Options for Cash Crop Production in the Northern Communal Areas of Namibia

Draft Report
January 1996

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EXECUTIVE SUMMARY
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BACKGROUND

The opportunities for a wide range of cash crops in the Northern Communal Areas (NCA) were reviewed. This review considered the competitive advantages for production and marketing. It also projected the scale of opportunities to give a guide to the relative importance of the crops considered.

The NCA has a considerable number of disadvantages for cash crop production. The low and erratic rainfall coupled with very high potential evapo-transpiration rates result in low yields for most crops unless irrigation is used. The soils are very sandy and have low inherent fertility. Basically, the NCA is a very harsh environment for the production of most crops.

Because of its low population, Namibia has a very small and widely spread local market. This makes achieving economies of scale very difficult. The transport infra-structure in Namibia is very good. Therefore, it is easy and cheap to import agricultural products from other countries into Namibia. The main source of imports is South Africa which has a much better climate for most of the imported products, a much larger local market and has been supplied with more up to date technical support.

If the NCA farmers are going to sustainably develop cash crops, it is important that they are well suited to the climate and soils and that they are competitive on the chosen market. These opportunities were reviewed in both the medium and long term. The medium term opportunities can be achieved with very little active research and development, but active extension and assistance would be needed. To achieve the longer term goals, much more research and development would be required.

Cereals

The crop which has the greatest potential to improve the rural cash economy is mahangu (pearl millet). It is already widely grown, there considerable market demand and little competition outside of the NCA. It is projected that increases in output which could traded would generate extra revenue of NS 56 million, which after production costs are deducted, would provide a cash margin of NS 22 million. This improved margin from mahangu is much greater than the sum of all the other crops considered. There is a small opportunity for generating cash from maize, but this is restricted to the Caprivi region. There are already considerable efforts to increase the output of these two crops to improve food security; the findings of this study demonstrates the importance of both crops for generating cash.

The potential for rice and irrigated wheat was shown to be very limited. Wheat requires a large expenditure in irrigation equipment and rice needs significant investment in research before it could even be considered for commercialisation. It is concluded that both these two cereals are not worth promoting as cash crops.
Horticulture

The opportunities for horticulture are extremely limited. In the NCA, there are a large number of NGO and Government subsidised horticultural gardens. Most of these are very badly managed, the yields are low and the quality of production is totally inadequate. It must be appreciated that the climate in the NCA is not suited to a wide range of fruits and vegetables. It is projected that in the medium term, increased horticultural output could generate extra revenue NS 7.5 million and a margin of NS 3.8 million.

The focus of horticultural development should be towards home production, especially making use of waste water. It is important that there is some research to select more appropriate varieties, i.e. ones that are more tolerant of the heat. It is also recommended that the horticultural effort is directed towards a limited number of vegetables, i.e. cabbages, tomatoes, onions and carrots. Also, the planting mango and papaya trees near houses should be encouraged as it will help improve nutrition. In addition, it will allow the more entrepreneurial horticulturists to start to trade their produce within the NCA rural markets. If the farmer is successful, the next step will be to trade in the NCA urban markets. This is the most appropriate strategy to develop this sector, it is inappropriate to try to compete directly against South African produce from subsidised gardens.

In the longer term, there are three possible horticultural export opportunities, i.e. mangoes, dates and pistachios. It is projected that these could foreign exchange earnings of NS 5 million.

Cotton

Cotton is one of the few crops that is currently being grown for which the NCA has an inherent competitive advantage; the long sunshine hours give an excellent quality, long staple length. Cotton is an excellent crop for both small-holders and commercial production. In fact, it is essential that there is a significant area of commercial irrigated cotton to achieve the critical mass required to obtain external investment. It is hoped that with sensible promotion, cotton revenues could be NS 4.3 million giving a margin of NS 2.2 million. Further expansion of cotton is would be helped by the construction of a ginner. Because of its excellent quality, there are a number of South African countries interested in obtaining Namibian cotton. It is recommended that an independent cotton specialist is appointed to ensure that the Namibian farmers are given the best advice.

Vegetable oil

There are very limited opportunities for vegetable oil production in the NCA. Small areas of sunflower are being grown Caprivi and manual processing is being developed. This programme should be monitored and if it is a commercial success, similar such operations should be encouraged. However, sunflower is limited to the Caprivi. The only other vegetable oil crop which may have potential is sesame. There needs to be considerable research to select appropriate varieties and then a sensible marketing strategy has to be selected. This crop may have the long term potential to generate NS 2.6 million in revenue.
The cash opportunities for soya and groundnuts are virtually non-existent.

**Minor industrial crops**

After cereals, the next most important sector in the long term is the minor industrial crops. This group contains a wide range of crops, such as essential oils and oleoresins, food colorants, flavourings and additives, pharmaceutical crops and indigenous plants. Some of them, eg guar, could be very well suited to the harsh Namibian climate. It is estimated that a sensible target for long term revenue is N$ 25 million. Some of Namibia’s neighbouring countries have already been very successful at developing some minor industrial crops.

To achieve these long term goals, there would need to be a number of short term inputs to help identify what specific crops would have a competitive advantage in Namibia. Then they would have to be demonstrated and the quality of the extracted product would have to be evaluated. Given the limited number of other opportunities for cash crops in the NCA it is important that all the options in this sector are carefully considered.

**Other crops**

Oriental tobacco is well suited to the NCA climate and soils. However, there are marketing issues that have to be addressed. A number of commercial tobacco companies in both South Africa and Zimbabwe have shown interest in developing oriental in Namibia. It is recommended that independent expertise is given to ensure that the best terms and conditions can be attained for the farmers.

It is reported that thatching grass is already generates an annual revenue of almost N$ 2 million. This trade needs to be recognised and if possible helped. It also needs to be monitored to confirm that there no adverse environmental effects. Expansion of this sector will be dependant on the growth of the building industry.

The chances of cash generation from cowpeas, bambara nuts and castor beans are very limited. However, the first two crops are important in the farming systems and home food security.
ACRONYMS

ADC Agricultural Development Centre
cif Price includes carriage, insurance and freight
EU European Union
FOB Price implies free on board
FYM Farmyard manure
GRN Government of the Republic of Namibia
ha Hectare
ICRISAT International Crops Research Institute for Semi-Arid Tropics
kg Kilogram
km Kilometre
LFCU Likwama Farmers’ Union
mm Millimetre
mt metric tonne (1,000 kg)
NS Namibian Dollar
NAB Namibian Agronomic Board
NCA Northern Communal Area
NDC Namibia Development Corporation
NGO Non-government organisation
OKACOM Okavango River Basin Water Commission
pa per annum
pH Soil acidity rating
R South African Rand (par with NS)
RDSP Rural Development Support Programme
RSA Republic of South Africa
SADC
US$ Unites States Dollar
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CHAPTER ONE

INTRODUCTION
CHAPTER ONE

INTRODUCTION

1.1 Background

This report on the Options for Cash Crop Production in Northern Communal Areas of Namibia is a part of a wider programme for the area - the Rural Development Support Programme for the Northern Communal Areas - Project No: 7 ACP NAM 020. The specific objectives of this project are to enhance productivity of food crops and improve labour productivity in the Northern Communal Areas (NCA). The goals are to adopt appropriate technology and crop management practices, establish an extension service and create a rural credit and savings scheme.

The NCA stretch over 1,100 km from the Kunene River in the west, along the Angolan and Zambian borders in the north to the Botswana and Zimbabwe in the east. This region has very sandy soils and rainfall of less than 400 mm in the west and 800 mm in the east. Recent years have been more drought prone causing lower crop yields. Many of the animals have been weakened and died.

Some 60% of the population of Namibia, about 900,000 people, live in NCA but many of the men-folk have moved to urban areas so that labour availability is low and 60% of the households are female headed.

Low input agriculture predominates in the NCA. Donkeys and oxen provide draught power in cultivation of mahangu (pearl millet), sorghum and maize. These are, inter-cropped with cowpeas, groundnuts, bambara nuts and cucurbits. The pressure on land near water sources is acute and fallow periods are becoming less common. Social disruptions due to military activities have influenced the settlement of communities and concentrated their agricultural activities in riverside and roadside areas.

1.2 Objectives of the study

The Terms of Reference of this study are given in Appendix 1.1. Broadly the objectives of the study are:-

1. to identify those cash crops that might be researched and promoted for rainfed and irrigated production by smallholders in the NCA,

2. to research the market prospects for the identified crops,

3. to assess opportunities for large scale commercial crop production, and

4. to highlight the comparative advantages/disadvantages for a range of cropping opportunities within the NCA.
1.3 Methodology

A wide range of crops have been suggested as having potential in the NCA. Rather than produce a long list of crops and comment on their suitability, the crops have been considered in broad groups. These broad groups are

a) Cereals - including pearl millet (mahangu), maize, sorghum, rice, wheat
b) Horticulture - including the range of fruit, vegetables and floriculture
c) Cotton
d) Vegetable oil crops - sunflower, sesame, soya, groundnuts
e) Dry land crops - tobacco, castor bean, bambara nuts, cowpea
f) Minor industrial plants - essential oils, oleoresins, food colorants, pharmaceutical plants, indigenous plants
g) Other crops - sugar cane, thatching grass, marula

Exciting prospects have been reported for several crops, without fully appreciating the market opportunities, comparative advantages and profitability. This study attempts to quantify some of the opportunities and apply a sense of proportion. There are two important reasons for promoting this sense of proportion in production possibilities: ie to justify the scale of resources of supporting services that should be devoted to a crop and to understand the extent to which an enterprise will impinge on existing food security and livelihoods.

It was necessary in the course of this study to categorise farmers according to their size and institutional support. They have been broadly referred to as either small-scale or commercial implying that the latter are producing as a business enterprise for financial gain while the former are producing primarily for subsistence but may have some surpluses for sale. Traditional farmers are small-scale farmers who are producing for subsistence using low levels of locally obtained inputs, like farm yard manure, and who may have some surplus product for sale in a good year. Emergent farmers are those who are emerging from the traditional sector into the commercial sector and are producing with some purchased inputs with the aim of selling surplus production for cash and are operating on a larger scale than traditional farmers.

The report consists of another 10 chapters. The next one presents the physical background, ie climate, soils and current farming systems to the NCA. Chapter three describes the main markets that for NCA production. Chapters 4 to 10 review the broad range of crops described above. Chapter 11 summarises all the opportunities and puts them into perspective.

1.4 Acknowledgements

The authors are pleased to acknowledge a debt of gratitude to the many people, including representatives of Ministry of Agriculture, Water and Rural Development (MAWRD), aid agencies, National Development Corporation (NDC) and many farmers who, without
exception, freely gave their time to provide information and pass on their experiences. Without their kind co-operation, it would have been impossible to complete the study in the time available.

The consultants are indebted to many who provided assistance in the course of the study and particularly to Barry Weightman, Trevor Uprichard and Jack Matanyaire of RDSP, Martin Fowler of the Planning Department of MAWRD for their tireless assistance and Rod Davis of Namibia Resource Consultants.

Opinions expressed in the report are those of the Consultants and do not necessarily reflect those of others who were consulted.

This report has been produced by Dr Andrew Sergeant and John Fynn for Agrisystems (Overseas) UK under contract to the European Union Delegation to Namibia. The Report was written in December 1995 following a tour of NCA and relevant institutions in Windhoek.

1.5 Assumptions used in the report

The following exchange rates have been used

- Namibian dollar to US dollar - 3.15
- Namibian dollar to UK pound sterling - 5.40.
CHAPTER TWO

AGRICULTURAL BACKGROUND
CHAPTER TWO

AGRICULTURAL BACKGROUND

2.1 Agriculture in Namibia

In terms of income generation, the mining sector is the most important industry; accounting for 28% of the GDP. Agriculture accounts for 10% of the country’s GDP. Mining is also the most important earner of foreign exchange. Whilst mining has traditionally been the most important sector in terms of income generation in the Namibia as a whole, agriculture is the most import sector in the NCA.

Agriculture in Namibia is the most important industry in terms of employment; it directly or indirectly supports about 70% of the population. Communal agriculture is the main source of livelihoods for about 300,000 people, more than half of the economically active population. Agriculture is also an important source of foreign exchange, earning more than 15% of the visible export earnings (NS 735 million in 1994) in recent years.

Livestock dominates agriculture in Namibia. It is estimated that the national cattle herd is 2.09 million, the goat flock is 1.60 million and there are 2.56 million sheep. Beef is the major livestock product. Almost 90% of formally traded beef is exported. In the more southern areas of the country where the rainfall is at its lowest, the main farming activity is sheep (especially karakul) and goat production. As the rainfall increases, cattle production becomes more important.

Cropping is severely restricted by the very low rainfall in virtually all of the country and the lack of surface and/or ground water for irrigation. The very poor sandy soils are also a constraint to crop production. Commercial crop production is really only important around the Grootfontein Otavi Tsumeb triangle where the higher elevation, better soils and higher rainfall allow maize and sunflower production. Farms in this area which have sufficient underground water have invested in wheat production in the dry season. Yields attained by the commercial farmers in this area are very low compared with neighbouring African countries. These lower yields reflect the low rainfall and poor soils in Namibia.

Some of the farms in the Grootfontein triangle which have irrigation also grow fruit and vegetables. In addition, there are other farms nearer to Windhoek which also grow horticultural crops, but these are very limited. In the NCA, a considerable area of land is given to crop production, mainly millet, for subsistence. Very little of this millet is actually traded.

The average farm size throughout the country is about 7,000 ha. Most (73%) of the farmed land is owned by about 4,500 owners who are situated south of the Veterinary line. It is estimated that the NCA has about 3 million ha of agricultural land of about 274,000 ha are cultivated. There are between 120,000 and 150,000 farmers which gives an average farm size of about 23 ha of which about 2 ha are cultivated. The major agricultural activities are cattle, sheep and goat production combined with dry land cropping, mainly staple food production.
It is estimated that in an average year the total domestic demand for cereals is 220,000 tonnes of which 120,000 tonnes is supplied in a year of good rains. Most of the shortfall is supplied from South Africa. It is estimated that total Namibian production of fruit and vegetables is valued at about N$ 10 million.

There are three major statutory boards regulating agriculture in Namibia. These are the Meat Board, the Karakul Board and the Agronomic Board. The first two are involved with livestock and not with cash crops. The Agronomic Board is responsible for ensuring a market for locally produced maize, wheat and sunflower. As the NCA produces very little of these three crops; therefore effectively cash crop production in the NCA is currently non-regulated.

2.2 Climate in Northern Namibia

North-western Namibia is on the edge of the tropical zone in which there is just sufficient rain for reliable crop production. The climate becomes progressively drier and less favourable for crop production further south and further west. The exception to this trend is the Grootfontein, Tsumeb, Otavi triangle which is at a higher altitude and attracts more rainfall. The rainy season is unimodal and, in the north (latitude 17° 50’S), can normally be expected to start by late October and to be finished by mid April.

The rainfall is seldom greater than the absorption capacity of the sandy soils and small permanent streams therefore do not occur. Since 1992 annual rainfall has been below average causing a series of droughts that may indicate a long term trend towards a drier weather pattern as a result of either global warming or natural weather cycles. Articles in the academic press suggest a tendency toward reduced rainfall in southern Africa.

The dry season is the winter during which night temperatures can drop to -6 °C for a few nights in June and July in some years. These severe frosts occur about every 5 to 10 years. Dry winds from the east are characteristic in late August and September leading to maximum temperatures of 40°C during October as the rains build up. In drought years, with cloudless skies during January and February, the direct sun can desiccate vegetation.

Monthly rainfall figures show reduced precipitation from Katimo Mulilo in the east to Ondangwa in the west (Table 2.1).

<table>
<thead>
<tr>
<th>Month</th>
<th>Katimo Mulilo</th>
<th>Rundu</th>
<th>Ondangwa</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>177</td>
<td>144</td>
<td>109</td>
</tr>
<tr>
<td>February</td>
<td>161</td>
<td>149</td>
<td>118</td>
</tr>
<tr>
<td>March</td>
<td>98</td>
<td>96</td>
<td>92</td>
</tr>
<tr>
<td>April</td>
<td>23</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>May</td>
<td>4</td>
<td>3</td>
<td>3</td>
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<tr>
<td>June</td>
<td>1</td>
<td>0</td>
<td>1</td>
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<tr>
<td>July</td>
<td>0</td>
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<tr>
<td>August</td>
<td>0</td>
<td>0</td>
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<tr>
<td>September</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>October</td>
<td>20</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>November</td>
<td>75</td>
<td>59</td>
<td>47</td>
</tr>
<tr>
<td>December</td>
<td>146</td>
<td>99</td>
<td>76</td>
</tr>
<tr>
<td>Total</td>
<td>787</td>
<td>605</td>
<td>498</td>
</tr>
</tbody>
</table>

Although annual rainfall is the highest in the north-east of the country, the mean monthly potential evaporation frequently exceed monthly rainfall leaving a water deficit for crop production. The mean annual gross Class A pan evaporation rate is almost 2,600 mm compared to mean annual rainfall of between 500 and 710 mm across the northern region, exceeding total rainfall by a factor of five. The evaporation rates, together with the rapid percolation in sandy soil, lead to a small fraction of the rainfall being available for crop growth. Indeed much of the rainfall evaporates within a short time of falling so that only a small portion penetrates the soil to become available to plants and to replenish the water table. This is the major constraint to high yields on rainfed crops and highlights the importance of drought tolerance for the area which becomes increasingly significant from east to west.

The high maximum temperatures create a constraint to production of some crops for a portion of the year including Irish potatoes, cabbages and irrigated wheat. In contrast, the occasional incidence of severe frost precludes the commercial production of some fruit and nut crops including bananas and cashew.

Table 2.2 - Mean monthly temperatures (°C)

<table>
<thead>
<tr>
<th>Month</th>
<th>Katimo Muillo</th>
<th>Rundu</th>
<th>Ondangwa</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>31</td>
<td>31</td>
<td>32</td>
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<tr>
<td>February</td>
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<td>March</td>
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<td>December</td>
<td>30</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>Mean</td>
<td>29.5</td>
<td>30</td>
<td>30.5</td>
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</tbody>
</table>


It is the temperature and rainfall regime which imposes the greatest restrictions upon crop production potential in NCA. Rainfall is very low, evaporation exceeds rainfall by a factor of 5 and temperatures are too high and yet frost occurs frequently enough to be a hazard.

By contrast, agricultural areas to the north in Zambia and the east in Zimbabwe have considerably higher rainfall (800-1,000 mm), perennial rivers with cooler climate, less frost risk and better soils. As these areas are within easy reach, the climate puts the NCA at a competitive disadvantage.

2.3 Soils in Northern Namibia

Most of the soils throughout Northern Namibia are more than 90% sand but the flood plains and river terraces are enriched by silt. The sand results in rapid leaching of soluble plant nutrients, quick drainage and percolation of both rain and irrigation water. The poor water
retentive capacity exacerbates constraints on crop yields by low rainfall. The build up of nutrients in the soil is also reduced by lack of an appropriate rotation and by erosion caused surface run-off from occasional heavy storms and by wind in the late dry season. The sand also causes difficulties for wheeled transport.

Movement of water underground in the oshana region is facilitated by the sandy nature which has both advantages in filling sunken reservoirs from distant sources, and disadvantages when they drain with equal ease. Some of the apparently dry river beds, or ephemeral rivers, have water that flows slowly underground and may be accessed by wells and boreholes and dammed at rock bars.

Pockets of loamy sands exist in the east and alluvial soils are found in conjunction with the sands in the Cuvelai catchment area in Ovamboland and on the flood plains of the Zambezi in Caprivi. Thin layers of clay at 80 to 240 cm underlay the sands in parts of Caprivi providing a useful perched water table under irrigation but poor drainage during the rains. Further thicker layers at greater depth create a brackish groundwater source that can inhibit drainage.

