bunches per year from each plant. The best farms were reported to be yielding 25 t/ha, of exportable quality, but the average exportable yield was much lower, as little as 7.4 t/ha in 1977. MacDonald (1978) gives the following information for production and yield in the 1970's:

Table 3. Lower Shabelle Banana Production in the 1970's

Year	Banana Area (ha)	Exported Yield (mt)	Exportable Yield per ha (mt)
1971	3,400	36,710	10.8
1972	3,917	60,650	15.5
1973	4,700	46,270	9.8
1974	4,694	41,470	8.8
1975	4,209	34,990	8.3
1976	3,897	33,870	8.7
1977	3,895	28,810	7.4

Some of the reasons for low yields could perhaps be addressed, like poor irrigation, nematode infestation etc., but the adverse effects of other factors, which include excessively strong winds and high rates of evaporation, susceptibility to flooding and difficult drainage due to the topography, are not easy to mitigate. Areas of really suitable soils are also limited and bananas are not always grown in ideal conditions.

7.2.6 Marketing of Bananas

Somalia's last full year of banana exports was in 1996 (24,188 mt), prior to the destruction of about 80% of the banana plantations by the floods and high winds of 1997/98. Since that time only local markets have been available and the chairman of SHEFA estimates that 6-8 truck-loads, of 110 quintals each, are being sent daily to the Mogadishu markets. Traders also collect from as far away as Hargeisha, Galcaio and Bossaso in the north, as well as Kismayo in the south. Bananas are loaded loose in bunches, and not in cartons as they would be for export. According to SHEFA the average price received is 70-80,000 Somali Shillings per quintal (approx. US$ 4.4), from which has to be deducted the cost of transport and the illegal militia check point levies. Transport costs Shs 2.8 million per truck (US$ 1.5 per q.) and militia levies Shs 440,000 per truck (US$ 0.24 per q.).

7.2.7 Costs and Returns for banana production

Banana production at the present time is largely based on existing plantations, with very little new planting. Chemicals and fertilisers are generally unavailable or considered too expensive in view of poor returns from the local market. Most of the production can be assumed as saleable, since there is no export market and, in view of the lack of fertiliser, pest control, irrigation problems and aging plants, it would seem unlikely that there would be more than 10 tonnes produced per ha (gross yield), about half that of previous years. On this basis the economics of producing bananas at present might be as follows:

Table 4. Costs & Returns for Banana Production (US $/ha/annum)

Sales/(US$)	100 q. @ $ 4.40/q	**440.00**
Costs/ha (US$)		
Labour	100 man-days/ha @ $ 1.00/day	100.00
Transport & levies	100 q. @ $ 1.74/q	174.00
Miscellaneous at 10%		27.00
Total Cost (US$)		**301.00**
Net income per ha (US$)		**139.00**

This cost estimate is necessarily tentative, in view of the general lack of verifiable data and the widely varying figures given by different farmers. The costs of initial land preparation and planting are not included, on the assumption that establishment of new plantations is unlikely to be very common without an export market, in view of the high costs.

7.3 Smallholder Farming

The original reason for the development of the irrigation system was to produce commercial crops of cotton initially and bananas in more recent times. However it also (potentially) serves an estimated 50,000 smallholders who subsist mainly on annual crops.

The MacDonald study of 1978 gives the average farm size for around 20,000 smallholders growing mainly annual crops, as 1.93 ha (range 0.5 – 13.0 ha), with a maximum cultivable area of 1.6 ha and an average net area cropped each year of 0.90 ha per farm. The smallholders association, Somalta'ab gives 15 ha as the maximum size of farm to qualify for membership. Farmers questioned during the current study gave a range of 1-5 ha per family as the norm. Some fragmentation into smaller units would be appear likely as the population has increased over the intervening 25 years, so it would seem reasonable to assume that the land area per family has probably declined since 1978.