The pH value of the soil is generally high and liming is not generally required particularly since nitrogenous fertilisers are not widely applied. Only on the irrigated tobacco and maize rotation at Wenela in Caprivi has lime been used. The need is caused by heavy use of nitrogenous fertiliser on the irrigated maize and the specific requirement of the tobacco crop.

2.4 Cropping patterns in Northern Namibia

Conditions for agricultural production change progressively from east to west across the NCA as both rainfall and soil quality decrease. These conditions have led to the present cropping pattern in which drought tolerance is the major consideration. The result is the preponderance of mahangu and sorghum with drought tolerant legumes as intercrops. There has traditionally been little opportunity for alternative crops.

Water availability for irrigation varies considerably across the northern boundary. Areas of Caprivi, bordered by the Zambezi, Kwando, Linyanti and Chobe Rivers provide irrigation possibilities. The Kavango region has the Kavango River flowing along a section of its northern boundary, and Ovambo has water reticulated by canal and pipe from the Kunene and by seasonally filled oshanas.
Table 2.3 - Summary of cropping and meteorological data for the NCA

<table>
<thead>
<tr>
<th></th>
<th>Caprivi</th>
<th>Kavango</th>
<th>Ovamboland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area ('000 ha)</td>
<td>1,153</td>
<td>4,170</td>
<td>5,607</td>
</tr>
<tr>
<td>Population ('000)</td>
<td>50</td>
<td>136</td>
<td>671</td>
</tr>
<tr>
<td>Rainfall Range (mm)</td>
<td>500-750</td>
<td>400-600</td>
<td>360-470</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Forest Savannah</td>
<td>Woodland Savannah</td>
<td>Mopane Savannah</td>
</tr>
<tr>
<td>Cropped Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millet area (ha)</td>
<td>3,000</td>
<td>27,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Prodn. (tonne)</td>
<td>1,200</td>
<td>8,100</td>
<td>60,000</td>
</tr>
<tr>
<td>Sorghum area (ha)</td>
<td>4,000</td>
<td>12,500</td>
<td>16,500</td>
</tr>
<tr>
<td>Prodn (tonne)</td>
<td>1,800</td>
<td>5,000</td>
<td>6,600</td>
</tr>
<tr>
<td>Maize area (ha)</td>
<td>7,000</td>
<td>2,000</td>
<td>-</td>
</tr>
<tr>
<td>Prodn (tonne)</td>
<td>5,600</td>
<td>1,000</td>
<td>-</td>
</tr>
<tr>
<td>Total Area (ha)</td>
<td>14,000</td>
<td>41,500</td>
<td>216,500</td>
</tr>
<tr>
<td>Total Prodn (tonne)</td>
<td>8,600</td>
<td>14,100</td>
<td>66,500</td>
</tr>
</tbody>
</table>


Note: Figures are taken from data collected prior to the onset of droughts that have plagued the region since 1991.

a) **Caprivi** The Caprivi is a strip of land 425 km long which is divided by the Kwando River. To the west of the river about 590,000 ha is game reserve and hence very little crop production. To the east there are 1.19 million ha which has Namibia’s highest rainfall. In addition, it is bounded by a number of rivers and there is also with periodic flooding of the Zambezi River. The region is regarded as having the highest agricultural potential of the NCA.

In Caprivi there are 10,000 to 12,000 farming families in a population of 70 to 80,000. Average farm size is between 2 and 7 ha. There are approximately 150,000 cattle. About 1,500 of these farming families cultivate 4,000 ha on the Zambezi flood plain planting maize and legumes into the receding water table through the dry season and sorghum in the rains.

Three distinct cultivation systems are used among the riverside farmers on lands distinguished according to their proximity to the water:

1. **Litapa** are the fields on the lower levels of large sunken ponds left by receding flood waters. They are characterised by heavier, silt laden soil in which the receding water leaves wet. It is ploughed and planted with maize and pumpkin from September until the onset of rains. The maize is harvested in April before the floods refill the pools and swamp the gardens.

2. **Matema** are the fields in upland regions some distance away from the flood plain which are planted with sorghum and millet.

3. **Milundu** are the fields adjacent to Litapa but on the higher reaches or banks of the pools. These are planted at the onset of the rains with maize and sorghum.
The greatest proportion of cultivated area is ploughed by draught oxen using single furrow mouldboard ploughs. The ADCs provide tractor operated cultivation services for less than 5% of the cultivated area. These services use disc and mouldboard ploughs and disc harrows and are largely funded by aid donations of equipment, most of which lies discarded for want of spare bearings although discs are barely worn.

An insignificant amount of small scale irrigation is done on river banks for subsistence vegetable production. One large scale private commercial enterprise produces green and dried maize and virginia tobacco with centre pivot irrigation on land rented from NDC.

Lake Liambezi, which has recently dried out, has the potential to provide in excess of 20,000 ha for dry land cropping. Less than 10% is currently being used for maize production. Access to the recently exposed land at the centre of the former lake is under dispute between the Sube to the east and the Mafwe to the west although availability of land is not a constraint to either tribe.

b) Kavango This region lies to the north of the commercial farming area of the Grotofontein, Tsumeb, Otavi triangle and is bordered on its north by the Kavango River. Settlement is constrained by access to water resulting in 80% of the population of 156,000 dwelling within the 10 km of the Kavango River. This population is constantly increasing due to influxes, mainly from Angola.

It is estimated that 80,000 ha is committed to dryland cropping and 985,000 ha to grazing. 262,000 ha are under NDC control and 400,000 ha are nature reserves. 2.8 million of the total 4.5 million ha are undeveloped.

Occasionally, the annual rainfall exceeds 600 mm in a season of 55 to 66 days at Rundu but recent droughts have made distribution unreliable. Mahangu is the major dryland crop and maize is also common to the east. Fallow periods of at least 5 years are used to regenerate fertility but farm yard manure is sparsely used and inorganic fertilisers rarely applied. Animal traction is widely used for ploughing and transport with sledges. However, weeding is by hand since crops are seeded by broadcasting rather than planted in rows which would allow draught powered inter-row cultivation.

Large and small scale irrigation operations have been established by NGOs for vegetable production and NDC use centre pivots for supplementary irrigation on rainy season crops. Management of the majority of NGO vegetable gardens is spectacularly poor with inappropriate planting schedules, dissolve crop husbandry and ineffectual marketing resulting in a waste of capital and natural resources. Attempts to transfer technology to trainees is so inappropriate as to be counter-productive even in the event of the trainees subsequently being given the opportunity their training into practice. This state of affairs is common to most schemes in the NCA.

Crop yields are generally low and there are few opportunities to trade agricultural commodities. It is reported that in both Kavango and Ovamboland families store up to 6 years food grain requirements as a precaution against future crop failure. However, stored grain also conveys an element of prestige which may lead to
distortion of economic rationality in storage practices at village level, and to false
claims about stocks. This greatly reduces the opportunities for trading of subsistence
surpluses.

e) Ovambo The total area of Ovamboland is 5.57 million ha with a population of
671,000, (44% of Namibia’s population) of which 90% live in rural areas at a density
of 11.9 per square km - the highest in the country. It has the lowest rainfall in the
NCA and is subject to persistent desertification. It is bordered by Angola to the north
and Etosha Game Park and commercial farming areas to the south.

The dry water course of the seasonal Cuvelai River leaves flooded oshanas and richer
alluvial soils when there has been sufficient rain in the highlands of Angola which
drain towards Etosha pan in exceptional seasons. The annual rainfall is between 360
and 470 mm per annum over a season of 37 to 53 days giving a very poor climate for
crop production.

The flat topography facilitates the canal and pipelines from the Kunene River to
provide water for livestock and (after purification) human consumption. This water
reticulation system, terminating at Oshakana, is used to supply small-scale irrigation
schemes, but the collection of water charges has not been fastidious. When the
collection of water charges becomes more rigorous, many of these schemes will not
survive. There are no perennial rivers for irrigation.

Virtually all households (120,000) are involved in agriculture although there is a
growing urban population in Oshakati and Odangwa of about 100,000. The median
farm size is between 2 and 5 ha. About 260,000 ha of rainfed cropping takes place
which is less than 10% of the total land area. The fields are cultivated by donkeys or
oxen and about 90% of the area is planted with mahangu and 7% with sorghum.

Yields of local millet varieties are low at 200 to 350 kg/ha. However, the drought
tolerance is high. Mahangu is interplanted with groundnuts and the more drought
tolerant bambara nuts and cowpeas.

Artificial fertilisers are rarely used, but cattle are grazed on the crop stover where their
manure provides some fertility to the following crop although dry winds in September
reduce its usefulness.

The major constraint to yields is drought. Records over 80 years indicate a 20%
probability of less than 300 mm per annum (pa) which is 60% of the minimum
requirement for mahangu if well distributed over the growing period. The newly
introduced dwarf short season variety “Oshakana 1” has reduced the vulnerability of
the crop to poor rainfall distribution. The production of surpluses for sale is currently
extremely limited.
Throughout the NCA fruit trees are rarely planted around homesteads. This is partly explained by insecurity of land tenure and partly by difficulties in watering young trees. Also, the lack of availability of seedlings and knowledge to grow them are important constraints.

2.5 Potential for irrigation

The groundwater is frequently brackish, and found only at great depth or confined to annual water courses. Therefore, the main irrigation potential is from the rivers that either border or transect the NCA. Other water sources for irrigation are the oshanas and, in some areas, shallow aquifers.

All the major perennial rivers are used for small-scale irrigation and a few large-scale schemes. All the rivers of the NCA are subject to international agreements regulating the drawing rights.

a) Caprivi The potential for large scale commercial irrigation project in the dried up Lake Liambezi using water from the Zambezi has been investigated by Lonrho. The high capital cost of the earthworks for dikes, canals and reservoirs combined with the cost of pumping from the river into the canals and the possible environmental hazards associated with the disposal of tail waters mitigate against the development of irrigation on his Lake.

The potential exists for small-scale irrigated production of crops within dikes on the vleis along the Zambezi River. When the market price for irrigated produce is sufficiently high, there is scope for low technology low lift pumping using shaduffs or small motorised pumps to irrigate gardens near to rivers. Proper environmental guards should be installed and protection of the river banks against erosion need to be guaranteed. It is important to stress that the establishment of gardens on river banks should not be encouraged due to the danger of erosion and contamination. Some gardens could be established using residual water pumped from shallow basins on the flood plains.

Water drawing rights from the Kwando-Linyanti-Chobe River system in the Zambezi River Basin are subject to agreement by the Joint Permanent Water Commission between Botswana and Namibia which deliberates on matters concerning the development and utilisation of water resources of common interest. These, in turn, would be guided by principles laid down by the Helsinki Rules which are 33 principles (not laws) relating to non-navigable rivers agreed in 1994. Water Rights are also subject to the outcome of environmental impact studies commissioned by the Water Board.

b) Kavango A number of schemes for irrigated horticultural production have been established along the Kavango River. These could be extended to the capacity of the available water right.

Water drawing rights from the Kavango River basin are subject to the authority of the Water Board of Namibia which refers to conditions and agreements specified by a
joint permanent commission between Angola, Botswana and Namibia called the Permanent Kavango River Basin Water Commission (OKACOM). The granting of a water right to an enterprise for irrigation purposes would be subject to the outcome of an environmental assessment of the irrigation plan conducted by agents of the Water Board as well as the availability of water from the river in the view of the Water Board and within the confines of the international agreements reached by OKACOM.

e) Ovambo In Ovambo, most of the irrigation takes place from the canal and pipeline which takes water the Kunene is on a small-scale. The advent of strict water charges will severely limit the extent of economically viable irrigated crop production. The charge for non-purified water from the canal is expected to be N$ 0.66 per cubic metre while purified water will cost N$ 1.53 per cubic metre.

The Etunda project is using its irrigation capacity to grow green maize, cucurbits, groundnuts and bambara nuts for the local market. Trainees are charged a commercial rate for their water (N$ 4.62 per cubic metre including pumping costs). This is comes to between N$ 400 and 500/ha for green maize and groundnut crops.

There is a concentration of horticultural schemes on the banks of the Olushandja dam which have received assistance from either GRN or NGOs.
CHAPTER THREE

MARKETING ISSUES AND COMPARATIVE ADVANTAGE
CHAPTER THREE

MARKETING ISSUES AND COMPARATIVE ADVANTAGE

3.1 Background

There have been a number of studies which have attempted to identify cropping opportunities for the NCA. However, virtually all of them have failed to assess the market opportunities for the new crops and, perhaps more importantly, they failed to put into perspective the competitive advantages and disadvantages of growing the recommended crops in the NCA. If growers are to develop a sustainable cash income by growing and trading crops, new crops must be assessed in relationship to the competitive sources.

For descriptive purposes, the market for crops grown in the NCA have been segmented. These market segments are the local rural, the local urban, the rest of Namibia, exports to South Africa and other African countries as well as exports to Europe. The characteristics of each of these segments are described in the following sections. It must also be appreciated that all these areas and countries are potential suppliers of crops to the other markets as well. For example, perhaps the main competition for the Northern Namibian producers in virtually all of these markets is from South Africa.

3.2 Local rural market

The local rural market can be regarded as being at the neighbour or village level. It is appreciated that this is a small and very informal market. It is therefore very difficult to get accurate and quantitative information on size and values. Often produce is bartered rather than traded for cash. The competitive advantage for local NCA production lies in the fact that any other suppliers will have to incur considerable transport, and possibly marketing commissions. The transport costs associated with “importing” products into this market are high because of the small and scattered nature of this market. In contrast, a local producer will not incur any actual transport costs; the product will simply be carried by hand or on a cart. The small size of this market segment means that larger producers are unable to get as many significant benefits from economies of scale in transport as they do when they supply larger markets.

There are two main places where transactions can take place. These are at a local, often informal market or through cuca shops.

3.3 NCA urban market

The NCA urban market is mainly centred on about 4 towns, Katima Mulilo, Rundu, Oshakati and Ondangwa. These are the main conurbations in the NCA. Over half the population of Namibia lives in the NCA, about 800,000. Therefore, by Namibian standards, this represents a potentially large market. However, it must be stressed that compared with many other countries in the region, this is a very small market.
Currently, the NCA have a remarkably sophisticated, by African standards, system of marketing. There are a number of supermarkets and other specialist shops which a wide range of agricultural produce is traded. The open air wholesale and retail markets, through which a considerable volume of cash crops are traded in much of Africa are not very important in Northern Namibia. Because of the wide range and large number of retail outlets, the consumer is relatively well served as there is competition between the shops and the margins made by the traders are very small. This relatively sophisticated range of marketing outlets is complimented by an equally efficient and effective distribution network. Therefore a wide range of agricultural products are available in the NCA urban market. This effective distribution system means that it is very easy for goods to be transported to the main towns in the NCA and therefore compete with locally grown production.

Given the sophisticated system of marketing and distribution, it is easy for traders to obtain their supplies from a wide range of sources. In other words, it is easy to obtain produce from the cheapest source. Therefore, Namibian producers can not rely on cheaper transport or import barriers to compete with non-NCA production. To effectively compete on the NCA urban Namibian market, the producers have to be very efficient at production and marketing. The alternative is if there are items which can be produced at a time when imports can not compete.

The main source of competition for nearly all products comes from RSA. Transport costs from the major markets or production centres are low, communications are good and products are therefore readily available in many of the NCA urban markets. A number of observers claim that the marketing system unfairly favours South African products. This was not found to be true. It must be appreciated that the NCA urban market is competitive and relatively sophisticated and therefore responds to better quality and cheaper prices. It is stressed that RSA products do not enjoy a monopoly. If NCA producers offer products of comparable quality and price, they are able to compete. The key is that they must offer comparable quality and price. Much of the local production is poor quality, and there is very little effort to give a good market service.

3.4 Namibian market

Namibia has a modern and efficient infra-structure. Therefore, distribution to markets in the other parts of Namibia should be relatively easy. One of the main issue facing producers in the NCA is the relatively small size of this market. In fact, the main market outside the NCA is Windhoek. Some producers are attempting to supply markets in Grootfontein and Tsumeb, but if the Namibian market is to be effectively supplied, the target market will have to be in Windhoek. Namibia is a large country in terms of area, but with a total population of about 1.4 to 1.6 million, the actual size of the market is small. Therefore, if a major cash cropping industry starts to develop, it will become all to easy to flood the market.

As with the NCA urban market, there is an efficient marketing and distribution system in Namibia. Thus it is very easy for traders to source products from a wide range of origins and to chose the cheapest and best quality source. Therefore, to compete NCA producers have to be very cost effective or offer inherently better quality. Alternatively, they have to have a seasonality advantage before they can effectively compete. This is only applicable to the fresh market, non-perishable products or processed goods are not seasonal.
The main competition for agricultural produce in the Namibian markets is from products imported from South Africa. It is relatively easy to get large 30 to 40 tonne consignments of produce from either Cape Town or Johannesburg. It is possible to hire a refrigerated truck for between N$ 8,000 and 11,000; this works out at about N$ 0.25 to 0.30/kg. Because of the volume of meat exported from Namibia to South Africa, it is possible to negotiate cheap "backloads". In contrast, to hire a 10 tonne vehicle to transport agricultural produce from Rundu or Oshakati to Windhoek would cost about N$ 2,000 to 2,500, or about N$ 0.21 to 0.25/kg. Therefore, there is virtually no transport cost competitive advantage for the NCA producer in trying to compete with imported South African produce. Again this emphasises that the NCA producers must compete on inherently better quality, cheaper production or a seasonality advantage.

3.5 South African market

Namibia does export small quantities of produce to South Africa. Customs statistics show that in 1993, it exported about N$ 2 million worth of fruit and vegetables to South Africa. Most of these exports were out of season produce, grown between April and August when the climate in South Africa is too cold for fruit and vegetable production. Most of this production came from the Southern part of Namibia, although there were small quantities of asparagus exported from Swakopmund and, reputedly some onions from the Kavango region. The asparagus exports from Swakopmund are based on the area's ability to produce at a time of the year when there is none in South Africa; which is a good example of competing on seasonality. It is not sure whether the onion exports were profitable; no further attempts were made to repeat this trade.

South Africa has a sophisticated and open system of marketing and it is easy for Namibian producers to sell their products into it. However to succeed, the products need to be landed in South Africa and be competitive - it must be realised that for many agricultural products this will be very difficult.

3.6 Other African countries

Other, neighbouring African countries could represent a market for some of Namibia's exports. In particular, there could be transport cost advantages competitive advantages for selling into Zambia, Zimbabwe and Botswana from the Caprivi region. These market opportunities will tend to be small, but could have a significant benefit to a small number of farmers and therefore this market should not be dismissed without due consideration. However, it is perhaps more likely that these countries could be serious competition for the Namibian markets in the NCA. For a considerable number of crops they have better climate (higher and more reliable rainfall and less winter frosts) and cheaper labour. However, Namibia has a much better infra-structure and would have an advantage for processed products.

3.7 European market

Europe represents a potentially large market for Namibian exports if any crops which can be grown profitably can be identified. Almost certainly, the competitive advantage will be to be
based on climate, seasonality and cheap labour. It must be stressed that there are very little opportunities in the short and medium term for exporting agricultural products from Namibia to Europe. If Namibia is to compete in this market, it is important that products that have a large market opportunity so that transport costs can soon be brought down. If transport costs can be reduced, this may make other products competitive. Currently, Namibia exports small quantities of agricultural products to Europe. The main ones being table grapes and sweet melons. The competitive advantage of table grapes comes from being about 6 weeks earlier than South Africa, ie a seasonality advantage. Similarly, the competitive advantage of sweet melons comes from being able to supply the market when most other countries are unable to supply it.

The main cost associated with the export of most primary agricultural products is freight. To be competitive, a country must at least have comparable transport costs as the main competition.

3.8 Cost structure

The main cost which the NCA producers have to be aware of is transport and, to a lesser degree labour. As the target markets become further away from the producer, transport costs become more important. For markets close to areas of production, the NCA grower has the advantage that the competition will have higher transport costs. If the NCA producer wants to market further afield, then transport costs will become a significant cost.