Maize and sesame are the principal food crops grown in the irrigated areas, with sorghum in the rainfed areas at the "tail" end of the irrigation system which receives very little water. The traditional cropping pattern over most of the area is to plant 100% of the land with maize with the main rains (Gu season – Apr/May/Jun), followed by a second crop of maize (40%) plus sesame (60%), with the second rains (Der season – Oct/Nov/Dec). The Cropping Calendar in Table 4 shows typical seasonal operations for maize and sesame.

Table 5. Cropping Calendar Operations for Maize & Sesame

Month	Maize	Sesame
GU SEASON		
April	planting	threshing
May	planting, irrigation, weeding	threshing
June	irrigation, weeding	
HAGAI SEASON		
July	irrigation, weeding	
August	harvest	
September	harvest	
DER SEASON		
October	irrigation, planting	land preparation, irrigation
November	irrigation	irrigation, planting
December	irrigation	weeding
JILAL SEASON		
January	harvest	weeding
February	harvest	harvest, stooking
March	land preparation	harvest, stooking, threshing

The areas can vary considerably from year to year, depending on the rainfall, particularly for the second maize crop and no planting is carried out after October as river levels fall. Some sesame is planted as a catch crop in Hagai – inter-planted in maturing maize (triple-cropping). Tomatoes are generally planted in May/June when the risk of heavy rains is past.

The 2003 cropping pattern in the study area (for the main crops only) is estimated in Table 5 and compared with the situation in 1977. The cultivated area estimate has been increased by 70% from the 1977 figure, to reflect the assumptions on population increase (see Sections 4 & 5). The proportions of the different crops have been maintained and the main difference in the farming system would be a reduction in the irrigated area and a corresponding increase in rainfed cropping, as result of the irrigation difficulties.

Table 5. Crop Area Estimates – 1977 & 2003 (ha)

Crop	Season	1977	2003	%
Maize	Gu	16,590	28,000	100
"	Der	6,636	11,200	40
Sesame	Hagai	1,000	1,680	6
"	Der	9,954	16,800	60
Tomatoes	Hagai	350	560	2

Sources: 1978 figures - "Genale - Bulo Marerta Project" report by Sir M. MacDonald & Partners.
2003 figures – Mission estimate - see notes below.

Other annual crops include cowpeas, mung beans and ground nuts, as well as watermelons and vegetables like tomatoes, onions, garlic, lettuce and carrots. Tobacco has also been important in the past but very little is now grown. Cowpeas are probably the next most popular crop, usually inter-planted with maize. Upland rice used to be grown on a mechanised state farm and commercial farms, and CEFA is trying to create interest in it again for smallholders, by multiplying seed and supplying milling equipment to RGAs (Rice Growers Associations). Paddy rice was recently tried with the RGAs but was unsuccessful, mainly due to irrigation difficulties.

7.3.1 Land Preparation

Generally only the larger farmers with more than 30-50 ha have their own tractor and smaller farmers would hire from them for ploughing. Current tractor hire charges are actually quite low, at Shs 120 per hour (US $ 6-8), probably unsustainable and certainly uneconomic for new equipment. Most farmers, except those with the very smallest holdings would prefer to hire tractors if they could afford them. The soil in the irrigated areas tends to be very hard when dry, as result of the fine silt content, and difficult to dig by hand. This is also said to be one of the reasons for the lack of ox cultivation. The end result is that land preparation by hand is usually very shallow, which might be expected to restrict root development, thereby exacerbating moisture stress, as well as causing waterlogging. The traditional hoe is small and light, more suited to weeding than digging and it might be worth trying something more substantial like the jembe used in other African countries. After ploughing, land for irrigation is divided into square basins and levelled using a small scraper blade (kawawa), which is operated by two men, one pushing and the other pulling on a rope. A typical basin is 1 jibal (0.06 ha), subdivided in to 4 smaller basins.