To put transport costs in perspective, it is estimated that air freight accounts for 63% of the sales price of Kenyan green beans and 38% of Zimbabwean cut roses in Europe. As the target market becomes nearer to the production area, the importance of transport costs decrease.

Table 3.1 reviews the road transport costs from a farm 40 km out of Rundu to various end markets. These costs have been collected from a wide range of sources but they give a useful comparison of transport costs.

<table>
<thead>
<tr>
<th>Table 3.1 - Transport cost from farm to various markets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target market</strong></td>
</tr>
<tr>
<td>Farm to NCA village</td>
</tr>
<tr>
<td>NCA urban (Rundu)</td>
</tr>
<tr>
<td>Windhoek</td>
</tr>
<tr>
<td>RSA -non-refrigerated</td>
</tr>
<tr>
<td>- refrigerated</td>
</tr>
<tr>
<td>Zimbabwe (Harare)</td>
</tr>
<tr>
<td>Europe - sea freight</td>
</tr>
<tr>
<td>- air freight</td>
</tr>
</tbody>
</table>

Note - it is assumed that the farm is situated 40 km outside Rundu
When trying to estimate the cost of transport, important assumptions have to be made in the size of the lorry. As lorry sizes increase the cost per unit weight carried decreases dramatically. For example, it is estimated that it costs N$ 2.75/t to hire a 4 tonne lorry and N$ 4.00/km for a 30 tonne vehicle. In other words, to move 1 tonne a km on a 4 tonne lorry costs N$ 0.69, but only N$ 0.13 on a 30 tonne lorry, i.e. it is over 5 times cheaper to us a larger lorry. This very neatly demonstrates the importance of economies of scale in transportation. If NCA growers are to effectively compete, either they have to be large growers or are able to combine together to get the critical mass to negotiate cheap transport.

The high cost of freight to Europe underlines the importance to attempting to develop local and African markets before the European market is targeted. This is especially important during the development phase of a project when “start up” problems can cause the occasional consignment to be written off. If this happens on the European market, there are considerable transport losses.

To put international air freight rates from Namibia to Europe into perspective, Table 3.2 compares the cost from a range of countries that Namibia would have to compete against. The cost data presented in Table 3.2 is in USS, the normal units for quoting air freight rates. The rates from Namibia are comparable to South Africa and most other countries in Southern and Eastern Africa. However, compared with countries in North and West Africa, Namibian exporters would be at a considerable competitive disadvantage. Data in this Table also demonstrates the importance of only attempting to export high value crops.

Table 3.2 - Air freight rates from various countries on passenger aircraft to Europe (USS/kg)

<table>
<thead>
<tr>
<th>Country</th>
<th>Fruit and vegetables</th>
<th>Cutflowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Namibia</td>
<td>1.59</td>
<td>2.25</td>
</tr>
<tr>
<td>South Africa</td>
<td>1.57</td>
<td>2.17</td>
</tr>
<tr>
<td>Kenya</td>
<td>1.50 - 1.70</td>
<td>2.25</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>1.55 - 1.65</td>
<td>2.50 - 2.60</td>
</tr>
<tr>
<td>Zambia</td>
<td>1.30 - 1.50</td>
<td>2.60</td>
</tr>
<tr>
<td>Uganda</td>
<td>1.50</td>
<td>1.80</td>
</tr>
<tr>
<td>Ghana</td>
<td>0.65 - 0.85</td>
<td></td>
</tr>
<tr>
<td>Egypt</td>
<td>0.85 - 1.00</td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td>0.60 - 0.90</td>
<td>0.85</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.25 - 1.70</td>
<td></td>
</tr>
<tr>
<td>Columbia</td>
<td></td>
<td>1.70 - 1.90</td>
</tr>
<tr>
<td>Thailand</td>
<td>1.52</td>
<td>3.05</td>
</tr>
<tr>
<td>China</td>
<td>2.50 - 3.00</td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that the main product exported by air from Namibia is chilled fish. It is estimated that about 15,000 tonnes per year are exported by air on a range of chartered freight aircraft. Because the fish is a relatively high value product, the exporters pay about USS 6,000 per aircraft pallet and their trade is effectively all the year round. Therefore, it is
constant and lucrative business for the air freight companies who would prefer to carry fish rather than the lower value horticultural of floricultural crops.

Currently sea freight exports to Europe are transported from Walvis Bay to Cape Town before they are transferred to larger ships. Therefore, the sea freight costs from Namibia are going to be slightly more or similar to South African exports, but perhaps more importantly, they will take longer to get to the market.

Production costs in Namibia are generally regarded to be high. This is because most of the inputs, such as seeds, fertiliser and packaging are imported from South Africa. Therefore, they are more expensive than a South African farmer would have to pay. Labour costs in Namibia are expensive compared with many other African countries, with the exception of South Africa. For example, labour rates paid in the NCA are generally in the order of N$ 6 to 10/day (US$ 2 to 3/day). In countries such as Zambia, Zimbabwe and Uganda, the agricultural labour rates are lower, at about US 1/day. Most of the capital equipment has to be imported from RSA, therefore it more expensive for the Namibian grower than his counterpart in South Africa.

The majority of the inputs for agricultural production in the NCA are imported from RSA. There is a general complaint that the inputs, such as seeds and fertiliser, are not suitable for the climate in Northern Namibia. Therefore, the yields are not as high as they should be. This therefore results in higher production costs per unit of production. In addition, it has been noted that the South African agricultural research and extension system is much more active than the equivalent in Namibia. This again puts the Namibian producers at a further competitive disadvantage.
CHAPTER FOUR

CEREALS
CHAPTER FOUR

CEREALS

4.1 Agronomic issues

Production of cereals in northern Namibia is constrained by a low and declining rainfall, very sandy soils, high temperatures and occasional winter frosts. In addition, the legacy of development policies applied to the area by previous Governments has resulted in the persistence of low technology production systems due to poverty and inadequate technology transfer mechanisms. Production is also constricted by poor agricultural infrastructure for inputs, marketing and processing. Also, the traditional land tenure system, which persists today with the added burden of encroachment by privileged organisations and individuals, inhibits long term investment by farming families in soil fertility and in perennial crops.

The soils and rainfall of the Caprivi Strip are the most favourable for cereal production in Namibia. This region is only rivalled only by the Grootfontein, Otavi, Tsumeb triangle which is also better placed geographically for the Namibian internal market.

In former Ovamboland, mahangu is the only cereal crop suited to the prevailing conditions. This it owes to its drought tolerance, afforded by the waxy coating that prevents desiccation in the hot dry spells between rain storms, and to its ability to resume production by further tillering with the onset of additional rainy spells. In spite of this drought tolerance by mahangu, 58% of all Ovambo households may be expected to buy millet in any one year to fulfil their consumption requirements because of shortfall in production (Keyler 1994)

Sorghum is also grown in Ovamboland but it constitutes only 7% of the grain production in the region (Table 4.1).

Table 4.1 - Summary of rainfed cereal production in NCA

<table>
<thead>
<tr>
<th>Cropped Area</th>
<th>Caprivi</th>
<th>Kavango</th>
<th>Ovamboland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millet area (ha)</td>
<td>3,000</td>
<td>27,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Prodn. (tonne)</td>
<td>1,200</td>
<td>8,100</td>
<td>60,000</td>
</tr>
<tr>
<td>Sorghum area (ha)</td>
<td>4,000</td>
<td>12,500</td>
<td>16,500</td>
</tr>
<tr>
<td>Prodn (tonne)</td>
<td>1,800</td>
<td>5,000</td>
<td>6,600</td>
</tr>
<tr>
<td>Maize area (ha)</td>
<td>7,000</td>
<td>2,000</td>
<td>-</td>
</tr>
<tr>
<td>Prodn (tonne)</td>
<td>5,600</td>
<td>1,000</td>
<td>-</td>
</tr>
<tr>
<td>Total area (ha)</td>
<td>14,000</td>
<td>41,500</td>
<td>216,500</td>
</tr>
<tr>
<td>Total prodn (tonne)</td>
<td>8,600</td>
<td>14,100</td>
<td>66,500</td>
</tr>
</tbody>
</table>

Note: Data was collected prior to the onset of droughts that have reduced production in the region since 1991.

Increased pressure on land due to population expansion has induced a reduction in the fallow period allowed by farmers between successive cropping of individual fields. Only 8% of Ovambo households cleared new land in the 5 years before 1994 and 41% declare that lack of land is an obstacle to further production. This has further reduced yields since nutrients are not being consistently replaced by fertiliser applications, and opportunities for improving fertility by crop rotations are limited by a dearth of drought tolerant legumes. Farmers in Ovamboland only apply manure to their fields if livestock produce it in situ as there insufficient labour to transport it. Inorganic fertilisers are used by only 9% of farmers due to financial constraints and their tenacity to traditional methods.

Oshanas are characteristic of the region and may provide an opportunity for rice production both as the waters rise and as they recede. This possibility, however, requires considerable further investigation to ascertain the yield potential and, hence, evaluate the economic viability. Rice production must be assessed in terms of the world market and comparative advantages of alternative production areas. The benefits, including the synergistic production of fish and ducks accruing, from rice production in the oshanas must then be considered against the alternative uses of the land and water resources. These alternatives would include late grazing for draught animals and the consequent extra ploughing capacity at planting time for mahangu.

As rainfall increases into Kavango, conditions improve for production of sorghum and maize which together make up 16% of total cereal output of the region. These are usually grown together with mahangu and inter-cropped with legumes and cucurbits. Higher, more consistent yields are expected from mahangu and only 19% of households usually buy it (Keyler 1994).

Land availability is better in Kavango than in Ovamboland; 48% of farmers cleared new land in the 5 years prior to 1994. Only 16% of farmers declared land availability to be an obstacle to further production whereas lack of seed, labour and animal draught power were far greater obstacles. In addition, the land is perceived by the farmers to be more fertile than that in Ovamboland. The more westerly farmers in Kavango apply more manure and more chemical fertiliser than those to the east where soil conditions and rainfall tend to improve.

In Caprivi there are more cereal cropping options because of the higher and more reliable rainfall and better soil quality. These options include maize, rice and sorghum which are grown in preference to mahangu since they yield higher in this region. Yield potential for maize compares favourably with the Grootfontein triangle and Livingstone in Zambia. Maize is also grown on receding water tables in depressions in the flood plains and harvested prior to the onset of the following floods.

Wheat can be produced under irrigation in the dry season and rotated with soya or green maize under supplementary irrigation during the rains. However, two factors reduce the yield potential for wheat in the area; firstly, the sandy soils mean irrigation cycles must be short because of the low soil water holding capacity, and, secondly, the extremes of temperatures. The sandy soils in most of the NCA necessitate short irrigation cycles. Often the cycle has to
be as frequent as every 6 days or less and this means the capital cost of irrigation is excessive, even where shared with a summer season crop. Temperatures are too low in the winter and too high later in the growing season for good wheat yields. Late frosts could cause ear sterility early planted wheat, and high temperatures in August and September reduce grain fill and, hence yield. Wheat has been produced under irrigation on NDC farms where yields of 3.5 to 4.5 t/ha have been attained over 100 to 200 ha.

Rice production has been proved technically feasible on the flood plains using irrigation from rivers. The economic viability was determined on a 40 ha trial and it was calculated that to achieve break even yields of 8.5 t/ha were required. A yield of 8.6 t/ha has been achieved in trials but is unlikely that this could be reached on a regular basis by small-scale or even commercial farmers. Problems of weed control and bird damage were encountered as well as resistance to the introduction of a new crop by the farmers. These difficulties indicate that further efforts in pursuing rice as a cash earner in NCA would be wasted.

The introduction of an improved mahangu variety ‘Okashana 1’ with a shorter stem and reduced growing time gives better prospects for drought resilience. However, Okashana 1 will only out-yield local varieties in dry conditions when soil fertility is adequate. With better rainfall and poorer nutrient status, local varieties still outyield Okashana 1.

Table 4.2 gives the range of yields recorded in the three regions for maize and the millet/sorghum combination by small-holders between 1990 and 1995. The susceptibility of maize to drought is clearly demonstrated by the total loss of yield in Kavango which occurred in the 1991/92 drought when mahangu showed sufficient resilience to yield 100 kg/ha.

<table>
<thead>
<tr>
<th>Region</th>
<th>Maize</th>
<th>Mahangu/sorghum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg/ha</td>
<td>kg/ha</td>
</tr>
<tr>
<td>Ovambo</td>
<td></td>
<td>100-350</td>
</tr>
<tr>
<td>Kavango Rainfed</td>
<td>0-1.150</td>
<td>100-330</td>
</tr>
<tr>
<td>Caprivi Rainfed</td>
<td>30-700</td>
<td>70-445</td>
</tr>
</tbody>
</table>

*Source: Namibia Early Warning & Food Information Unit*

The availability of seeds is quoted as one of the obstacles to increased output together with labour availability and access to draught power. These constraints change from year to year according to the rainfall of the preceding year which governs the production of seed and the vigour and numbers of available draught animals. Recent droughts have been very severe and caused the death of oxen and donkeys and the depletion of seed reserves as food. Lack of financial resources to replace seed and animals or to hire tractors is an overriding constraint to enhanced production.

Little cultivation is done without animal or mechanical draught power (20% in Ovambo and 4% in Kavango). Access to draught power is therefore a crucial determinant of cereal capacity and consequently attaining staple food self-sufficiency. Mechanical power is provided in Caprivi at only N$ 12 per ha (limited to 3 ha per family by ADCs). Hired draught power accounts for more than half the cultivated hectarage in some areas although this may be high in the wake of the droughts that have reduced animal numbers. Keyler
reports charges of N$ 78 to 86/ha for privately owned tractors and N$ 240 to 416 for draught animals. Privately owned tractors are very rare and these tend to be smaller than the government machines.

Another major determinant in the capacity of a family to produce surplus cereal is the availability of labour. Total labour requirements for cereals are shown in Table 4.3 and relate to improved production methods in Zimbabwe. This demonstrates that maize produces the best return to labour and mahangu the worst. However, the drought resilience and tolerance of poor soils of mahangu are more important in the western regions in spite of the poor returns to labour.

### Table 4.3. Labour requirements for cereal crop production.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Maize hr/ha</th>
<th>Mahangu hr/ha</th>
<th>Sorghum hr/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation</td>
<td>30</td>
<td>38</td>
<td>25</td>
</tr>
<tr>
<td>Planting</td>
<td>14</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>Fertilising/manuring</td>
<td>7</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Weeding</td>
<td>68</td>
<td>41</td>
<td>91</td>
</tr>
<tr>
<td>Harvest/threshing</td>
<td>95</td>
<td>201</td>
<td>101</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>214</strong></td>
<td><strong>299</strong></td>
<td><strong>250</strong></td>
</tr>
</tbody>
</table>


#### 4.2 Main competitors and comparative advantage

**a) Mahangu** The comparative advantage of mahangu is to be viewed initially in the context of the Namibian market where demand for the product is derived from food processors, urban dwellers and those members of rural communities who have failed to attain self-sufficiency. The western NCA have an advantage in that the farmers are already familiar with the crop and could expand production with the application of better technology and bring sustainability by introducing fertility maintenance practices.

**b) Maize** Maize production supplies two markets:

- Green maize, green mealies or corn on the cob which is eaten fresh within 2 or 3 days of picking. This is dealt with in horticultural section.
- Dry-grain which is harvested at full maturity at 13% water content and used for production of maize meal. Dry grain is discussed in this section.

In some neighbouring countries, maize has a yield potential of over 10 t/ha of dry grain under favourable conditions of sunshine, water availability and soil fertility conditions not found in Namibia. Even with supplementary irrigation, yields of only 6.5 t/ha are achieved in Caprivi and Kavango. A long growing season, in excess of 120 days, are needed to get good yields but periods of drought of as little as 10 days can be severely limiting especially if it coincides with pollination when moisture is needed for fertilisation. Maize has no capacity to cease transpiration in the way that millet can, and drought over a long period can therefore desiccate the crop to the
extent that it will not recover with the resumption of rainfall. Where no supplementary irrigation is provided and rainfall is known to be poorly distributed, water stress becomes the limiting factor and plant populations are reduced to maximise access by individual plants to water. Top yields in neighbouring countries are from plant populations of 45,000/ha but 14,500/ha is recommended for the Grootfontein triangle where rainfall is limiting. This reduces yields to 3.5 t/ha even in good rains.

Financial returns to maize production in NCA are limited by rainfall and soil quality. However, the maize price is controlled by the Namibian Agronomic Board (NAB) at an artificially high level to support the industry and provide some food security to the nation. Without this politically supported economic distortion to the maize industry, Namibia could not compete with neighbouring countries which have better soils and rainfall. Zimbabwe and RSA achieve better maize yields than Namibia, but have also suffered the effects of drought on maize production in recent years. Zambia and Angola, with more reliable rains and extensive areas of good soils, have the potential to supply Namibia on a long term basis, but each currently have difficulties relating to their agricultural industries.

c) Sorghum
Sorghum is mainly used for the local production of beer and very little is traded. As with maize, it can be produced better in the more easterly regions and further to the north, beyond Namibia’s boundaries where rainfall is more reliable. In Botswana it is grown on a large commercial mechanised scale with supplementary irrigation which gives protection against bird damage. Sorghum could be produced on such a scale with supplementary irrigation from the Kavango or Zambezi, the market is not sufficiently established in Namibia to justify the large capital investment that would be required. Exports would not compete with the more favourable growing conditions in other countries.

There could be limited opportunities for the production of sorghum seed of approved varieties under contract to breeders or seed companies. This could be done where there is a concentration of competent producers in a favourable production area. This would facilitate inspection and monitoring of the crop. However, extensive production sites in treeless areas offer protection against bird damage. This favours commercial producers where scale of operation allows mechanisation of harvesting, cleaning, treatment and packaging.

d) Rice
Production of rice in the Far East is on a large scale, with the benefit of extended experience and considerable technical backup. Consequently, new entrants to the market, even within the boundaries of their own countries, find it difficult to compete. The World market price for rice leaves a very small margin to accommodate costs associated with the learning curve and the inefficiencies of dispersed small scale production.

The following hurdles must be overcome before an evaluation can be made of the competitive position of rice production in Namibia:
• varieties suitable to the climate and to three possible production systems to be identified;
• production techniques to be researched and refined—both oshanas, both while filling and while draining, and for the flood plains;
• extension messages to be determined from trials;
• farmer training to be undertaken;
• adjustments in the grazing patterns of the oshanas and flood plains to be accommodated by herdsmen;
• processing capacity to be installed;
• marketing channels to be established.

Namibia has much to learn before rice could be established as a part of the farming system. Even if a production system acceptable to farmers can be established, there is ample evidence to show that rice production is at best marginal and that there are preferable alternatives to be considered.

The rice market in Namibia is 2,000 tonnes per annum and is supplied from RSA which imports from the world market in shiploads of 20,000 tonnes. These are divided to supply neighbouring countries as well as RSA on a scale that permits a great efficiency. Importing only 2,000 tonnes directly into Namibia would be more expensive than importing via RSA.

e) Wheat Irrigated wheat is produced at altitudes of 1,200 and higher in Zimbabwe and Zambia where temperatures during grain fill are lower. In these countries, it is rotated with soya using the same irrigation, planting and harvesting equipment. Without a market or suitable soil for soya, the rainy season crop must be green maize which has a limited market. Rotating wheat with maize for dry grain does not allow the wheat to be planted at the optimum time unless drying silos are installed for maize which would make it non-viable. Also rain fed wheat is produced more cheaply in the southern winter rainfall areas of RSA and it is easy for processors (mainly based in Windhoek) to access wheat from the world market through Walvis Bay. The cost of transport from the NCA to Windhoek added to the high production costs, the unsuitable soils make locally produced wheat a poor prospect for the NCA.