7.3.2 Maize

Planting: Maize is typically planted by dropping 5 or more seeds in one hole at a spacing of about a metre apart in each direction. Farmers in many African countries plant maize like this to insure against the risks of poor germination, pest damage etc., but undoubtedly competition between plants limits the yield potential. The wide spacing between planting holes gives a low plant population, about one quarter of optimum for maximum yields, but is necessary to minimise competition for moisture under rainfed or partially irrigated conditions. Row planting is more common in irrigated and commercial crops. Maize planting usually starts with the first rains and dry planting before the rains is said to be common. The first irrigation, if available, is given after germination. A local 105 day variety predominates and seed of better varieties is not available. As much as 50% of the maize is said to be inter-planted with other crops, more than half of that with either cowpeas or green grams. Pumpkins, lablab beans, lima beans, g/nuts, sweet potatoes and melons (Der season only) can all be found inter-planted with maize.

Irrigation: Where irrigation is still possible, maize would usually receive a maximum of three irrigations, with long periods between irrigations, as much as 60 days. One of the reasons, apart from water availability, is said to be the fear of excessive weed growth as a result of seeds from the canal banks being carried in the water. Another is the danger of waterlogging, if rain should come soon after irrigating. Because of insufficient water and irrigation scheduling problems, some farmers get very little water, especially near the tail-ends of canals. Water use efficiency is also generally low due to poor land levelling, wastage and spillage.

Pests & Diseases: Maize stalk borer, *Chilo partellus*, is the main pest of the crop, with losses of 30% or more being experienced and even total crop destruction is not unheard of. It is worst in the Der season, populations of insects having built-up during the first, Gu season crop. Chemical control used to be common but is now rare and cultural control by stover removal/burning is unusual, although many farmers do remove infested plants when they see them. The virtual monoculture of maize without rotation or fallowing also favours this pest. Trials by NGOs, with insecticidal extract from the Neem tree, which grows locally, have had some success. Armyworm damage has also been reported in some years and can necessitate replanting if the crop is attacked early. Bush pigs & warthogs are plentiful, since they are not hunted for food for religious reasons, and can do a lot of damage to maize. Farmers put "scarecrows" of pieces of plastic etc., in the fields to try and scare them off.

Fertiliser: As mentioned above in the Soils section, small-holder crops are grown without any fertiliser, but in spite of that maize crops throughout the area showed no signs of any nutrient deficiency, during the time of the Mission in May/June, when most maize was 4-6 weeks old. Previous soils studies indicate that potassium is not limiting except for bananas, but attributes small cob sizes to phosphorus deficiency. With such a heavy silt load in the irrigation and flood water, it is likely that most nutrients are being be replenished annually, to some extent, but it is still likely that maize would respond positively to nitrogen fertiliser. However with the currently low prices for maize (± Shs. 2,000 per kg) it is unlikely that farmers would purchase fertiliser even if it was available. Animal manure is not used on crops, even where available. Cattle dung is mainly used in house building and also burned for smoke to discourage flies.

Yields: The MacDonald report quotes the following maize yield survey results:

1. Fertiliser, pest control, 3 irrigations	2.0 t/ha
2. Fertiliser, pest control, 2 irrigations	1.5 t/ha
3. No fertiliser, pest control, 2 irrigations	1.2 t/ha
4. No fertiliser, no pest control, 2 irrigations	1.0 t/ha
5. No fertiliser, no pest control, 1 irrigation	0.5 t/ha

The current situation is almost universally one where no fertiliser is applied, no pest control measures are used and irrigation is limited to one application in most cases, i.e. situation No.5 in the above table, with a yield of 0.5 t/ha. The above yields are generally in line with the information given to the Mission by farmers, although they were inclined to be a bit more optimistic, usually putting rainfed yields at 0.6-0.7 t/ha and maize irrigated once at 1.0-2.0 t/ha.

Harvest: The local variety of maize takes 105 days to mature and is then cut and stacked in the fields until time for shelling. The stover is mainly used for animal feed and the traditional storage method of storing grain is in underground pits, about a metre deep, lined and covered with maize stover and topped with soil. Maize stored in this way rapidly gets discoloured but the flavour is said to improve. One wonders about the possible dangers of Aflatoxins as moulds develop. The selling price of maize has been very low recently, around Shs 2,000 per kg, even to the extent that some farmers have cut down the area planted in the Der season and replaced with extra sesame, which continues to command good prices. One of the reasons given for low maize prices is the presence of food aid maize in the markets, from Ethiopia as well as Somalia.

Economics: Maize is the staple food crop and only the surplus to a family's food requirements will be sold for cash. The following Table 6 gives a simple economic analysis of the crop's value:

6. Maize Production and Sale Value	**Rainfed Maize**	**Irrigated Maize**
Average maize area per family in Gu -100% (ha)	0.90	0.90
Average maize area per family in Der -40% (ha)	0.36	0.36
Total maize area per family for a year -140% (ha)	1.26	1.26
Yield per ha (kg)	600	1,000
Total maize production for the year (kg)	756	1,260
Annual maize consumption per family of 6 (kg)	840	840
Surplus for sale (kg)	- 84	420
Value of surplus at Shs 2,000/kg = US$ 0.118 ($)	0	50

864 kg of rainfed maize production is obviously below the theoretical subsistence level, whereas an irrigated maize production of 1,260 kg, provides a surplus worth about US$ 50, somewhat less than a dollar a day return to labour. One ha of maize requires 60+ days of labour, depending on the yield.

Both these examples are based on the assumption that no fertiliser is used and there is no effective pest control and that 1-2 irrigations are possible in the irrigated version.

7.3.3 Sesame

Planting: Sesame is planted similarly to maize, with a pinch of seeds per hole, spaced at 0.5-0.7 metres, after irrigation, or on residual moisture at the end of the Gu season (as a catch crop during the Hagai), or with the rains of the Der season, which is the main growing period. A mixture of white & brown seeded types is sown together and planting times are chosen to ensure sunny conditions for growth, to get good pod set and minimise disease losses.

Irrigation: Basin irrigation is also the norm for sesame, and planting is done after the soil has been allowed to dry out after a single irrigation. No further irrigations are given and this probably restricts yield potential. If ridge and furrow irrigation were to be used, instead of flooded basins, it would be possible to irrigate more than once without creating the waterlogged conditions which would damage the crop. It can take several weeks for the soil to dry out enough for planting and this delay could also affect yield potential.

Pests and Diseases: The webworm (*Antigastra*) is regarded as the most damaging pest of sesame, with the capacity to cause yield reductions of 25-50% losses. Leaf spot (*Cercospora)* is mentioned as an important fungal disease, which is worse under wet overcast conditions.

Yields: Rainfed sesame yields average 3–4 q/ha (5-8 in good years). Irrigated sesame can produce 0.8 t/ha. No fertiliser is used.

Harvest: Sesame takes 90 days to harvest and is cut green, before the pods have started to split, then tied in bundles and stacked in the field or homestead yard to mature for about 15 days. The seed are then shaken out onto cloths. If the crop is processed at home to extract the oil, this is done by simple, wooden mortar & pestle type equipment, usually driven by a camel.

Economics: Sesame is used for oil and as a food, but recently the selling price has been so attractive, at Shs 10,000/kg or more, that many farmers have opted to sell most if not all of their production and to buy imported cooking oil, particularly palm oil, which is relatively cheap. The following Table 7 gives a simple economic analysis of the crop's value:

Table 7. Sesame Production and Sale Value	**Rainfed Sesame**	**Irrigated Sesame**
Average sesame area per family in Der -60% (ha)	0.54	0.54
Yield per ha (kg)	350	800
Total sesame production for the year (kg)	189	432
Value of sales at Shs 10,000/kg = US$ 0.588 ($)	111	254

The labour required to produce sesame is about 80 man-days per hectare, which would be worth about US$ 80, if there were any opportunities for paid employment.