4.3 Market size

Estimated market demand for cereals and area that would be needed to supply the demand is summarised in Table 4.4. Local market demand is derived from consumption and production figures where the difference is usually made up by imports. Poor production of mahangu is usually compensated for by imports of maize and not of mahangu due to availability of maize on the international market. However, mahangu produced locally could replace a portion of imported maize.
Table 4.4. Market demand for cereals

<table>
<thead>
<tr>
<th>Cereal</th>
<th>Local market</th>
<th>Export market</th>
<th>Implied hectarage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>2,000 t</td>
<td>nil</td>
<td>1,300 ha</td>
</tr>
<tr>
<td>Wheat</td>
<td>40,000</td>
<td>nil</td>
<td>8,000 ha</td>
</tr>
<tr>
<td>Sorghum</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
</tr>
<tr>
<td>Maize</td>
<td>10,000 t</td>
<td>nil</td>
<td>1,800-6,600 ha</td>
</tr>
<tr>
<td>Mahangu</td>
<td>20,000 - 40,000 t</td>
<td>nil</td>
<td>40,000 - 100,000 ha</td>
</tr>
</tbody>
</table>

Assumptions about the local market size are naturally dependent on prices, particularly with mahangu which, with a comparatively small presence in the market, enjoys a higher price than maize. The maize price is currently controlled by NAB at a level that would not be sustained in a free market. This, therefore, affects the degree of substitution with mahangu and sorghum and the implied hectarage to fill the market demand. Production of maize is currently higher than it would be without price protection, but the opportunities for import substitution are not taken up because of the poor comparative advantage as explained above.

Assumptions about implied hectarage to supply the market in the Table 4.4 are dependent on the intensity of management which affects the yields. High figures for implied hectarage assume that the market would be satisfied using traditional production techniques. However, it would be logical to assume that market demand would be fulfilled by raising yields through application of fertilisers and improved husbandry due to the injection of cash and extension advice. This is particularly so in the case of maize and supplementary irrigation under which yields of 6.5 t/ha can be obtained on the soils of the NCA.

The mahangu market is divided into:

- the local demand from households who have failed to attain self-sufficiency in production,
- the urban market for milled meal, and
- the food processing market for soups, stews, cereal porridge, milk powder, bread, whey powder etc which are sold through shops and to institutions including schools, hospitals, prisons etc.

Declining rainfall has had the effect of increasing demand from the rural areas where surplus production should normally take place. Local consumption per capita is 130 - 140 kg per annum and normal production per capita in the NCA varies from 80 to 155 kg among producers. Farmers do not usually produce a surplus with cash sales in mind. Furthermore, rainfall recently has meant that five out of the last ten years in Omamboland and four in Kavango were classified as poor harvests, reducing surpluses still further. In times of normal rainfall only 30% of farmers on Omamboland sell surplus mahangu, although in Kavango 54% sell in some years and 18% sell every year.

Trade in mahangu is governed by:

- taste preference (75 to 95% of NCA residents prefer mahangu),
• relative price (commercially traded mahangu is 13 to 36% more expensive than maize although informally traded mahangu is up to 8% cheaper),
• availability of mahangu in the market (maize meal is more accessible), and
• self-sufficiency and surpluses among producing households.

The urban market has not been fully tested but indications from supermarkets suggest that demand would be high and sustain. An experimental consignment of 25 tonnes of milled mahangu was recently released to supermarkets and was sold out in a matter of hours.

It is interesting and alarming to note, in the context of market potential for cereals, that the Namibian Millet Subsector Project Surveys in 1992-93 recorded that 50% of children indicated a preference for bread over any other staple food. If this taste persists and becomes prevalent throughout the community it will be at a high cost to the economy, since wheat is not an appropriate crop for any part of Namibia and must therefore be imported. However, 20% of the children, the next highest proportion, preferred mahangu.

4.4 Gross margins and revenues

Table 4.5 below gives gross margins for the cereal crops discussed above except for sorghum which is now discounted as a potential cash crop. Land preparation costs are high due to the charges made by owners of draught animals as reported by Keyler. Charges made by owners of tractors are considerably lower but may not reflect economic rates.

Table 4.5. Projected gross margins for cereal production in the NCA (NS/ha)

<table>
<thead>
<tr>
<th>Variable Costs</th>
<th>Mahangu</th>
<th>Irrig. Maize</th>
<th>Dry Maize</th>
<th>Wheat</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanisation</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>480</td>
<td>360</td>
</tr>
<tr>
<td>Seed</td>
<td>74</td>
<td>102</td>
<td>102</td>
<td>98</td>
<td>110</td>
</tr>
<tr>
<td>Fertiliser/FYM</td>
<td>130</td>
<td>250</td>
<td>200</td>
<td>250</td>
<td>200</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0</td>
<td>98</td>
<td>98</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Packaging</td>
<td>16</td>
<td>136</td>
<td>86</td>
<td>136</td>
<td>37</td>
</tr>
<tr>
<td>Labour</td>
<td>80</td>
<td>250</td>
<td>180</td>
<td>250</td>
<td>280</td>
</tr>
<tr>
<td>Irrigation</td>
<td>0</td>
<td>800</td>
<td>0</td>
<td>1,400</td>
<td>0</td>
</tr>
<tr>
<td>Transport</td>
<td>42</td>
<td>330</td>
<td>120</td>
<td>240</td>
<td>90</td>
</tr>
<tr>
<td>Interest</td>
<td>21</td>
<td>79</td>
<td>37</td>
<td>106</td>
<td>39</td>
</tr>
<tr>
<td>Total VC</td>
<td>602</td>
<td>2,285</td>
<td>1,063</td>
<td>3,040</td>
<td>1,116</td>
</tr>
</tbody>
</table>

Income

<table>
<thead>
<tr>
<th>Yield Kg/ha</th>
<th>700</th>
<th>5,500</th>
<th>2,000</th>
<th>4,000</th>
<th>1,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price/Kg</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Output</td>
<td>980</td>
<td>4,125</td>
<td>1,500</td>
<td>3,200</td>
<td>1,500</td>
</tr>
<tr>
<td>Gross Margin</td>
<td>378</td>
<td>1,840</td>
<td>437</td>
<td>160</td>
<td>384</td>
</tr>
</tbody>
</table>

In the gross margin analysis, mahangu yields have been assumed to be 700 kg/ha with the application of fertiliser and improved management. These are higher than current average yields, but most farmers do not use improved management techniques. It is important that farmers are encouraged to improve their growing methods. The proven success of mahangu
in the NCA means that it is the most reliable source of cash from cropping even if does not have the highest gross margin. It must be borne in mind that the data in Table 4.5 does not reflect the reliability of the crops.

The farm gate price for maize is calculated on the basis of FOB Grootfontein + 30% and is therefore largely dependent on the South African price. 1995 saw a decline in South African production due to the drought, which led to higher prices which have not yet been passed on to the Namibian growers. The drought led to a decline in Namibian production from over 40,000 to less than 15,000 tonnes. Projected gross margins are not sufficiently high to encourage expanded production.

Irrigating maize is only remunerative where the capital costs can be shared with a winter crop and only in areas with sufficient water, inexpensive power and suitable silos.

The current wheat price is fixed below the South African price of SAR 789/tonne which is about the same as the world wheat price, cif Walvis Bay. The farm gate would have to be increased significantly above the world price to allow for the high costs of irrigation and low yields in the NCA.

Since the production of rice is unproven in oshanas and the production cost structure is speculative, there could be a significant margin of error associated with the gross margins.

4.5 Scale of opportunity

The scale of opportunities for increased cereal production are compared in Table 4.6. The data for this is derived from Tables 4.4 and 4.5.

<table>
<thead>
<tr>
<th>Crop</th>
<th>GM (N$/ha)</th>
<th>Opportunity (tonnes)</th>
<th>Production scale (ha)</th>
<th>Total revenue (‘000 N$)</th>
<th>Total margin (‘000 N$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahangu</td>
<td>378</td>
<td>30,000</td>
<td>57.000</td>
<td>55,860</td>
<td>21,600</td>
</tr>
<tr>
<td>Dry maize</td>
<td>437</td>
<td>10,000</td>
<td>5.000</td>
<td>7,500</td>
<td>2,180</td>
</tr>
<tr>
<td>Wheat</td>
<td>529</td>
<td>40,000</td>
<td>10.000</td>
<td>32,000</td>
<td>1,600</td>
</tr>
<tr>
<td>Rice</td>
<td>384</td>
<td>2.000</td>
<td>1.300</td>
<td>1,950</td>
<td>510</td>
</tr>
</tbody>
</table>

Opportunities for expanding the mahangu market cannot be viewed in isolation as maize can be a substitute. Not only is maize a substitute, it is preferred by some and it is widely grown in southern African. Mahangu requires a two stage milling procedure and must be size graded prior, whereas maize is milled in one process at less cost. Mahangu producers are not yet fully integrated into the cash economy and prefer security in the form of stored grain to bank savings, in spite of grain losses to insects and rot. Nonetheless, mahangu presents an opportunity for a margin of N$ 21.6 million.

Maize offers opportunities for generating cash, but it can only be produced in limited areas, or with irrigation. It owes its viability to the NAB controlled price maintained artificially at a
cost to the Government. Without this support, there would be a trend towards more mahangu production trading.

Wheat shows a small gross margin but this represents a poor return on capital. There is no comparative advantage in wheat production in the NCA.

Rice will only have commercial potential if a number of trials are undertaken to determine the best growing practices. Even then, it is unlikely to be viable. Research efforts on rice would detract support of more promising crops.

4.6 Recommendations

Increased trade in mahangu would have several benefits:

- it would induce a commercial culture to production. This would lead to increased and more sustainable yields, without long fallow periods, through enhanced use of fertilisers,
- it would promote national self-sufficiency by substitution of imported maize,
- it would improve food security by inducing higher production levels,
- it would attract grain stocks into safe storage thereby minimising losses, and
- it would stimulate other sectors of the rural economy by increasing the cash in circulation.

To improve cash earning capability from mahangu, it is recommended that:

- trading activities be reinforced by NAB taking an active trading role, alongside commercial traders.
- the processing and marketing through supermarkets should be encouraged
- its use in food processing should be encouraged;
- credit should be provided to help cover production costs;
- provision of credit be closely linked with extension;
- inputs including high yielding seed varieties, fertilisers and appropriate cultivation equipment and animals be made readily available on credit; and
- commercial storage of mahangu be promoted at village level so villagers can sell into and buy back from a local store thereby minimising storage losses and providing a mechanism for absorbing surplus production.

It is appreciated that many of the measures are already part of the RDSP work plan.

Namibia does not have comparative advantages in maize production. Recommendations for promoting it as a cash crop are determined solely on the basis of the fixed selling price. While this is set at a level that brings financial benefits to producers, it would not be beneficial to the national economy.

Wheat production should not be targeted for promotion. A small amount could be produced as a part of a rotation using irrigation equipment installed for alternative purposes such as cotton, tobacco, vegetables and green maize.
The NCA would appear to be marginal for rice production. It should be borne in mind that the scale of revenue for potential rice production is only 2% of mahangu. Any efforts applied to determining the potential for rice could detract from improving mahangu output.
CHAPTER FIVE

HORTICULTURE
CHAPTER FIVE

HORTICULTURE

5.1 Background

The term horticulture is used to describe a wide range of fruits, vegetables and floricultural crops. However, in this document it will refer only to fruit and vegetables. Floriculture is currently of little importance and this is not likely to change in the foreseeable future. A considerable effort has been made to establish a horticulture industry in the NCA.

In the context of the NCA, floricultural production can be regarded as only of minor importance. In the late 1980s, EHAFO attempted to establish a floricultural farm in the Kavango region. Despite considerable financial aid, this project was not successful. The small size of the Namibian market and the unfavourable climate both contributed to its problems. It has been suggested that efforts should be made to establish an export orientated floricultural industry in the NCA. Comparisons have been made with Kenya and Zimbabwe, who in 1993, exported cutflowers worth US$ 124 and 56 million respectively. It must be stressed that the climate in both these two countries is much better than for temperate cutflower production. In addition, the climate in Kenya is much more uniform which gives the potential for all the year round. The main production areas in these two countries are much nearer to the main international airports, which makes transport cheaper and easier. It must be stressed that Namibia has little chance of establishing a significant floricultural industry in the NCA.

Namibia has been successful at producing fruit and vegetables. Between the first and second world wars, before the road and rail connections to South Africa were established, Namibia was self sufficient in horticultural products. As the infra-structure improved, Namibian production became increasingly under threat from the more competitive South African exports. Today, most of the fruit and vegetables traded in Namibia originate from South Africa. South Africa has a much better climate for the production of most horticultural crops and an efficient marketing and distribution system. It is also relatively cheap to hire a refrigerated truck for a “backload”; a large number of trucks carry meat from Namibia to South Africa and would have to return empty unless they carried horticultural produce. These good communications between ensure that cheap fruit and vegetables are available most of the year round to Namibian consumer. This makes it difficult for the Namibian farmers to compete.

A number of Governmental and NGO funded fruit and vegetable schemes, or gardens, have been established in the NCA with the objective of replacing some of the South African imports as well as trying to train Namibians in horticultural production. The cost of establishing the irrigation systems are often “written off” and the growers are often given free seeds and fertiliser as well as a vehicle to “help with marketing”. In most cases, the growers/trainees do not put in any equity. In other words, these horticultural producers are very heavily subsidised. From a production point of view, virtually all of these gardens have been an unmitigated disaster. Yields have been very low, pest and disease control has been virtually non-existence and there has been little attempt to grow crops in the season for which
they are best adapted. The understanding of the management of water is very poor. Most of the gardens visited do not have sensible marketing strategies. It should be stressed that not all the horticultural projects were visited, so there may be some which are more successful.

A recent paper by van Uytvanck (entitled “Feasibility of a vegetable project in Northern Namibia”) studied the viability of a 1.5 ha vegetable garden in Omusati region. He calculated that the project needed annual sales of at least N$ 92,000 to break even. Given the standard of management and technical capabilities, he estimated that the maximum income it was likely to generate was about N$ 10,000. In other words despite considerable assistance, this particular garden was going to lose money and the participants could only keep producing if they received continued subsidisation.

One aspect of the attempts by subsidised gardens to produce fruit and vegetables has been to distort the market and to disadvantage the true entrepreneur from getting involved with horticultural production. In most African countries, and indeed in most countries around the world, horticultural production is regarded as being technically very difficult and the producers tend to be entrepreneurs who are prepared to take risks and sometimes make very good profits. The large number of subsidised gardens make it much more difficult for the true entrepreneur to make money, and therefore much more unlikely to enter the industry. The marketing help given to these gardens has discouraged the establishment of traders who buy from the growers and transport to the urban conurbations. These traders have in many other countries been very important in the establishment of a horticultural industry.

Some commercial farms south of the Veterinary line have started to expand horticultural production. A number of growers in the Grootfontein Tsumeb Otavi triangle have invested in citrus orchards and vegetable production on a larger scale than any of the gardens in the NCA. Some of these farmers have started to grow and market excellent quality onions and other vegetables. In addition to the Grootfontein triangle, there are other areas of significant commercial vegetable production: including Omaruru, Okahandja, Windhoek, Mariental, Stampriet and along the Orange River. These areas have been more successful at horticultural production than the NCA. There are a number of reasons for this, including

- better technical ability and management skills to grow the produce resulting in higher yields and better quality
- growers have better marketing expertise; the horticultural crops are grown for a specific target market. The production areas are often close to the target market
- most of the growers produce on a large enough scale to achieve sufficient critical mass to be a force on their chosen market, and
- the climate is better for horticultural production
- a good supply of water for irrigation

Probably the most important advantage the production areas outside the NCA have is a better climate and/or soils. For example, the Grootfontein triangle is about 200 to 300 metres higher than much of the NCA, and is therefore cooler. This triangle is much less frost susceptible. In the Stampriet and Mariental regions they produce sweet melons which grow well in their hot and dry climates. The climate along the Orange River is suited for producing “out of season” fruit and vegetables for the South African market.
It must be appreciated that the climate and soils in Namibia are not very good for horticultural production. Also, even within Namibia, there are areas which have significant advantages over the NCA for horticultural production.

The major vegetables consumed in Namibia are potatoes, onions, cabbage and tomatoes. The main fruits are apples and oranges. Consumption of other fruit and vegetables are small compared with these items. The demand for leafy vegetables crops such as kale, spinach, amaranthus, and other crops which would grow well in the summer such as courgettes, okra, aubergines is reportedly very low.

5.2 Agronomic issues

Horticultural crops are much more technically demanding to grow and require a much greater investment in time and money than staple cereal production. Given the climate in the NCA, a reliable source of water for irrigation is essential for fruit and vegetable production - rainfed horticulture will not be viable.

It must be recognised that the climate and soils in the NCA are a major impediment to the establishment of a horticultural industry in North Namibia. The summer is too hot to grow temperate crops successfully, eg potatoes, cabbage, onions. The risk of frosts in the winter make the production of cold sensitive crops such as potatoes, bananas very risky. The climate is much too warm for deciduous crops such as apples. It is possible to grow good crops of certain fruits and vegetables at certain times of the year, providing there is good management and source of water for irrigation. For example, cabbages, spinach and tomatoes grow well in the winter, while in the summer, good crops of okra and aubergines can be produced. Temperate crops which are frost sensitive only have a very small window of opportunity. For example, potatoes can be planted after the risk of frost has finished. However, if planting is delayed by one month, yields are depressed and the quality is seriously impaired. This happened with the Etunda irrigation scheme in 1995. It must be stressed again that the climate and soils in the NCA are not very suitable for a wide range of horticultural production. However, there could be opportunities for establishing certain crops.

Besides the poor yields which are currently achieved, the quality of fruit and vegetable grown in the NCA is very poor. In fact the concept of quality, in terms of shelf life and presentation is very badly understood, the produce is often transported in inappropriate containers, left out in the hot sun and is very rarely graded. In short, there needs to be considerable improvement in all the technical aspects of production and post-harvest handling of fruit and vegetables in most of the gardens in the NCA. Without such improvements, the chances of establishing an effective and sustainable horticultural industry in the NCA are virtually non-existent.

The high sand content of the soils and its subsequent low water holding capacity mean that an effective and well controlled irrigation system is required if good yields are to be attained. The low soil fertility means that high fertiliser rates as well as applications of trace elements are needed to get good yields. Great care needs to be taken to prevent the leaching of the applied fertiliser and trace elements.
A number of observers have suggested that the NCA is a good place for horticultural production because there are low levels of pests and diseases. This observation is not true, most of the horticultural crops seen had high levels of pests and diseases. The intense rotation of crops in most of the gardens was leading to high levels of root knot nematodes, which will need to be controlled in the future if the farmers want to obtain economic yields. The current understanding of pest and disease by the both farmers and consultants engaged to advise on horticultural production is poor. In addition, considerable concern must be expressed to whether there is a proper understanding of the concept of the “pre-harvest interval” between chemical application and harvesting of the crop. If this pre-harvest interval is not observed, consumers could well be eating vegetables with unacceptably high levels of agro-chemicals. Additionally, the improper adherence to pre-harvest intervals could eliminate the possibility of marketing of fruit and vegetables in Europe.

The yields of many of the crops seen in the NGO gardens were abysmally low. For example, most of the projects visited regard tomato yields of 6 tonne/ha acceptable. One commercial organisation achieved yields of processing tomatoes in a commercial trial of about 60 tonne/ha in North West Namibia, which they did not believe would make tomato production viable. In South Africa, yields of over 100 tonne/ha are achieved commercially.

There are a number of reasons that could be contributing to the low yields. Firstly, farmers are often growing the wrong crop at the wrong time of the year. The general agronomic practices and management of the crops are very poor, for example the appreciation of pest and disease control needs to be vastly improved. In addition, most growers are probably using inappropriate varieties, i.e., ones that have been selected for South African production, whereas they would probably be better using cultivars selected in hotter countries. It must be stressed again that horticultural production is more difficult than staple food production in all countries. Namibia is no exception. In most countries, it is normally the most advanced farmers who produce fruit and vegetables. Also, in most countries only a small proportion of farmers commercially produce horticultural crops, the markets are simply not big enough for all the farmers to participate. Therefore, if the farmers in the NCA are to become involved in sustainable horticultural production, they will need much more appropriate and more carefully targeted assistance. This assistance should be aimed at the most advanced farmers.

5.3 Main competitors and comparative advantage

a) Local market. The local, village level market is currently very small. Much of the small demand at is probably satisfied by “home production”. It is difficult to identify exactly what the issues are with supplying this market. The small size of the market could either be associated with the lack of supply or the shortage of purchasing capacity to buy fruit and vegetables. One of the main supposed problems of servicing this market is associated with transporting the produce to the rural villages. However, one settler on the Etunda scheme identified an opportunity to supply vegetables to some of the surrounding villages. To facilitate this, he purchased a pick-up and distributed his produce. He claimed that there was sufficient demand, and profit, to enable him to service the loan on the vehicle. Alternatively, if crops are grown locally, then they can be transported by ox cart or by foot. However, local production can only take place if there is a source of water for irrigation.
The main competitor to the NCA growers for supplying the rural village market probably comes from home production. Currently, home production making use of waste water is not-very widespread in the NCA. However, there is a possibility that this may become an increasingly important source of horticultural production. In fact the RDSP should assess the sustainability of promoting this sector. The other likely source of competition comes from imported fruit and vegetables, from either South Africa or other parts of Namibia which would be traded first in one of the main population centres in the NCA and then transported in smaller vehicles to the rural villages. This imported production is often sold through cuca shops.

The main competitive advantage for production by the NCA farmers arises from their close proximity to the market. Given that the NCA rural market is characterised by being a series of small markets, it would ideally be best serviced by a series of small growers near to the villages. In most of Namibia's neighbouring countries, this segment of market would be serviced by small farmers who have access to water, either on the side of a river or dam or on a receding flood plane. Farmers in the NCA which have access to water for irrigation are therefore in the best position to supply this market.

b) NCA urban market. Most of the fruit and vegetables traded in the NCA urban markets are imported from South Africa. The biggest market outlets are centred on Oshakati where there are four main importers of produce, who between them dominate the wholesale trade. Between them, it is estimated that they sell about 350 tonnes of fruit and vegetables per week. About a third is sold to institutions such as schools or Government establishments. About half the tonnage sold is potatoes. Apples, onions and cabbages are also significant products. These major importers sell to supermarkets, cuca shops and traders from small retail markets. The main functions of the retail traders is to break the consignments into smaller lot sizes or to effectively move the produce nearer to areas where most of the people live, ie nearer the outskirts of the towns.

Throughout Namibia, the traditional outdoor markets are, in terms of produce traded very small. Most of the NCA consumers purchase their horticultural requirements from supermarkets or shops. Traditionally in Africa, the informal nature of the traditional outdoor wholesale and retail markets are of great help to the small farmers where continuity of supply and quality (especially in terms of shelf life) are less important than to the supermarket or shop owners. The small size of these traditional outdoor markets in Namibia obviously reduce the potential for horticultural development by the small NCA growers. An example is in the Caprivi where one grower of spinach is able to supply all the requirements of the outdoor market in Katima Mulilo, about 300 kg/week, from her small garden.

Three of the four importers based in Oshakati do buy Namibian grown fruit and vegetables. They are prepared to prepared to pay Namibian producers import parity price (ie the South African market price plus transport costs), if the quality is as good as the South African. It is estimated that perhaps about 10% of the wholesale market is supplied with Namibian grown produce, most of which comes from the
Grootfontein triangle. Very little of the NCA urban market is supplied by NCA growers.

In the Kavango region, most of the horticultural produce is sold through supermarkets. It is estimated that the main supermarkets in Rundu sell about 30 to 40 tonne of fruit and vegetables per week. Most of these supermarkets obtain their horticultural requirements from Grootfontein based wholesalers. Although the biggest supermarkets do buy locally grown produce, but there is very little on offer. Most of the Grootfontein wholesalers do buy from Namibian growers, at import parity, if they supply produce of the same quality as imported produce. However, given the distance between the NCA and Grootfontein, it will be difficult for the NCA growers to supply this market.

In the Caprivi region, the main supermarkets, shops and outdoor markets in Katima Mulilo sell about 30 tonnes of horticultural produce per week. Most of it originates from South Africa. The supermarkets either buy through wholesalers based in Grootfontein or import directly. One of the main supermarkets will directly buy locally grown produce, but very little is available.

Throughout the NCA, the retail markets only sell a small quantity of fruit and vegetables; supermarkets and shops are much more important. For example, in Katima Mulilo it was estimated that on average only about 1 tonne of fruit and vegetables were sold per day. This compares with about 5 to 6 tonne per day in the supermarkets.

Until most of the gardens in the NCA significantly improve their yields and quality, they will find it virtually impossible to compete against produce imported from South Africa. In addition, the NCA growers are also at a disadvantage when compared with the farmers in the Grootfontein triangle. These growers have the advantage of a cooler and more equitable climate (the altitude is about 200 to 300 metres higher than much of the NCA), better soils, large well established farmers were sensible crop rotations can be implemented and an already installed irrigation system. Participants in the marketing of horticultural produce were asked to state their marketing commissions. It is appreciated that these traders may not always have given the correct information. However, wholesalers claim that work on a margin of between 10 and 20%. Supermarkets between 17.5 and 30%; some supermarkets claim that when they buy locally grown production they make a smaller margin. The highest marketing commissions were in the wholesale markets where margins were in the order of 100%. The high mark-ups in the outdoor wholesale and retail markets may be one of the reasons why they are less important for the marketing of fruit and vegetables than supermarkets. The consumers appreciate that they are getting better value for money at the supermarkets.

c) Namibian market. Given that the NCA can not compete in their own local market, they will find it very difficult to compete market outside their region. The extra transport costs would put them even more at a competitive disadvantage compared with South African production.
The only realistic chance for the NCA growers to market their horticultural production in Namibia is if seasonality of production confers a competitive advantage. One opportunity that may exist is mangoes, which reputedly mature earlier in Northern than in Southern Namibia. The other opportunity could occur if the NGO or Government subsidised gardens vastly improve their yields and quality, the subsidisation would enable them to be competitive. This, of course, would not be economically sustainable in the medium to longer term without further, continual, subsidisation.

d) South African market. The only commercial opportunity for the NCA growers to market horticultural produce in South Africa is if seasonality confers a competitive advantage, for example possibly the mango crop.

e) Other African markets. There appears to be very little opportunity for sustainable horticultural exports into other African markets. In fact the NCA is probably a net importer of horticultural production, it is reputed that there is a significant informal trade of fruit and vegetables from Angola and, to a lesser degree, Zimbabwe.

f) European export markets. The NCA has no significant opportunity to export fruit and vegetables profitably to Europe in the short to medium term. Perhaps in the longer term, it may be possible to develop exports of crops which have seasonality competitive advantage.

g) Summary. In summary, the central focus of the marketing of fruit and vegetables in Namibia are the importer/wholesalers. This is because, in recent times it has been cheaper and easy to import from South Africa. However, it must be appreciated that good quality local production can enter the marketing chain at a number of stages - there is no attempt to exclude Namibian production from the market. Locally produced vegetables were seen in a number of wholesalers’ warehouses, supermarkets retail markets and cuca shops. Fig 5.1 summarises the marketing of horticultural produce in Namibia.

The yields and quality of fruit and vegetables grown in the NCA is extremely poor. In addition, the quality is very poor, which is the main reason why very little enters the formal marketing chain. There are a number of reasons for the low levels of production. It is essential that some of them are addressed.

5.4 Market size and scale of opportunity

The only two markets which growers of horticultural produce in the NCA can sensibly focus is the local village market and a very small portion of the urban NCA market.

It is difficult to estimate the size of the local village market because it is very dependant on the purchasing power of the village communities, their priorities for using the money and their own production. If the RDSP decides to focus more on encouraging home production, then the opportunity for the commercial production will decline.
It is estimated that the average weekly sales of horticultural produce in the NCA by wholesalers is between 400 and 450 tonnes per week. Until proven otherwise, potato production will remain very marginal in the NCA, apple production will be impossible and production of many of the other fruits and vegetables will only be possible at certain times of the year. Therefore, in the medium term, it is sensible estimate that the NCA will only be able to grow 20 to 25% of its horticultural production, ie 100 tonnes per week. Given an average selling price of N$ 1.50/kg, this market opportunity is worth about N$ 7.5 million per year. However, to realise this potential there will need to a considerable investment in irrigation and technological research. It also must be realised that the other areas of Namibia have competitive advantage and even this opportunity may not be realised by the NCA farmers.

If the medium term target of N$ 7.5 million for the NCA urban market is achieved, this would represent about 5,000 tonnes of vegetables, or perhaps about 200 ha of fruit and vegetable production. This is only a small area compared to the total area of land available in the NCA. However, it does reflect the small size of the NCA urban market.

It has occasionally been suggested that the processing of horticultural produce could be a potential opportunity. The competitive advantages of processing are conferred by a number of factors, such as a cheap raw material, cheap processing costs (often associated with economies of scale) and proximity to a major market. If the NCA does not have competitive in terms of production costs, it will not be a source of cheap raw material. It will find it extremely difficult to process the volumes required to get the economies of scale necessary to compete with imported production. The commercial processing of horticultural crops will never become more than a simple cottage industry in the NCA in the short or medium term.
5.5 Gross margins and revenues

Accurate data on gross margins are extremely difficult to obtain. Given the low yields and poor quality of the production, there is a very large difference between the gross margins attained and their potential. Table 5.1 highlights the gross margins for tomatoes, potatoes, green maize, onions and cabbages. The data used for these calculations are based on the information supplied by NDC. As with all the horticultural gross margins produced for a region, they need to be treated with considerable caution. The yield assumptions made are those which should be attained, although they are not currently achieved by many producers in the NCA. It is assumed that these crops are sold in the NCA urban market, except for the green maize crop which would be sold at the farm gate.

Table 5.1 Projected gross margins for vegetable production in the NCA (N$/kg)

<table>
<thead>
<tr>
<th>Input</th>
<th>Tomato</th>
<th>Potato</th>
<th>Green maize</th>
<th>Onions</th>
<th>Cabbage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanisation</td>
<td>650</td>
<td>1,000</td>
<td>400</td>
<td>650</td>
<td>450</td>
</tr>
<tr>
<td>Irrigation</td>
<td>1,500</td>
<td>1,250</td>
<td>1,250</td>
<td>1,750</td>
<td>1,250</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>3,000</td>
<td>3,000</td>
<td>500</td>
<td>3,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>1,600</td>
<td>400</td>
<td></td>
<td>750</td>
<td>300</td>
</tr>
<tr>
<td>Seed</td>
<td>1,200</td>
<td>4,000</td>
<td>110</td>
<td>1,000</td>
<td>100</td>
</tr>
<tr>
<td>Packaging</td>
<td>2,400</td>
<td>1,600</td>
<td></td>
<td>1,200</td>
<td>500</td>
</tr>
<tr>
<td>Labour</td>
<td>2,300</td>
<td>2,000</td>
<td>1,250</td>
<td>2,100</td>
<td>1,750</td>
</tr>
<tr>
<td>Transport</td>
<td>600</td>
<td>450</td>
<td></td>
<td>360</td>
<td>900</td>
</tr>
<tr>
<td>TOTAL COSTS</td>
<td>13,250</td>
<td>13,700</td>
<td>3,510</td>
<td>10,810</td>
<td>7,250</td>
</tr>
<tr>
<td>Yield</td>
<td>20,000</td>
<td>15,000</td>
<td>14,000</td>
<td>12,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Selling price</td>
<td>1.5</td>
<td>1.0</td>
<td>0.45</td>
<td>0.75</td>
<td>1.0</td>
</tr>
<tr>
<td>REVENUE</td>
<td>30,000</td>
<td>15,000</td>
<td>6,300</td>
<td>9,000</td>
<td>30,000</td>
</tr>
<tr>
<td>MARGIN</td>
<td>26,750</td>
<td>1,300</td>
<td>2,790</td>
<td>(1,810)</td>
<td>22,750</td>
</tr>
</tbody>
</table>

The gross margin for onions are negative. A yield of 12 tonne/ha has been assumed in the projections; with good management they should easily be exceeded; if this happens, the margins would become positive. In fact, given better agronomic management, onions should become a very profitable crop.

If yields of 20 tonne/ha of tomatoes are achieved, then a good margin of about N$ 27,000 could be achieved. However, yields of only 6 tonne/ha are commonplace in many of the NCA gardens; this would give a negative margin of about N$ 4,000. The potential margins associated with cabbage are again very impressive. However, the yields and quality achieved by most of the NCA growers will not achieve these margins; in fact most of the cabbage crops seen would probably produce negative margins.

The gross margins in Table 5.1 demonstrate that well grown crops of horticultural crops can produce attractive gross margins. However, it must be stressed that these margins are not being achieved by most of the growers because they are achieving the yields well below those
assumed in the projections. Under good management, these yields should, and margins should be achievable. These demonstrate that there is potential for growers to make some money by growing horticultural crops.

The gross margins in Table 5.1 suggest that given good management it should be possible to make a profit growing some horticultural crops. It must be re-emphasised that there are other areas in Namibia where it will be possible to obtain better gross margins.

In section 5.5, it was estimated that the medium to long term potential for horticultural production in the NCA is about N$ 7.5 million per year. About half this potential revenue would be accounted for the costs of production, which would mean that if the full horticultural potential was achieved, this would generate about N$ 3.75 million. This would have to cover overheads and capital replacement costs. However, it must be stressed that to achieve this, there will need to be considerable improvement in the yields and quality.

5.6 Observations on the opportunities for specific fruit and vegetables

This first part chapter has put into perspective the general potential for the horticulture in the NCA. However, it is worth discussing the commercial opportunities for specific fruits and vegetables. It is not possible to cover all possible options, the discussion focus mainly on crops which were raised in meetings and ones with cash earning potential.

Potatoes - This is the most popular vegetable consumed in the NCA, therefore there is a good market potential. However, for much of the year the climate is too hot for good yields; the biochemical pathways of potatoes are not adapted to the high summer temperatures. The combination of high temperatures at harvest and sandy soils also cause considerable post-harvest losses. Potatoes are frost susceptible, therefore they should not be planted when there is a risk of sub-zero temperatures. This effectively leaves one production window, ie a spring planting after the risk of frost has finished. Potatoes also require a considerable investment in seed, are technically difficult to grow and, even if planted at the correct time the gross margins are very low (Table 5.1). The difficulties with this crop encountered at the Etunda irrigation scheme, and many other gardens, demonstrate the considerable risks associated with growing this crop. Research work is being undertaken to try to reduce the cost of seed by using “true potato seed”, but even the growing costs are reduced, there will still be considerable limitations imposed by the climate.

Onions - The crops of onions grown in the NCA are, generally, very poor. The gross margins indicate that they are grown at a loss. However, it should be possible to produce higher yields than are currently being attained; they are more suited to the NCA climate than potatoes. It would appear that the plant populations in most of the gardens were much too low - mechanised planting would help improve plant spacing. It must be appreciated that onions are a difficult crop to grow and perhaps more heat tolerant varieties should be used. A variety trial using seed selected for the warmer parts of the USA should be established. If good yields (ie 40 tonne/ha and more) and good quality are achieved, this should become a profitable crop. If handled properly, it should be also possible to store the crop for a few months and give a fairly continuous marketing season. Onions are being successfully grown in the Grootfontein triangle.
Cabbage - This is a simple crop to grow, providing the right varieties are used and a correct spraying regime is followed. Unfortunately, incorrect varieties and spraying programmes are being followed, making the profitability of the crop very variable. This crop should be grown in the cool season, temperatures in the hot season are too warm for the current varieties. If this crop is to be developed a series of variety trials are required to establish the best varieties for each season; it is especially important to get more heat tolerant varieties to try to lengthen the effective production season.

Tomatoes - It should be possible to attain good yields through most of the year, except if a frost kills the flowers then about two weeks production would be lost. Using the correct inputs and with good management, it should be possible to compete with imported South African produce. However, there needs to be considerable improvement in the technical and agronomic management. If good yields are attained, it is potentially profitable (Table 5.1).

Sweet potatoes and cassava - There is considerable potential for these two crops for improving “home food security”. There is less compelling evidence that there is a significant market demand to make them major cash crops, but they could become important for home production. The research and development currently being undertaken should continue; it is suggested that research workers look to countries such as Zambia and Zimbabwe for new planting material.

Carrots - Another temperate crop that is difficult to grow in the hot season. The high temperatures in the summer make germination very difficult, and because the crop is not well adapted, growth is poor. Therefore, summer planting should be avoided. However, it should be possible to get yields in the cool seasons.

Beetroot - It grows well in the dry season, but the temperatures in the summer are much too hot.

Green maize - This crop is well adapted to the climate in the NCA - it is much better suited to the temperatures than crops such as potatoes, which is why it is easier to grow and get good yields. In addition, there is a good market demand. It is a potentially profitable crop, but care must be taken not to over-supply the market.

Chillies and paprika - There are severe market constraints for chillies. The local market is small, the international market is over supplied from countries which have much cheaper labour costs such as Malawi and Uganda. The local market for paprika is small, but there is an interesting opportunity for supplying dried paprika to Spain. As labour costs go up in Spain, the markets are attempting to source from countries with cheaper labour. Already, a South African country is trying to act as a “middleman” between Spain and other African countries. The main disadvantage that Namibia faces is that it would have to carry the cost of irrigating the crop and its labour costs are high compared to some of the other countries trying to break into this market. The high summer temperatures may give too high pungency levels. However, the quality of paprika oleoresin, used in colouring could be good.

Apples and other deciduous fruit - It is too hot in the NCA to grow apples and other deciduous fruit well.
Citrus - There are a number of citrus orchards in the NCA. However, most of them are not well managed and often the names of the varieties have been lost; so very little meaningful information can be gained from these experiments. It will be too hot for good “easy peeling citrus” production, but the climate should be satisfactory for grapefruit and Valencia oranges. Given the economies of scale, technical support the industry gets and the quality standards in RSA, the only way a farmer in the NCA can compete is by growing citrus on a large scale. A number of farmers in the Grootfontein triangle have invested in large citrus orchards; this will make it difficult for NCA farmers to compete in Windhoek. The world market for citrus is large and it is expected to continue expanding. If Namibia wants to compete with countries such as South Africa, there would need to be a major investment in research and development. There does not appear to be a compelling competitive advantage to make such an investment worthwhile.

Mango - There are very few mango trees growing in the NCA. This may be due to the issues relating to land tenure. It is reported that mangos mature at a different time in the NCA than in South Africa, therefore this should confer seasonality competitive advantage. This opportunity should be developed. From a market perspective, the demand in Europe is increasing and countries that have rapid sea freight services and can supply between November to March have the best potential. Namibia fulfils these requirements. In addition, mango plantings should be encouraged at a household level to improve both “home food security” and nutrition. It should be possible to take advice from mango specialists from countries with similar climates to the NCA to identify the most appropriate varieties. It is recommended that a limited number of varieties are released, which will make getting “critical masses” for marketing easier.

Banana - There have been a number of attempts to grow bananas in the NCA. However, the winters are too cold. Either the frosts kill off the plants or the cold weather inhibits the growth, giving very low yields. They are not suitable for promotion in the NCA.

Papaya - This crop also suffers from the cold winters, thought not as badly as bananas. Because of their frost susceptibility, they should not be considered for commercial production. However, as they do recover from cold winters quickly, they could have a useful role to play in improving nutrition if the crop is promoted for “home production”.

Sweet melons - This crop will grow in the summer, but it does need a sophisticated agrochemical application programme. There is a possibility that the local market could be supplied. However, currently the pest and disease control on this crop in the NCA is appalling. Care will have to be taken to ensure that the fruits do not rot after a rainstorm. Namibia does export about 150 tonnes of sweet melons from the southern part of the country to Europe. However, the higher rainfall in the NCA will make controlling the water supply to the plants much more difficult. Putting the crop under controlled water stress is used to increase sugar levels to the level demanded by the European supermarkets. It must be accepted that there needs to be considerable improvements in agronomic management before the NCA can contemplate exporting melons.