7.3.4 Other Annual Crops

On smallholdings, other annual crops like cowpeas, mung beans, groundnuts, watermelons, pumpkins and tomatoes, are inter-planted with maize. On larger commercial farms watermelons, onions, tomatoes and other vegetables are planted on their own.

7.4 Livestock

Livestock do not feature largely in the farming systems. Most farmers have a few sheep and goats and some do have small herds of cattle. In the dry season the area attracts large herds from more arid areas, seeking the grazing provided by the river and flooded lowlands. Local farmers may rent out land for grazing to these seasonal immigrants. Oxen and donkeys are used for transport but not for cultivation. The silty nature of the irrigated soils makes them extremely hard when dry and very sticky when wet, which are difficult conditions for animal draft.

8 The Potential for Improving Agricultural Production

8.1 The Approach

The Mission's approach to this "Banana Sector Study" was to establish whether or not there was a possibility of Somalia reviving its international banana export trade and if not, what could replace it to utilise the irrigation water and soil resources in the former banana growing areas, for the maximum benefit of the people living there.

The benefits of the former banana export trade were:

- foreign exchange earning for the national economy
- employment opportunities for local people
- a high standard of living for a minority (±150 out of ±30,000 families)

Should there be no prospects for reviving the banana export trade, to its former scale, interventions to replace it could have the following objectives:

- Increase food production for better food security and nutrition
- increase cash crop production for better living standards
- increase production of import substitution crops to lower cost of living

Somalia is a food deficit country and increased food production would not only benefit the smallholder families living in the irrigation farming areas but could provide surpluses to improve food security in the country as a whole, as well as reducing import requirements.

Many of the workers previously employed by the banana plantations are now dependent on smallholdings for their survival and would benefit from interventions to increase crop yields/production and improve living standards.

Replacement of foreign exchange previously earned by exporting bananas might be achieved, at least partially, by growing crops to replace imported foods, which would be more affordable for the majority of the people.

8.2 The Potential for Bananas

There are, unfortunately, many factors militating against success for Somali bananas in the international market. Because they have to be irrigated, Somali bananas are more expensive to produce than the rainfed crops of their main competitors in the Americas and South East Asia. Yields have also been low, about half that of other banana producing countries, which generally achieve in excess of 40 t/ha. At the present time, with no government in power, there is also a real security risk to developing any lucrative business, with the danger of theft, illegal taxes and land occupation. The local market for bananas is substantial however, and seems to be adequately supplied by the existing plantations. Apart from rehabilitation of the irrigation system, which in any case is necessary for smallholder agriculture, the potential for bananas does not justify any other specific intervention or investment to increase production.

8.3 The Potential for Other Export Crops

The quantities of grapefruits and watermelons exported in the past were very small and only justified on the back of the banana trade, filling up space on the banana boats and benefiting from preferential trade tariffs etc. Similar reservations apply to those regarding bananas, i.e. high production costs and lack of security. The future for these crops is also limited to the local market and also does not justify any development intervention to increase production.

8.4 The Potential for Improving Annual Crop Production

With the demise of the banana export trade, the potential for increasing agricultural production lies with the smallholder sector and the improvement of annual crops. The principal annual crops of the irrigated areas, maize and sesame, both have potential for increasing yields substantially, with improved irrigation and agronomic practices. They can contribute to the objectives suggested earlier in Section 8.1,that of achieving better food security, increasing incomes from the sale of surpluses and lowering prices by reducing the quantities of imported maize and cooking oil.

Cooking oil, rice and wheat flour are currently imported in considerable quantities and trials of sunflower, safflower, groundnuts, upland rice and wheat are being carried out in the area under the direction of the CEFA agronomists. These crops have to potential to reduce import requirements and improve farmer incomes, but it is still too early to judge how successful they will be. Problems which might prove difficult to overcome are discussed briefly below.

Upland rice and wheat present a number of potential problems for smallholder production. The lack of tractors or oxen for seed bed preparation may pose problems. In countries where these crops are traditional, several operations to cultivate, harrow and level are usually necessary before a suitable seedbed is achieved. Weed control without chemicals is very labour intensive in broadcast crops and bird damage is also a major constraint, particularly when relatively small areas are grown and the bird pressure is therefore concentrated. Considered in relation to these difficulties the yield potential of upland rice is not particularly high, with only 1.5-1.7 t/ha having been achieved in the past when it was grown on large commercial farms, even with 5-7 irrigations. Smallholder yields can be expected to be substantially lower, especially if adequate fertiliser application is not possible. Wheat has the added disadvantage that the yield potential of heat tolerant varieties is also limited, probably less than 2 t/ha, and may be sub-economic in terms of the return to labour expended. Extensive on-farm trials are recommended before promoting these crops.

Other oilseeds, groundnuts, sunflower and safflower are attractive in their potential to boost local production of cooking oils. However areas of light soils suitable for groundnuts are limited, bird damage is a threat to sunflower production and safflower yields tend to be rather low. Here again, extensive on-farm trials are recommended before promoting these crops.

The problem of bird damage in sorghum is a major factor militating against more use of this drought tolerant crop and is the main reason why there has not been a shift to from maize to sorghum, in spite of the shortage of irrigation water. Instead, farmers are planting maize at lower densities to match the expected rainfall. The potential for increasing yields is good but the bird problem tends to be even more serious with improved varieties. In view of this and the fact that it is only grown at the fringes of the irrigable area, it is not recommended for any development intervention at this stage.

In conclusion therefore, it is recommended that development activities should concentrate on increasing production of maize and sesame, the main food crops grown in the area.

8.5 Interventions to Increase Production of Maize and Sesame

8.5.1 Irrigation Rehabilitation

The deficiencies of the irrigation system are on the top of every farmer’s list of constraints, in view of the marginal rainfall which is the norm for the area. The adverse effects of not having an efficient irrigation system include; limited crop areas, necessity for drought tolerant low yielding crop varieties, non-ideal planting times, low crop yields, risk of crop failure, and the need to cultivate larger areas to supply minimum food requirements. Rehabilitation of the irrigation canals and control structures is therefore a priority, together with farmer organisation and training in orderly water scheduling and efficient water use to minimise waste.

8.5.2 Improved Maize Varieties

In order to maximise the benefits of a more extensive and efficient irrigation system there should be an increase in the area planted with improved maize varieties with a higher yield potential than the local one. At present there is little known about the potential for improved sesame varieties in the area. Seed multiplication of improved maize varieties and their promotion through demonstrations and extension is therefore the second of the main intervention recommendations.

8.5.3 Control of Maize Stalk Borer

Maize stalk borer is a major pest in the area, reducing crop yields by at least 20%. Effective control measures by smallholders are believed to be possible and economic, and their introduction is recommended, as the third major intervention activity.

8.6 The Potential for Increasing Production of Maize and Sesame

Table 8 presents an estimate of the potential for increasing production of maize and sesame by implementation of the three main development interventions discussed above; rehabilitation of irrigation, introduction of better maize varieties and control of the maize stalk borer.