Avocados - This crop is frost-sensitive and therefore not suitable for commercial development in the NCA.
Water melons - It is much easier to grow water melons in the NCA than sweet melons, but there still needs to be improved pest control before even the local market could be supplied profitably.

Grenadillas - These should grow well in tropical and, to a lesser degree sub-tropical climates, therefore they will not be suited to the cold winters. The local market will be small. The NCA has no competitive advantage for exporting out of the country.

Grapes - This is becoming a major export crop, mainly from the south of the country. Namibia has a considerable seasonal competitive advantage because grapes mature about 6 weeks before the South African crop. The NCA crop may be even earlier. However, export grapes are technically very difficult to grow and they benefit from significant economies of scale. Therefore, before small-holders can consider growing them, a commercial farm would have to be established first and become a nuclear estate controlling quality and marketing the produce.

Dates - Two date orchards were reportedly established between the World Wars near Windhoek, but they were eventually destroyed by frost. Dates will survive sub-zero temperatures providing they do not fall below -7°C. Therefore, the most frost susceptible areas in the NCA must be avoided if date orchards are going to be established. Market limitations might also development. The local market is very small, but perhaps could be developed. The world market is massive, about 4 million tonnes. However, most of them are grown and consumed in the Middle East and Asia and are traded for less than US$ 500/tonne. Namibia would not be able to compete with this trade. There is a much smaller trade for desert dates, usually the variety Medjool, and dried dates of the variety Neglet Dour packed in "glove boxes". The main producers of desert dates are the USA and Israel. Therefore, Namibia may have a seasonal competitive advantage for supplying Europe and the USA. This could be worthy of further investigations. A number of organisations have noted that there is potential for supplying these Medjool and Neglet Dour to South Africa. It has been estimated that the size of this market is about 300 ha and already there are 125 ha established in RSA. It is reported that already sufficient date palms have been propagated to plant 350 ha in Namibia. This would suggest that there is little opportunity for the NCA to market desert or glove box dates in South Africa. Given that the climate in the NCA could well be suited and there is a local market that could be developed and some potential in the world market, dates are worth including in a trial programme, but it is a long term opportunity.

Mushrooms - To gain competitive advantage in cultivated mushrooms it is important to have a cheap source of appropriate substrate. The NCA does not have a cheap source of substrate. It has been noted that truffles are found in certain parts of the NCA and are traded in the Rundu market. There may be a small opportunity to develop this trade and perhaps even target an export market. However, the opportunity will be small.

Pecan - This crop requires a consistent cold spell each winter to ensure fruit set. The winters in the NCA are not consistently cold enough.

Cashew - It has been noted that there is a cashew project in western Zambia and perhaps they grow well in the sandy soils of the NCA. The project in Zambia has not been a commercial success. Also, it is a crop that is frost susceptible. A few high yielding grafted
cashew trees were imported from Zambia. However, a frost in 1994 killed all the above ground parts of the 5 year old trees. They grew again, but from the rootstocks. The incidence of severe frosts are too great to make cashew a potential cash crop in the NCA.

Macadamia - This crop grows best in humid environments. The climate in the NCA is too dry for macadamia trees to grow and yield satisfactorily.

Pistachio - Once established, this crop should grow well in the NCA. The demand for high value snack nuts is increasing quickly in Europe and the USA, so there should be good market opportunities. Pistachio are non-perishable, so accumulating sufficient critical mass should not be an issue. There would appear to be interesting commercial opportunities for this nut crop. The potential is long term, but it is worthy of further consideration.

Gerkins - The climate in the NCA is not satisfactory for producing good quality gerkins for pickling. The cool winters would give a large percentage of misshapen fruit and even the rainfall in the summer would give tremendous disease problems. It is a labour intensive crop which requires trellising to get good yields. If labour is expensive and cheap trellising material is not available, then production costs will be high.

Processed fruit and vegetables - The opportunities for processed horticultural products are limited. There have been a number of attempts to produce tomato paste in Namibia which have all failed. Most processing industries rely either on utilising the second quality produce from a crop grown for the fresh market or by growing specialist varieties in a climate well suited to the crop. Neither of these situations are applicable to the NCA. There is insufficient fresh production to yield significant quantities of out-grades, nor is the climate sufficiently good to grow special varieties cheaply to establish a food processing industry.

5.7 Recommendations and strategy for implementation

A number of commentators have suggested that a large portion of Namibia’s demand for horticultural requirement can be supplied by domestic production. Whilst many fruit and vegetables can be grown in Namibia, the climate and soils, especially in the NCA, are not conducive to high yields and good quality. The competitive advantages for most horticultural production, especially temperate crops, are much greater in South Africa. There a few exceptions, some temperate annuals can be grown under irrigation in the winter. Crops such as mangoes, dates and pistachio are probably well suited to the climate and there could be profitable markets outside the NCA. However, with these three crops, and most other horticultural crops, the technical and management skills are severely lacking to take advantage of the opportunities. Also, most of the farm sizes are much too small to get the critical mass required to grow and market them profitably.

It has also been suggested that imports from South Africa should be “controlled” and give priority to Namibian production. Alternatively, a Horticultural Marketing Board could be established along the lines of the other Boards mentioned in section 2.1. The establishment of Boards to improve farmer incomes or restricting imports for perishable horticultural normally results in much higher retail prices and often even greater inefficiency of production. Such courses of action are not recommended.
The potential for cash crop production in the horticultural sector is small. The only significant market for virtually all the fruit and vegetables is the NCA rural market. It is estimated that if the full potential for supplying the NCA rural market is realised this will generate a margin of about N$ 3.75 million for the NCA farmers. This production should be generated from about 200 ha. However, to achieve this limited target, a considerable number of improvements need to be made. These improvements must be focused on the better, and larger growers, who have the management capabilities to implement the improvements. Also, it is important to undertake research and extension on a limited number of horticultural crops, ie the ones with the largest market demand.

There is possibly a longer term potential to supply markets outside of Namibia with mangoes, dates and pistachio. Mangoes and dates have the potential to become interesting additions to home production. However, all three crops are long term export possibilities requiring considerable research and development. Given the long term nature of these opportunities, it is difficult to accurately estimate the potential export earnings. However, if mangoes could be successfully developed a target of 1,000 tonnes exported at US 1.70/kg in the long term would be achievable. The opportunity for fresh dates is smaller, 500 tonnes at US$ 2.00/kg. The opportunity for pistachio is probably even smaller, about 250 tonnes at US$ 7.00/kg. This would give a total revenue of N$ 11 million. A realistic total target from these three crops would be about N$ 5 million in the long term.

If it is decided that Namibia wants to exploit the opportunity for expanding its horticultural production in the NCA, a number of recommendations could be implemented. Therefore, the strategy for improved horticultural production should be targeted at a number of different areas.

a) More appropriate varieties. It is important for variety trials to be conducted on a range cultivars from countries which have a similar temperature regime as Northern Namibia. It is also important to undertake these trials at different times of the year so different varieties can be recommended for each season. These trials should focus on a limited range of fruits and vegetables, ie cabbages, tomatoes, onions and possibly carrots. As horticultural production improves, it may be possible to introduce more appropriate varieties for other crops. It is recommended that the RDSP initiates a series of variety trials to attempt to identify more appropriate varieties. A short term input will probably be required by a vegetable agronomist to ensure that the trials are established and managed correctly.

Mangoes is a crop which could have interesting opportunities for commercial production in the NCA. However, it is important to plant a limited number of varieties which could be accepted on markets outside the NCA, ie stringless cultivars. Ideally, there should have been a series of mango trials established in Namibia which would generate the information for making variety recommendations. This data are not available, therefore it is recommended that the RDSP initiates a short term consultancy to advise on the most appropriate mango varieties for use in the NCA. This consultancy should also focus on providing guidelines for the extension service to pass on to growers. The RDSP should then arrange for trees of the recommended cultivars to be imported and distributed to the rural areas for sale.
b) Better awareness of the improved post-harvest handling. Unless horticultural growers are more aware of the importance of improved post-harvest handling, they will find it extremely difficult to market to the retailer/wholesalers, the most important people in the marketing chain. It is not impossible to enter the marketing chain, providing quality is good and post-harvest handling is correct. Growers in other parts of the country have proved that local horticultural production can be marketed in Namibia. It is recommended that the RDSP organises for a post-harvest handling specialist to conduct a series of demonstrations for farmers, probably at some farms and the out door markets. The specialist would also arrange to give advise on improved packaging and leave a written report to form the basis of future advice given by the extension department.

c) Improved agronomic management. If the NCA is to develop a small but sustainable horticultural sector, then the farm management skills need to be improved. It is important that any efforts made to improve management skills are targeted at the better, and more entrepreneurial, growers. It is recommended that following on from the identification of improved vegetable varieties, short term agronomic inputs are employed to help improve some of the better growers. One of the important areas of agronomic management that needs to be focused on is the correct use of agrochemicals, especially the importance of adhering to the post-harvest intervals.

d) Encourage "home production" of certain fruits and vegetables. A more cost effective way of improving horticultural production would be to promote "home production". In particular it is recommended that the encouragement of home production should focus on the planting of mango trees and possibly date palms and making use of waste water for the production of small areas of vegetables. It is recommended that the mango specialist referred to in section a) above, selects mango varieties that would be suitable for home production. Similarly, the vegetable variety trials must be designed with the objective of identifying cultivars suitable for home production. The encouragement of vegetable production at the household level may, over time, stimulate more interest in horticulture within the NCA.

e) Improve the agronomic management and marketing of the NGO and Governmental assisted gardens. It must be recognised that the management, yields and quality of most of the subsidised gardens is extremely poor. Unless it is improved, a large number of trainee horticulturists will not have benefited from the financial assistance given to these gardens. It is recommended that if the RDSP employs short term fruit and specialist specialists, they should visit some of the gardens and give advise on improved agronomic management.

f) Improved marketing infra-structure. One of the reasons often put forward for the slow development of the horticultural industry in the NCA has been the problems of marketing the produce. This is totally correct, there are other more fundamental reasons which inhibit the development of the fruit and vegetable industry in the NCA. It is possible to market locally grown fruit and vegetables providing the quality is good and they are competitive with imported production. An open market is being established in Rundu, financed by Lux-Development. Given the ineffective service
offered by the other open markets in Namibia, and the competitive prices charged by
the supermarkets, caution must be expressed as to whether the Rundu open market
will significantly benefit local horticultural production. However, given that the
traders will be offered subsidised facilities (including cold stores), it is
recommended that the RDSP monitor and, where possible help this project. It
should be given every chance to be successful, then it could be repeated in other
towns.

g) Export opportunities. There a limited number of crops which have a significant
export opportunity, perhaps only mangoes, dates and pistachio. These should only be
developed for export by large commercially managed farms. To assist with these
potential exports, it is recommended that help is given to private entrepreneurs
who want to develop these crops. This help could be in form of technical and
marketing advice or help in the preparation of feasibility studies.

h) Critical mass. One of the main problems facing the development of the horticultural
industry is the lack of “critical mass”. This is required to achieve economies of scale,
to obtain cheaper transport and to achieve negotiating power in the market place. This
is an issue that besets many countries which have a preponderance of small-farmers.
It becomes much easier for small-scale producers to enter the horticultural industry
once it has been established. Therefore, if a horticultural industry is to be established
in the NCA, it is important that the larger farmers are helped and only assist smaller
growers if they are part of a grouping. The grouping of people to farm gardens has
been very unsuccessful. This is not too surprising given the lack of success of the
gardens. Additionally, it must be noted that co-operative marketing of perishable
produce is very difficult to effectively control.

5.8 Summary

There are a number of constraints to the establishment of a commercial and sustainable
horticultural industry in the NCA. These include poor climate and soils, lack of appropriate
knowledge, a shortage of agronomic skills and experience and significant competition from
South Africa. It is not recommended that the NCA farmers attempt to take on the South
African suppliers head on, but to gradually erode their trade by focusing on a limited number
of crops, and markets, where the NCA may be able to compete. If a horticultural experience
can be gradually developed, the NCA may be able to gradually reduce the South African’s
share of the market. It must be stressed that it would be folly to attempt to compete directly
with the vast experience and economies of scale the South African producers have.

The potential for generating cash from horticultural crops is small in the medium term;
perhaps only about N$ 3.75 million per year after production costs have been deducted.
Given the high capital cost associated with establishing gardens (about N$ 40,000/ha), it must
be appreciated that the development of serious fruit and vegetable production in the NCA
may be marginal. A number of recommendations have been given in the previous section.
The most appropriate strategy should be to promote a limited number of fruit and vegetable
crops on a home-grown basis. It is therefore recommended that priority is given to the
identification and selection of mangoes and the establishment of vegetable variety trials,
especially for home production. In addition, the promotion of growing vegetables using waste household water should be promoted.
CHAPTER SIX

COTTON
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COTTON

6.1 Background

Cotton has been discussed as a possible cash crop in the NCA for a number of years. In fact there have been a number of attempts to commercially develop the crop. One South African based company, Tangaat, has been actively trying to promote cotton production in the Kavango and Caprivi regions. These two regions are preferred because of their higher and more reliable rainfall. Another South African company is coming to Namibia in early 1996, to assess the potential for cotton production.

The reason for the interest of South African ginning companies in Namibian cotton is that its quality is exceptionally good. The high number of sunshine hours in the growing season helps produce long staple cotton. The staple length is much longer than that produced in South Africa, and indeed longer than most of the cotton produced in the rest of the world. This long staple length helps confer a major competitive advantage for cotton production in the NCA. The quality associated with the long staple length is improved by being picked by hand; machine harvesting results in poorer quality and lower prices.

There have been a number of attempts to develop cotton in the NCA. Tangaat have been trying to establish themselves since 1991. They have made some progress, but identified lack of finance for crop inputs as the major constraint. To really establish themselves and to seriously invest in agronomic advice for the growers, they believe that they need to procure at least 2,000 tonnes annually. Currently, cotton exports were about 320 tonnes in 1994/95, down from 390 tonnes in 1992/93. More recently, a project to construct a ginnery at Rundu was proposed. Many reasons for this scheme failing to get established have been suggested, but basically it did not attempt to balance the production with the demands of the ginnery. However, these problems in the past have much to do with poor planning and should not cloud the potential for this crop.

There are a number of advantages of promoting cotton production. It is an excellent smallholder crop. In fact, the cotton industry in Zambia and Swaziland is based on the small-farmer sector. When there is sufficient cotton production, a ginnery can be established and value can be added within the NCA. Eventually, it may be possible to add further value by developing a textile industry.

6.2 Agronomic issues

Cotton can be produced both as a small-holder crop and commercial crop. If it is grown as a commercial crop in the NCA, it would need to be irrigated; it responds exceptionally well to irrigation. It would only be recommended as a non-irrigated crop in the areas with higher rainfall, ie the Caprivi and Kavango regions. Rainfed cotton should be planted at the onset of the rains and would be harvested after the rains have finished. Irrigated cotton should be planted in mid-November.
Cotton is a more difficult crop to grow than mahangu and most other rainfed cereals. It is susceptible to insect attack and needs regular applications of pesticides. It is also fairly labour intensive; its peak labour requirement is during harvest which is April and May. However, the peak labour requirement for cotton is different to the mahangu and maize, so cotton should compliment the staple crop production within a small-grower’s farming system.

The South African companies interested in purchasing cotton from Namibia have, in the past supplied seed of their preferred varieties. There have been very limited agronomic trials undertaken to assess the potential of these varieties. One non-replicated trial performed by the Rassing Foundation in the Kavango region demonstrated that varieties used in Zambia considerably outyielded the varieties supplied South African ginneries. It is noted that the Research Department in the Ministry of Agriculture is undertaking some cotton variety research. It is important that this agronomic research work continues, and is expanded to include a wider range of varieties. It should of course be conducted with an organisation that has the capabilities of correctly assessing lint quality.

Given the climate in NCA, it is estimated that non-irrigated small holder production would give average yields of about 1 tonne/ha. A commercially grown irrigated crop should yield about 4 tonne/ha.

6.3 Main competitors and comparative advantage

The world market for cotton is massive; in 1994/95 about 17 million tonnes was produced on about 30 million ha. Therefore, Namibian production will not have a serious impact on the world market. The two biggest producers in the world are China and the USA who produce about 5.0 and 3.4 million tonnes respectively. There are a number of other countries in Africa which produce cotton successfully, including Zimbabwe, Zambia, Swaziland (which produced 3,000 tonnes in 1994/95) and South Africa (21,800 tonnes in 1994/95). In North Africa, Egypt, Sudan and Ethiopia and major suppliers.

The competitive advantage for the NCA lies in the inherent excellence of the cotton grown. Also, compared with land locked countries such as Zambia, Zimbabwe and Swaziland, Namibia has a transport cost advantage. In addition compared to some of the other African producers, the superior infra-structure in Namibia will help confer competitive advantages. Also, as the Namibian crop is hand harvested, it does not suffer reductions in quality associated with machine harvesting.

6.4 Market size, prices and trends

The world consumption of cotton is about 17 million tonnes. In the early 1990s, total production exceeded consumption. However, since 1993 usage has exceeded production. This has lead to an improvement in world prices, which is expected to continue. Even if the world prices do not increase, they are not expected to fall. In fact the International Cotton Advisory Committee believes that the world cotton industry may be entering a five to ten year period of higher than average prices.
Within the region, production in South Africa is declining; which may in part explain the interest by their ginneries in Namibian and other African countries production. The decline in South Africa is associated with rising production costs, a preference for farmers to use irrigation for other crops and lack of promotion by the Government.

Given the quality of cotton in Namibia, there will always be a strong demand for it; also it will not be as susceptible to fluctuations in world market prices. The price of cotton in Namibia is simply determined by what South African based ginneries will pay for it. The indications are that they will pay a price of about N$ 2.10 to 2.20/kg delivered to a depot at Grootfontein for the 1996 harvest.

If cotton was ginned in Namibia, it would significantly increase its value. Namibian cotton lint would be worth about N$ 7.30 to 7.40/kg after ginning. A by-product of the cotton ginning is the cotton seed, from which cooking oil can be extracted, which should be worth about N$ 800 to 850/tonne. One tonne of unprocessed cotton should give about 350 kg of lint and 620 kg of seed. Therefore after ginning, one tonne of harvested cotton would be worth over N$ 3,000.

6.5 Scale of opportunity

There are realistically no market constraints to the potential size of the Namibian cotton industry. The scale of opportunity will be determined by production factors, ie the area of land farmers would commit to cotton, or the availability of labour for harvesting.

From a processing point of view, there are two significant targets of production. The first is if the total production in Namibia reaches about 2,000 tonnes, then the ginning company buying the cotton should place an agronomist in the NCA and start to develop an extension service. The next critical mass is when production is sufficiently high to justify the construction of a ginnery. It is possible to build a ginnery that requires 4,000 tonnes, but it is unlikely that this would be economic. The normal minimum critical mass required for a profitable ginnery is about 8,000 tonnes. Using second hand equipment, it would cost about N$ 6.0 million to construct a ginnery.

There are two main issues that have to be addressed before the scale of opportunity can be estimated. The first is how much land will farmers take out of staple food production to grow cotton and the other is the availability of labour for harvesting. If a ginnery is eventually going to be established in the NCA, 8,000 tonnes will have to be grown. If it is all grown by small-scale producers, this would require about 8,000 ha, which would be a significant portion of the available arable land in the Kavango and Caprivi regions. However, if commercial organisations with irrigation were attracted to this crop then a smaller area of rainfed production would be required. If 1,000 ha of irrigated cotton was grown, then only 4,000 ha of rainfed cotton would be required to justify the establishment of a ginnery. The key to the successful establishment of a cotton ginnery is therefore a commitment by commercial organisations to plant irrigated cotton.