Table 8. Potential Increase in Production of Maize and Sesame

Crop	Season & % of Area Planted	Production Current Situation			Production with Irrigation System Rehabilitated			Production with Irrigation Rehabilitated Plus Maize Borer Control		
		Area (ha)	Yield (t/ha)	Production (tonnes)	Area (ha)	Yield (t/ha)	Production (tonnes)	Area (ha)	Yield (t/ha)	Production (tonnes)
Irrigated	Gu (100%)	8,000	1.00	8,000	22,922	1.20	27,506	22,922	1.50	34,383
Maize	Der (40%)	3,200	1.00	3,200	9,169	1.20	11,003	9,169	1.50	13,754
	Sub-total	*11,200*		*11,200*	*32,091*		*38,509*	*32,091*		*48,137*
Rainfed	Gu (100%)	20,000	0.60	12,000	5,078	0.60	3,047	5,078	0.70	3,555
Maize	Der (40%)	8,000	0.60	4,800	2,031	0.60	1,219	2,031	0.70	1,422
	Sub-total	*28,000*		*16,800*	*7,109*		*4,265*	*7,109*		*4,976*
All Maize	**Total**	**39,200**		**28,000**	**39,200**		**42,775**	**39,200**		**53,113**
Irrigated	Hagai (6%)	480	0.80	384	1,375	0.80	1,100	1,375	0.80	1,100
Sesame	Der (60%)	4,800	0.80	3,840	13,753	0.80	11,002	13,753	0.80	11,002
	Sub-total	*5,280*		*4,224*	*15,128*		*12,102*	*15,128*		*12,102*
Rainfed	Hagai (6%)	1,200	0.35	420	305	0.35	107	305	0.35	107
Sesame	Der (60%)	12,000	0.35	4,200	3,047	0.35	1,066	3,047	0.35	1,066
	Sub-total	*13,200*		*4,620*	*3,352*		*1,173*	*3,352*		*1,173*
All Sesame	**Total**	**18,480**		**8,844**	**18,480**		**13,276**	**18,480**		**13,276**

It has been assumed that the irrigated area could more than double as a result of rehabilitation and that maize yields will increase by 20% from more efficient watering and a greater proportion of land being planted with improved varieties. The additional benefit of efficiently controlling maize stalk borer is assumed to be worth a further 20% increase in overall production. The assumed yields are taken to be averages since some farmers will achieve better results as a result of the interventions and many will not.

In summary:

- The area of irrigated maize could increase from the present 11,200 ha to 32,091 ha, as a result of rehabilitating the irrigation system.
- The area of irrigated sesame could increase from the present 5,280 ha to 15,128 ha, as a result of rehabilitating the irrigation system.

- Maize production could increase from 28,000 m/t to 42,775 m/t per annum as a result of irrigation rehabilitation, and up to 53,113 m/t with the addition of efficient maize stalk borer control.

- Sesame production could increase from 8,844 m/t to 13,276 m/t as a result of irrigation rehabilitation.

8.7 The Potential Value of Increased Maize and Sesame Production

Based on the above production figures, the value of production after implementing the project is estimated to rise from US$ 8.5 million at current levels, to US$ 12.8 million after rehabilitation of the irrigation system and to US$ 14.0 million with the additional benefits of maize stalk borer control. The potential financial benefits from all interventions would therefore be US$ 5.5 million per annum. Table 9 below shows the calculation, based on current local market prices of Shs 2000/kg for maize and Shs 10,000/kg for sesame, using an exchange rate of Shs 17,000 : US$ 1.00.

Table 9. Potential Value of Increased Maize and Sesame Production

Crop	Value of Production Current Situation			Value of Production with Irrigation System Rehabilitated			Value of Production with Irrigation Rehabilitated Plus Maize Borer Control		
	Production (tonnes)	Value (US$/tonne)	Total Value (US$)	Production (tonnes)	Value (US$/tonne)	Total Value (US$)	Production (tonnes)	Value (US$/tonne)	Total Value (US$)
Maize	28,000	118.00	3,304,000	42,775	118.00	5,047,450	53,113	118.00	6,267,334
Sesame	8,844	588.00	5,200,272	13,276	588.00	7,806,288	13,276	588.00	7,806,288
Both Crops	**36,844**		**8,504,272**	**56,051**		**12,853,738**	**66,389**		**14,073,622**

9 Agricultural Development Strategy

9.1 Components of the Proposed Programme

A good principle for any effective development intervention is to limit the objectives to those which are firmly believed to be achievable and which have clearly identifiable benefits. The selected interventions can then be more adequately and efficiently managed by the available staff, with more chance of success than if their efforts had to be spread over a large number of activities. This is particularly important in Somalia, when there are presently no government extension staff. The main components of the proposed Agricultural Strategy are therefore limited to three: rehabilitation of irrigation, introduction of better maize varieties and control of the maize stalk borer. A fourth component is also considered worthwhile, that of continuing the trials and seed multiplication on alternative crops, already being carried out by CEFA.