The other issue that needs to be discussed is the availability of labour for harvesting. Two of the NDC farms in the Kavango have recently grown cotton with differing experiences of recruiting sufficient labour for harvesting. They both grew about 50 ha, one was able to
recruit sufficient labour, the other was not. It is therefore appreciated that it may take a year or two to entice sufficient people to become interested in harvesting cotton before commercial organisations can become significant producers. The peak labour requirement for cotton (i.e. harvesting) is different for staple food production (i.e. weeding) in the NCA. An alternative to hand picking is to purchase mechanical harvesters, but this would reduce the quality, the value of the cotton and the returns to the farmers in the NCA.

6.6 Gross margins and revenues

Projected gross margins for rainfed and irrigated cotton production are shown in Table 6.1. These show that both methods have an acceptable margin. The potential margin for irrigated cotton of almost N$ 5,000/ha is particularly encouraging because the application of irrigation will remove much of the risk involved with the yields. The margin of N$ 1,100 for rainfed production does have a bit more risk; the assumed yield is 1 tonne/ha, but in a poor rainy season it could be lower. However, the yield will be higher in a good rainy season. If rainfed cotton is grown by a small-grower who uses only family labour, then the cash gross margin for the farmer will be almost N$ 1,500/ha. This is a better return than the farmer would achieve growing mahangu or other staple cereals.

Table 6.1 Projected gross margins for cotton production in the NCA (N$/kg)

<table>
<thead>
<tr>
<th>Input</th>
<th>Rainfed</th>
<th>Irrigated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanisation/land prep</td>
<td>120</td>
<td>288</td>
</tr>
<tr>
<td>Irrigation</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>Fertiliser</td>
<td>200</td>
<td>933</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>200</td>
<td>368</td>
</tr>
<tr>
<td>Seed</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Packaging</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Labour</td>
<td>341</td>
<td>941</td>
</tr>
<tr>
<td>Transport</td>
<td>60</td>
<td>240</td>
</tr>
<tr>
<td><strong>TOTAL COSTS</strong></td>
<td>1,026</td>
<td>3,827</td>
</tr>
<tr>
<td>Yield (kg/ha)</td>
<td>1,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Selling price</td>
<td>2.15</td>
<td>2.15</td>
</tr>
<tr>
<td><strong>REVENUE</strong></td>
<td>2,150</td>
<td>8,600</td>
</tr>
<tr>
<td><strong>MARGIN</strong></td>
<td>1,124</td>
<td>4,773</td>
</tr>
</tbody>
</table>

If the NCA producers grow 2,000 tonnes of seed cotton, this would generate N$ 4.3 million. After production costs have been allowed for, this would generate a cash income of about N$ 2.2 million. This cash income could be more if most of it is grown by farmers who are using family labour. Also, if it is rainfed then no provision has to be made for the depreciation of
the capital cost of irrigation equipment. Also, it should be noted that the capital costs of the
irrigation equipment required for cotton will be less than for horticultural crops.

If the NCA production expands and a ginnery is built then the revenue would rise. The value
of 8,000 tonnes of seed cotton after processing would be about N$ 24 million. About N$ 10
million of this would filter back to the rural NCA community.

6.7 Recommendations and strategy for implementation

Cotton is one of the few cash crops that has significant potential for improving the cash
generating earning ability of the NCA farmers. However, to achieve its full potential a
careful strategy need to be pursued. The strategy for the first phase should be to encourage
cotton production so annual output reaches 2,000 tonne. At this level, the companies buying
the cotton will take a more permanent presence in the NCA and will help with offering
agricultural advice and undertake research and development. This should help increase the
profitability of cotton production. The second production target to achieve must be 8,000
tonne, then a ginnery could be established in the NCA. Because cotton is not widely grown
in the NCA; current production is only about 300 tonnes, it will take a few years to achieve
these targets. With assistance, it could probably take about 3 years to reach the 2,000 tonnes
and another 3 years to reach the output to justify the investment in a ginnery. The best
strategy to achieve these targets will be to encourage some of the larger commercial
organisations to invest in cotton production. They could then become centres for buying
cotton from small-growers, or even run an outgrower service. The encouragement of
commercial farmers to grow cotton would increase cash in rural economy, because about
many people would have to be employed to harvest the crop.

One of the issues that have to be addressed is that if cotton production starts to increase, it
could be at the expense of staple cereal production. The total area of cereal production in the
Caprivi and Kavango regions is 55,000 ha. If there is a significant switch to cotton by small-
growers, it could be at the expense of staple food production. It is hoped that the small-
farmers can be encouraged to grow both cotton and their staple as the peak labour
requirements of both crops is at different times. Also, it is hoped that a considerable portion
of the cotton production will be by commercial farmers using irrigation, which will reduce
the effect on staple food production. Without the commitment by farmers with irrigation,
either within the NCA or perhaps in the Grootfontein triangle, a cotton ginnery will not be
established in the NCA.

The strategy to increase cotton production should focus on a number of areas. These include

a) Provision of independent advice. Currently, the growers rely on the ginneries to
offer a price. It is recommended that the RDSP provides independent cotton
specialists to help with the price negotiations with the ginneries. If a cotton
marketing specialist is employed, it should be possible to negotiate better terms and
conditions.

b) Provision of independent agronomic advice. The ginneries supply seed of their
own varieties for the farmers to grow. Agronomic trials have been undertaken which
indicate that there may be varieties selected in other countries which may be more
suited to the NCA, especially in a drought years. It is therefore recommended that the RDSP provides the services of an agronomist to review the current varieties and agronomic practices used in the NCA. This consultant would also assist the Research Department with their variety trials.

c) Improved management techniques. Currently, there is very poor understanding of the cultural hygiene standards that are required to reduce the possibility of disease levels. In most countries, cotton growers have to remove the crops after harvest to minimise the chances of insect pests being carried over to the next crop. It is recommended that the RDSP assists the development of cotton development by drawing up hygiene guidelines. The consultant hired to undertake the agronomic advice in section b) above should be able to provide these guidelines.

d) Critical mass. It is important the production of cotton expands quickly. The critical mass is required to persuade South African ginneries to continue their interest in Namibian production and to make the establishment of a ginneries a viable option. The RDSP should help expand output by promoting the crop to the small-scale farmers and to encourage larger, commercial, farmers to develop the crop. In addition, it is recommended that these larger farmers should be given help and advice to allow them to assist outgrowers and become buying centres for the small-farmers. Production should also be encouraged outside of the NCA.
CHAPTER SEVEN

VEGETABLE OIL CROPS

7.1 Introduction

The crops considered in this chapter include

- Sunflower which is already grown in Caprivi. There is also an attempt to process it using a manually operated press
- Soya which is widely grown in southern Africa, but not in South Africa, nor in the NCA,
- Groundnuts which are already produced on a small scale, and
- Sesame which grows wild in the NCA but is not yet cultivated commercially.

7.2 Agronomic issues

a) Sunflower The soil types in the NCA are prone to nematode infestation which is damaging to most crops. Sunflower in particular increases nematode populations which will be damage following crops. Sunflower grows in sandy soils provided pH is higher than 5.3; which it is case in the NCA. Dwarf varieties of sunflower have the highest oil content (over 35%) and shortest maturity period (100 -120 days) and can be grown with as little as 250 mm of rain if it is evenly distributed through the growing season. If a late start to the rains precludes growing of maize, sunflower provides a useful alternative as it should be planted in January. If it is planted earlier, the seed matures in the rains and rots. It responds well to fertiliser (350 kg of compound per ha), which should also contain boron. As a smallholder crop, it can still produce a reasonable yield in marginal conditions of soil fertility and rainfall. Commercial yields in other countries with supplementary irrigation on heavier soils can reach 3 t/ha while smallholder crops should reach 1.5 t/ha. Such yields are improbable in NCA where expectations under smallholder management would not exceed 500 kg/ha and this would be limited to Caprivi.

The constraints to yield imposed by low rainfall and poor soil, together with the lack of commercial oil extraction facilities nearby make sunflower production a marginal enterprise for Namibia. However, a manual ram press for oil extraction may increase the profitability of this crop.

b) Groundnuts These are legumes and therefore do not require nitrogenous fertilisers, and improve the soil fertility and structure for subsequent crops. They do not require inoculation for nitrogen fixation since the soils contain sufficient of the appropriate rhizobia. Groundnuts are sensitive to soil acidity and are well suited to the high pH, sandy soil types of the NCA although gypsum should be applied at flowering is needed to prevent 'pops' or empty shells. The minimum rainfall required is 500 mm through the season which makes the NCA marginal except in the east or where there is irrigation. The crop gives good ground cover against weed competition and is a useful inter-crop with maize and in orchards. Crop residue provide animal fodder
which can be stored late into the dry season for use when animal feed is highly valued for draught power. It is well suited to commercial production under supplementary irrigation with mechanical lifting and shelling and provides a good component of crop rotation with maize, cotton and tobacco. Yields in a limited area of Namibia should reach 2 t/ha under commercial management and 750 kg/ha under smallholder management with minimal fertiliser inputs.

c) Soya This is an ideal component of a winter wheat rotation since it enhances soil structure and nitrogen content. It can be planted and harvested with the same equipment as wheat and supplementary irrigation will increase yields. There are promiscuous varieties that do not require inoculation with rhizobia. Pest control can usually be done biologically and disease incidence is reduced under dry atmospheric conditions. It is a useful crop in rotation with maize and cotton but should not be rotated with tobacco because of disease and nematode build-up. Smallholders can thresh it by hand. Uprooting or cutting the stems prevents shattering of the ripe pods so that the threshing period can be extended considerably. Seed can be retained from one year to the next in dry conditions and should ideally be professionally handled in the interim. For this reason soya is best produced by smallholders under an outgrower scheme in conjunction with a complementary crop such as cotton where the distribution of inputs, provision of services and marketing can be combined with the substantive enterprise. It does not grow well in sandy soils and is not drought tolerant. Therefore it is not well suited to the NCA except where there is an irrigated wheat enterprise or where smallholders have access to heavier soils and fall within the reach of an outgrower scheme.

d) Sesame It is native of southern Africa. Yields are dependent on rainfall and careful selection would be required to find varieties best suited for the NCA. Some varieties produce white seed which used in the confectionery trade, and others tan or red coloured seed with a higher oil content. It has a minimum rainfall requirement of 500 mm. This severely limits its production opportunities to the eastern part of the NCA. Breeding programmes concentrate on selection of high oil content and non-dehiscent varieties. Non-dehiscent varieties simplifies harvesting since seed shedding is no longer a progressive process up the plant but only occurs when all pods are mature and can be harvested simultaneously. California would provide the most appropriate source of suitable varieties since they have similar conditions to NCA and extensive trials on sesame have been conducted. The oil content may be as high as 53% depending on variety and growing conditions, but extraction efficiency may be 55% or with a screw press 80% which would yield 25% and 36% respectively by weight of oil from a healthy crop. Yields under good conditions can be as high as 1.5 t/ha for dehiscent varieties and 1 t/ha for non-dehiscent but, under smallholder management in good conditions, are around 500 kg/ha. In Namibia irrigation would be required to attain higher yields but these facilities can be more profitably applied to alternative crops. Sesame is produced in southern Sudan and northern Uganda in rotation with millet and sorghum using dehiscent varieties which are uprooted when partially green to dry on racks for 2 weeks before threshing.
CHAPTER SEVEN

VEGETABLE OIL CROPS
7.3 Main competitors and comparative advantage

As in the case of virtually all crops in NCA, there are better growing conditions in surrounding countries. All the crops covered under this chapter have a certain tolerance to harsh climate of the NCA, they would produce higher yields with more rainfall and, in most cases, less sandy soils. Furthermore the production systems, markets and processing capabilities are more advanced in Zimbabwe, Zambia and South Africa. These neighbours have processing capacities which are fed by extensive commercial farms which give significant economies of scale. For Namibia to attain such scales, without the presence of a large and vibrant commercial sector and in the face of competition from its neighbours, would entail bold and continuous subsidies aimed at this objective.

There are limited opportunities for cash earnings at a village level with sunflower where the oil is expressed by portable hand operated ram presses. Non-hybrid seed varieties with thick hulls are not efficiently processed by ram presses since the hulls absorb a lot of the oil and it remains in the cake. The extraction rate from hybrid seeds having a thin hull is reported to be only 7% out of 25% oil content which leaves an oil rich cake for livestock, but cash returns with this efficiency rate are low. The economies of ram press extraction are only likely to be attractive where transport of the crop is a major cost. It this technology is not economically justified, producers face the cost of transporting it to the nearest oil extraction plant in either Omaruru, Zimbabwe or South Africa. This invariably entails overstepping more productive areas with greater economies of scale. This immediately implies poor comparative advantage.

A pilot scheme for local processing of sunflower oil has been set up with EU aid at the Likwama Farmers' Co-operative Union (LFCU) in Katima Mulilo at which a single ram press. Crop yields have so far been very disappointing due to drought so the economies of hand processing have not been fully evaluated. The press is operated in town which negates a major aspect of its usefulness since it is still necessary to transport the crop to the press and to return the cake and oil to the producers. This is, however, a trial period and critical scales of production that would justify the press in the production area have not been reached. It is claimed that the co-op is achieving 22.7% extraction rate by weight and the cake sold still contains 29% oil. This is a high oil cake for animal feed but it can be diluted with grain to give a 6% oil content. The added value of processing is more valuable than the production which must alone be viewed with some scepticism by farmers.

White sesame with 95% purity can be sold as a confectionery product and red sesame as a high quality oil on the international market which puts NCA into direct competition with producers in more favourable conditions. It is produced in Zimbabwe and Zambia where producers fetch US$ 350 per tonne but it is not processed at village level.

7.4 Market size

Namibia imports approximately 10,000 tonnes of raw oilseeds per annum for processing at Omaruru and an unspecified quantity of refined oil is delivered straight to supermarket chains from RSA. About 500 tonnes of sunflower is currently produced within the country. The local demand for oil in Caprivi is estimated to be 600 tonnes per annum.
World production and trade of the four oilseeds is shown in Table 7.1. The extent of these markets does not, of course, imply that new entrants can gain access to the markets with ease but it does indicate the size of the market of each of the crops. It is thought that the world demand for oilseeds will increase more than that for grains and prices will reflect this trend.

Table 7.1  World production and trade of oilseeds.

<table>
<thead>
<tr>
<th></th>
<th>World Production '000s</th>
<th>Yield (t/ha)</th>
<th>Traded (tonne)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(ha)</td>
<td>(tonne)</td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td>17,925</td>
<td>22,907</td>
<td>1.28</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>20,714</td>
<td>17,627</td>
<td>0.85</td>
</tr>
<tr>
<td>Soya</td>
<td>59,556</td>
<td>116,94 2</td>
<td>1.97</td>
</tr>
<tr>
<td>Sesame</td>
<td>6,110</td>
<td>2,391</td>
<td>0.39</td>
</tr>
</tbody>
</table>

About 6 million ha of sesame is grown world wide with average yields ranging from 180 kg/ha in Sudan to 600 kg/ha in Brazil. Total production world production is about 2.4 million tonnes of which India produces 800,000 tonnes per annum and Sudan, the largest African producer, 60,000 tonnes. Some 480,000 tonnes is traded on the world market and Japan, EU and USA are the largest importers. The world market for confectionery sesame seed is large enough not to be a limiting factor to exports from Namibia but the market would have to be established. Only the best quality of large seeded white varieties is marketable internationally and focusing on this market requires different varieties to those for the oil market.

7.5  Gross margins and revenues

The gross margins for vegetable oil crops have been calculated for both commercial and small-scale production (Tables 7.2 and 7.2). The yields obtainable under commercial production are higher than those with lower levels of input and management associated with smallholders. If the small-farmers start to use the level of inputs the commercial growers use, they will get near to the commercial yields. Yield assumptions are made with the expectation of reliable rains and timely and effective management of the resources. The gross margins for smallholder production do not account for the real cost of labour and should be viewed as a return to labour rather than a margin over costs. It is assumed that the crops are grown as pure stands although they are more likely to be planted as inter-crops which would have synergy. The cost of land preparation is higher when farmers hire draught compared to tractors. However, tractor hire is subsidised and are not widely available.
Table 7.2 Projected gross margins under commercial management (NS/ha)

<table>
<thead>
<tr>
<th>Variable Costs</th>
<th>Sunflower</th>
<th>Groundnuts</th>
<th>Soya</th>
<th>Sesame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanisation</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Seed</td>
<td>12</td>
<td>175</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>Fertiliser/FYM</td>
<td>133</td>
<td>200</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>Chemicals</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>Packaging</td>
<td>22</td>
<td>30</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>Labour</td>
<td>80</td>
<td>150</td>
<td>80</td>
<td>300</td>
</tr>
<tr>
<td>Irrigation</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>90</td>
<td>120</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Interest</td>
<td>20</td>
<td>52</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total VC</strong></td>
<td>557</td>
<td>1427</td>
<td>1112</td>
<td>731</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield Kg/ha</td>
<td>1500</td>
<td>1800</td>
<td>2200</td>
<td>1200</td>
</tr>
<tr>
<td>Price/Kg</td>
<td>1.12</td>
<td>1.34</td>
<td>1.1</td>
<td>1.32</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>1680</td>
<td>2772</td>
<td>2420</td>
<td>1584</td>
</tr>
<tr>
<td><strong>Gross Margin</strong></td>
<td>1123</td>
<td>1345</td>
<td>1308</td>
<td>853</td>
</tr>
</tbody>
</table>

Table 7.3 Projected gross margins for smallholder production (NS/ha).

<table>
<thead>
<tr>
<th>Variable Costs</th>
<th>Sunflower</th>
<th>Groundnuts</th>
<th>Soya</th>
<th>Sesame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Prep</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
</tr>
<tr>
<td>Seed</td>
<td>12</td>
<td>175</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>Fertiliser/FYM</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Chemicals</td>
<td>80</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Packaging</td>
<td>8</td>
<td>11</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Labour</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Irrigation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Transport</td>
<td>30</td>
<td>42</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>Interest</td>
<td>15</td>
<td>19</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total VC</strong></td>
<td>434</td>
<td>535</td>
<td>419</td>
<td>350</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield Kg/ha</td>
<td>500</td>
<td>700</td>
<td>750</td>
<td>500</td>
</tr>
<tr>
<td>Price/Kg</td>
<td>1.12</td>
<td>1.54</td>
<td>1.1</td>
<td>1.32</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>560</td>
<td>1078</td>
<td>825</td>
<td>660</td>
</tr>
<tr>
<td><strong>Gross Margin</strong></td>
<td>128</td>
<td>542</td>
<td>406</td>
<td>310</td>
</tr>
</tbody>
</table>

The returns to sunflower processing with 22% extraction are higher per kg than to production since Likwama Farmers’ Co-operative Union are selling oil at NS 6.00 per litre and cake at NS 0.85 per kg with 26% oil content. This equates to NS 2.34 per kg of sunflower which is purchased from farmers at NS 1.00 per kg, giving a margin for processing of NS 1.34 per kg. The capital equipment costs NS 3,000 and its capacity is 55 kg per day so that 40 days margin on operation can pay off the equipment if labour and marketing costs are ignored.

The world market price for tan sesame is in the region of US$ 1,000 per tonne and for white sesame US$ 1,300 per tonne cif European port. Transport to Europe would be approximately US$ 200 per tonne and marketing, packaging and local expenses would amount to a further US$ 400 to give a farm gate price of US $400 or NS 1,320 per tonne.
7.6 Scale of opportunity

Table 7.4 illustrates the revenue, less costs, i.e., the total gross margin or return to smallholder labour to be earned from the assumed market if it were to be filled by either commercial (com) or smallholder (sh) production. Note that the gross margin per tonne of produce is higher under commercial production than under smallholder production because, under proper commercial management, provision of inputs to the crop generates more efficient return to natural resources of rainfall, soil and sunshine.