9.1.1 Rehabilitation of the Irrigation System

The rehabilitation of the irrigation system is being dealt with in detail in the Irrigation Engineering Annex, but the high cost of irrigation requires that water be used efficiently, and extension activities should include farmer training in water scheduling and management as well as demonstrations of improved irrigation systems.

9.1.2 Increasing the Use of Higher Yielding Maize Varieties

As far as agronomy is concerned the high cost of irrigation also requires that crop yields be increased to maximise the return per litre of water. This can be achieved by using improved varieties, longer duration with higher yield potential for the areas with good irrigation, and shorter duration where irrigation is less reliable. Even after rehabilitation of the irrigation system there will always be farms, particularly near the “tail end” of the canal systems, where water shortages will occur. The use of short duration maize varieties could reduce the risk of crop failure and also enable more timely planting of the second Der season crops.

Seed multiplication of improved maize varieties can probably be done in the area, under the supervision of the NGOs. It will take time for a significant number of farmers to adopt new varieties and local seed multiplication should be able to keep up with demand. There is no question of using hybrid maize and the production of open pollinated varieties is fairly straightforward.

9.1.3 Control of Maize Stalk Borer

Maize stalk borer, *Chilo partellus*, was mentioned by all farmers as the main pest of the crop and a yield reduction of 30% or more is normal. There are number of methods of control which can be used, in addition to the traditional hand removal of infested plants, including: stover removal & burning, removal of volunteer maize plants, crop rotation, insecticidal extract from the Neem tree, biological predators and proprietary chemicals.

The UNA Integrated Pest Management Project in Somalia has provided information that the Bayer product, Bulldock is being used by some farmers in the Lower and Middle Shabeelle for stemborer control. At recommended application rates of 4 kg per hectare, one application per season, and wholesale costs in Nairobi of as little as US$ 1.50 per kg, effective insecticidal control of stemborers can be achieved at very little cost.

9.1.4 Crop Trials and Seed Multiplication of Alternative Crops

CEFA agronomists are conducting variety trials and seed multiplication on sunflower, safflower, upland rice, short duration maize, heat tolerant wheat and also groundnuts, as well as an alternative irrigation system for sesame and maize stem borer control using Neem tree extracts. As discussed above in Section 8.4, it is still too soon to recommend large scale adoption of new crops, but it certainly worthwhile continuing these activities, especially in respect of the oil crops.

9.2 Implementation

At present the NGOs – ADRA, CEFA, CARE and CONCERN are working on improvements to irrigation and agriculture in the area and, in the absence of a government agricultural extension service, it would appear, for the foreseeable future at least, that only NGOs can provide the supervision and extension services to implement the proposed developments. As far as possible they are working through traditional village committees, some of which deal with irrigation scheduling and others look after agricultural matters. The latter would be important, for example, in promoting the adoption of new maize varieties and stalk borer control methods.

9.3 Project Monitoring

Indicators for baseline establishment and monitoring of project progress in the improvement of maize and sesame production might include the following:

- Number of farmers able to irrigate their crops
- Proportion of cropped area irrigated
- Number of irrigations possible 1, 2 or 3
- Yields obtained
- Number of farmers using improved varieties
- Number of farmers controlling maize stalk borer efficiently
- Number & type of crop trials, demonstrations and farmer field days held.
- Number & type of training sessions and number of participants
- Amount & type of improved seed produced & distributed

Banana Sector Study for Somalia

Marketing Study in the Lower Shabelle Region

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