Table 7.4. Revenue from production of oilseed crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Gross margin NS/ha</th>
<th>Market Opportunity tonnes</th>
<th>Production scale ha</th>
<th>Revenue '000 NS</th>
<th>Total Gross Margin '000 NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunflower, com</td>
<td>1.123</td>
<td>1,000</td>
<td>666</td>
<td>1,120</td>
<td>751</td>
</tr>
<tr>
<td>Sunflower, sh</td>
<td>126</td>
<td>1,000</td>
<td>2,000</td>
<td>1,120</td>
<td>242</td>
</tr>
<tr>
<td>Groundnut, com</td>
<td>1,345</td>
<td>500</td>
<td>278</td>
<td>770</td>
<td>374</td>
</tr>
<tr>
<td>Groundnut, sh</td>
<td>542</td>
<td>500</td>
<td>714</td>
<td>770</td>
<td>387</td>
</tr>
<tr>
<td>Soya, com</td>
<td>1,308</td>
<td>600</td>
<td>273</td>
<td>606</td>
<td>357</td>
</tr>
<tr>
<td>Soya, sh</td>
<td>406</td>
<td>600</td>
<td>800</td>
<td>606</td>
<td>324</td>
</tr>
<tr>
<td>Sesame, com</td>
<td>853</td>
<td>2,000</td>
<td>1,670</td>
<td>2,640</td>
<td>1,425</td>
</tr>
<tr>
<td>Sesame, sh</td>
<td>310</td>
<td>2,000</td>
<td>4,000</td>
<td>2,640</td>
<td>1,240</td>
</tr>
</tbody>
</table>

The revenue earned for each of the crops does not take into account the production risks associated with drought and other factors. Thus, the practical opportunity for soya is very limited due to its lack of tolerance of both sandy soils and low rainfall. When risks are considered, sesame is likely to provide the best long term return to labour provided local and export markets can be secured and it is grown in areas with at least 500 mm of rain.

7.7 Recommendations

It is recommended that sunflower should be reviewed in light of the manual processing in the Caprivi. If this is shown to have some potential, then trials should be undertaken with hybrid varieties to increase oil yields and improve extraction rates.

Trials should be conducted on varieties of sesame from California and other arid areas. When appropriate varieties are identified, demonstration plots should be established and extension messages developed to promote production as a source of oil for the local and the export market. Sesame development is seen as a long term development programme in which variety trials will be carefully conducted before releases are made.

Opportunities for soya and ground nuts as a cash crop are very limited and it is recommended that they are not pursued as a cash crop.
CHAPTER EIGHT

DRY LAND CROPS
CHAPTER EIGHT

DRY LAND CROPS

8.1 Introduction

Crops considered under this chapter include:

1. Oriental tobacco which is not currently grown in NCA, although virginia tobacco is produced by one farm on a commercial scale;
2. cowpeas which are already a well established in the farming system;
3. bambara nuts are often grown as an intercrop the more westerly NCA; and
4. castor beans which is not commercially grown but some varieties grow wild in the NCA.

Oriental tobacco which was formerly called Turkish tobacco. After harvest, it is cured by both air and sun drying. Fermentation can also play a role in curing. This drying process leads to confusion with Burley tobacco which is air cured and sometimes referred to as air cured tobacco but is distinct from Oriental.

Cowpeas are also known by several names including black-eye pea, black-eye bean, southern bean, China pea and marble pea. Certain cultivars are also known as asparagus bean, Bodi bean, snake bean and yard long bean. All these names refer to *Vigna unguiculata* or one of the 70 cultivars derived from it.

Bambara nuts are *Voandzeia subterranea* and are known in Ovamboland as efukwa.

8.2 Agronomic issues

a) Tobacco Virginia tobacco is grown on one farm in Caprivi by a private-company on land rented from NDC. They have a marketing quota from a commercial producers' co-operative in RSA. This marketing arrangement is unique and probably could not be replicated. They attain yields of 3 t/ha of which 2.4 tonnes are marketable in RSA. A small quantity is sold for local consumption as *schaapiak* - for rolling or pipe smoking - at N$ 3 per kg. The water quality is good for tobacco production being chlorine free and the soil pH is reduced to between 5 and 6.2 by applying lime imported form RSA. Curing is done in 18 barns using coal from Hwange. It requires 2 tonne-of coal per tonne of cured tobacco. Given the difficulties of producing virginia tobacco in the NCA and the lack of tobacco expertise in the community, any further expansion is unlikely.

Burley tobacco has been tried by the Rossing Foundation in NCA and the climate was found to be too dry during curing to get adequate quality.

Oriental has more potential for the NCA than either virginia or burley tobacco. It has small leaves that require care but are easily handled and does not demand sophisticated production techniques or significant capital investment in curing.
facilities. Oriental rotates well with sorghum, mahangu and maize but should not be planted successively on the same land or rotated with sunflower or tomatoes to avoid nematode build up. Although it responds to phosphates, potash and small amounts of nitrogen, it is tolerant of poor soils and low rainfall. In fact, better quality leaf is attained without inputs. Irrigation would also increase yields where there are long periods of drought but excessive watering and fertility leads to rank growth and flavourless leaf. Curing does not demand fuel as the sun provides all the heat and drying that is required. Sun drying is preceded by air drying in the shade of thatched roof eaves and a period of a day or two when the leaves are left to ferment in heaps before exposure to the sun for final drying. Oriental tobacco is well suited to labour intensive smallholder production where labour is motivated. It is necessary for the labour to apply themselves to continuous care of the crop and its curing over a period of months.

b) Cowpea It is an important component of the farming system in NCA as an intercrop with mahangu, sorghum, sunflower and maize, providing a nitrogen fixing agent, a source of vegetables from green leaves, animal fodder from dried residue and both green and dried beans from the pods. The dried beans could be suitable for canning and the value of the growing bean is enhanced as a vegetable because of its indeterminate pattern of growth facilitates the harvesting of the pods and leaves progressively through the season. They are a valued inter-crop in NCA because of their tolerance of heat and poor soils.

c) Bambara nuts These are normally eaten fresh within three days of lifting as they become very hard when dry. Once the nuts have become dried, they may be pounded into a meal. They have a very low oil content and therefore do not compare with groundnuts. They provide a good balanced food having 20% protein, 5% fat and 55% carbohydrate. They are highly tolerant of poor soils and drought and fit well into the farming system of the NCA as an inter-crop with mahangu. Lifting is not as easy as groundnuts because the pods become detached from the haulm and must be found individually and are therefore not suited to mechanised lifting. With irrigation, they can yield up to 1.5 t/ha with a plant population of 30,000 per ha which requires up to 50 kg/ha of seed. As a smallholder crop, 20 kg/ha of seed is used, and soil is piled on the plant as it grows to induce tillering. Apparently it is not subject to disease or pest damage.

d) Castor beans Castor is found growing in NCA as a weed but these are not commercially useful varieties. Cultivated varieties are tolerant of low rainfall although irrigation is sometimes used for commercial production in some parts of the world. Although it is killed by frost, it grows as an annual. Commercial production would therefore be timed to avoid the risk of frost. The leaves and the seeds are poisonous containing a toxic protein, ricin, which has to be detoxified after processing before cake can be fed to livestock. The seed contains 55% oil. Normal yields of 500 kg/ha are obtained from low input cultivation but these can be increased to over 3 tonnes under intensive management including irrigation.
8.3 Main competitors and comparative advantage

a) Oriental tobacco is still supplied to the world-market largely by Greece and Turkey and local competition arises from Zimbabwean producers who are on the point of attaining self-sufficiency for this type of tobacco. Zimbabwean local demand is less than 100 tonnes per annum. They are well established in the market and have long-standing contacts with buying agents who purchase by negotiation with wide variation in price according to grade and specific targets on quantities. Although oriental tobacco may be produced in NCA, the area has no specific advantage and is, in fact, more prone to drought and therefore carries more risk. Comparative advantage would revolve around the cost of labour or their alternative opportunities and their willingness to dedicate their time to tobacco production. Breaking into the market would require concerted effort by a marketing agency. The need for a minimum quantity to justify this effort should not be ignored and bridging the gap between no production and the ‘critical mass’ for a presence on the market requires a special arrangement with a buying agent. There is no local cigarette manufacturing organisation so the crop would have to be exported initially to either Zimbabwe or RSA who would be protecting their own growers against imports.

b) Cowpea The NCA have no comparative advantage over other areas for cowpea production except that the farmers are already familiar with them.

c) Bambara nuts is a crop that is well suited to NCA and would face competition only from nearby Angola. There is no export opportunity, therefore, the only cash generating opportunity is the local market, unless processing the fresh nuts becomes a commercially attractive proposition.

d) Castor There are very few processing plants, there is only one in Europe, which supplies RSA with oil, and there are others in Brazil, China, India and Japan. Castor bean processing is subject to health and safety restrictions due to the toxic nature of the ricin. Castor processing as to be undertaken in factors dedicated only to castor. Although the ricin can be detoxified the equipment cannot be used on other oils and the throughput of castor must therefore be sufficient to justify the investment in the plant. This precludes establishing a dedicated plant in the NCA because the critical mass on production will not be attained. Therefore, the prospects for castor in the NCA revolve around the export market for beans. Exporters would face transport costs of US$ 200 per tonne from NCA which reduces returns to farmers. The crusher in Europe is not interested in small quantities; they require a minimum delivery of a 1,000 tonnes. There is a smaller processor in Zimbabwe which the NCA farmers could supply.

8.4 Market size

a) Oriental tobacco There is a market for good quality oriental tobacco may be penetrated by Namibia production. However, to enter this market would require skilled negotiations. This could either be achieved by an interested entrepreneur who could organise farmers under an outgrower scheme or by a tobacco company from outside of Namibia investing in oriental production. This would require dedication
over a number of years and would carry risks. However, a Zimbabwean and a South African tobacco company have expressed interest in developing this crop. The market size in the medium term is 100 tonnes but may extend to 2,000 tonnes in the long term.

b) Cowpea The cowpea market has wide scope since they can be sold either dry and there is reported processing demand. Plans have been forwarded to the Ministry of Agriculture for the establishment of a canning factory which could provide a source of cash income for farmers if efficiency of processing, marketing and distribution leaves sufficient margin to maintain current price levels. It is assumed that the maximum market size for cowpeas is 500 tonnes per annum.

c) Bambara nuts The market for fresh bambara nuts is currently limited to those areas reached easily from the farms. Trials have been conducted in the private sector to find a recipe for processing fresh bambara which may provide a wider market. Dried nuts have a limited market. The market for fresh and dried nuts combined is not expected to exceed 150 tonnes per annum unless the processing develops into a significant opportunity.

d) Castor World trade in castor seed is between 120,000 to 130,000 tonnes per annum of which 83,000 tonnes is supplied by China. The major importers are Brazil, EU, Thailand and Japan who each import between 26,000 and 31,000 tonnes. Apart from Zimbabwe and RSA, the closest markets for Namibia would be Brazil, Argentina and EU. Annual demand for castor oil in South Africa is 1,500 tonnes. The development and entry into any market will be difficult, but a target of 500 tonnes per annum within 5 years may be attainable.

8.5 Gross margins and revenues

Gross margins are estimated on the basis of improved smallholder production implying application of extension and inputs to achieve sustained production (Table 8.1). These yields could be improved with careful management, higher input levels but in view of the paucity of management skills and higher input levels would increase the risks of financial failure. In addition there is a significant risk of total crop failure if there is a major drought for some of the crops. The cost of labour has not been accounted for and the gross margin should, therefore, be seen as a return to family labour.
Table 8.1. Gross margins for dry-land crops

<table>
<thead>
<tr>
<th></th>
<th>Tobacco</th>
<th>Cowpeas</th>
<th>Bambara</th>
<th>Castor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanisation</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
</tr>
<tr>
<td>Seed</td>
<td>900</td>
<td>175</td>
<td>158</td>
<td>89</td>
</tr>
<tr>
<td>Fertiliser/FYM</td>
<td>250</td>
<td>50</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>Chemicals</td>
<td>130</td>
<td>0</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>Packaging</td>
<td>8</td>
<td>11</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Labour</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Irrigation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Transport</td>
<td>72</td>
<td>60</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>Interest</td>
<td>58</td>
<td>19</td>
<td>19</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total VC</strong></td>
<td>1657</td>
<td>555</td>
<td>541</td>
<td>856</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield Kg/ha</td>
<td>1200</td>
<td>1000</td>
<td>1250</td>
<td>1500</td>
</tr>
<tr>
<td>Price/Kg</td>
<td>6</td>
<td>1.25</td>
<td>3</td>
<td>1.32</td>
</tr>
<tr>
<td>Output</td>
<td>7200</td>
<td>1250</td>
<td>3750</td>
<td>1980</td>
</tr>
<tr>
<td><strong>Gross Margin</strong></td>
<td>5543</td>
<td>695</td>
<td>3209</td>
<td>1124</td>
</tr>
</tbody>
</table>

8.6 Scale of opportunity

Table 8.2 illustrates the total revenue less input costs, or return to labour, that can be made, given the assumptions on market size. The opportunities for Oriental tobacco and castor beans would require considerable market development to gain a foothold in these established markets.

Table 8.2 Projected gross margins for dry land crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Gross margin</th>
<th>Market size</th>
<th>Production scale</th>
<th>Total Revenue</th>
<th>Total Gross Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NS/ha</td>
<td>tonnes</td>
<td>ha</td>
<td>'000 N$</td>
<td>'000 N$</td>
</tr>
<tr>
<td>Oriental Tobacco</td>
<td>5,540</td>
<td>100</td>
<td>80</td>
<td>576</td>
<td>440</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>695</td>
<td>500</td>
<td>500</td>
<td>625</td>
<td>347</td>
</tr>
<tr>
<td>Bambara Nuts</td>
<td>3,210</td>
<td>150</td>
<td>120</td>
<td>450</td>
<td>385</td>
</tr>
<tr>
<td>Castor Beans</td>
<td>1,120</td>
<td>500</td>
<td>330</td>
<td>653</td>
<td>375</td>
</tr>
</tbody>
</table>

8.7 Strategy and recommendations

It is recommended that further the opportunities for entering the oriental tobacco market is further investigated. The critical mass for achieving a market presence must be assessed and farmer attitudes to tobacco production must be addressed. Since tobacco is not food there is some resistance by farmers. Trials should be conducted in co-operation with a tobacco marketing outlet who have involvement with production and are prepared to invest in the
crop's development. It is important that short term independent consultancy is made available to represent the producers in the negotiations with local or outside entrepreneurs.

It is recommended that trials are initiated in the NCA to select the most appropriate varieties, to determine yield and to evaluate quality. The expertise of a short term oriental tobacco specialist should be made available to help establish and monitor these trials.

It is recommended that cowpea production should be promoted to increase benefits gained from their rotation with cereal crops and the nutritional benefits. This will provide a limited cash generating capacity, but any wider expansion of the market will depend on processing.

The market for bambara nuts is subject to many misconceptions. Most of the nuts are sold fresh within three days of lifting and the trade in the dried nut is minimal. Extension of the shelf life of the fresh product would expand the market; trials could be conducted with this objective. There may be a potential for processing the fresh nuts. If this is proven, it is recommended that agronomic trials are established to determine the best production techniques.

However, the scope for cash earnings from these crops should be viewed in the perspective of the prospects for trade in cereals from which far greater earnings can be generated with less disruption and risk.
CHAPTER NINE

MINOR INDUSTRIAL CROPS
CHAPTER NINE

MINOR INDUSTRIAL CROPS

9.1 Background

This is a broad sector which covers a wide range of crops. Most of them are often regarded as minor industrial crops because they often require a degree of processing. Included in this chapter are essential oils and oleoresins, food colorants, medicinal or pharmaceutical crops, indigenous plants and other industrial crops.

Essential oils are the portion of certain plants that can be removed by distillation with steam. These oils are either used directly in the flavours and fragrance industry, or are fractionated (ie separated further) to supply the separate aroma chemicals that are used as chemical building blocks in the fragrance industry. Essential oils have been included in this section because a number of neighbouring countries are attempting to develop them as cash crops. The reason for this interest is they are high value (ranging from about US$ 4/kg for citronella to in excess of US$ 50/kg for geranium and—even higher for rose oil). Therefore transport costs are only a small proportion of the variable costs. In fact, to gain competitive advantage, it is important to have cheap labour and a good growing climate rather than cheap freight. For both these reasons, it will be difficult for Namibia to gain any competitive advantage in the production of the more common essential oils. However, there may be opportunities for the production of more “unusual, or minor” essential oils. They could be developed from some of the more interesting indigenous plants that grow in the NCA. These minor essential oils are traded in much smaller quantities, and are often used in aromatherapy. To really exploit this opportunity, it is normal to process these small crops in a project which also produces large volumes of a common essential oil. This market prefers extracts which can be certified as “organic”.

When essential oils are reviewed, it is normal to include oleoresins. These are the portion of certain plants which are extracted using organic solvents (normally hexane). After extraction, the solvent is removed to leave the oleoresin. As with essential oils, oleoresins are used as fragrances and flavourings in the perfume, cosmetics and other industries.

Pharmaceutical, or medicinal and indigenous plants have been considered in this sector because they have the potential to become significant cash crops in the NCA. Namibia, and especially the NCA, has a fairly unique combination of climate and soils. This facilitates a range of indigenous plants which are unique to Namibia. Already they are being exploited; it is reported that Namibia exports about 80 to 100 tonnes of both “devils claw” and !nara pips.

The !nara plant is endemic to the coastal part of the Namib desert, with the Kuiseb delta having the largest concentration. It is a cucurbit which grows on sand dunes. The fruits are picked, the flesh and pips are removed from the skin and boiled until the pips are released. The pips are removed by sieving. The main market for the pips is in Cape Town where they are known as “butterpits” and can be used as an ingredient in confectionery. The “devils claw” is a root harvested from a tree. If it is “overharvested”, the tree will die.
Natural food colorants are used in the food industry to replace synthetic colorants. To put the commercial opportunity for food colorants into perspective, Namibia's neighbour, Zambia exports annually about N$ 13 million worth of dried marigold, a natural food colorant which is used extensively in the poultry industry.

There is a range of plants that can be grown and extracts used in various industries. One that may be pertinent to Namibia is guar. The resin, guar gum, can be used in the mining for lubricating fast moving bits as well in the manufacture of certain diary products. This should be considered as a potential crop in Namibia.

The National Botanical Research Institute (NBRI) is responsible for the study of the Namibian flora. Its objective is to promote the development and sustainable development of natural resources. Within this institute, there is a project to undertake a Vegetation Resource Survey of Namibia with among its objectives to establish an inventory of plant species. This survey also reviews the literature on each species, including potential uses for the plants. This could provide invaluable data for exploiting the commercial potential for indigenous plants in the NCA.

9.2 Agronomic issues

As noted above, the opportunities for developing a profitable essential oil or oleoresin industry based on the most commonly traded product in Namibia is small because the climate in the NCA is not conducive to all-year round growth and it does not have cheap labour. However, there may be some opportunities. Vetiviar oil is distilled from the roots of the Veteveria grass. It grows well and easy to harvest in sandy soils. It also has an environmental benefit of reducing soil erosion. Citrus trees grow well in the NCA and there are a number of essential oils that can be produced from citrus. Of course irrigation will be needed for both citrus and vetiviar which may reduce the profitability. In addition, there could be other opportunities supplying the aromatherapy market.

Food colorants may have more potential. The industry in Zambia can be used as a case study. A private company, Masstock, have been developing the production of marigolds for use as a food colorant for the last 4 years. The marigold flowers are harvested, dried and the colorant is chemically extracted. In 1995, they grew 2,000 ha, produced about 20 tonne of food colorant. The marigold crop is grown in Zambia in the winter season using irrigation. Two crops a year are produced. The crop is picked by hand and employs about 3,500 pickers.

Guar gum has been tried in a number of southern African countries including Malawi and Zambia. It did not do very well in either country, especially in the wetter years. It did better in Malawi where it was tried as a smallholder crop, but in Zambia where the commercial farmers tried to grow it was even less successful. After these trials, it was concluded that it preferred a drier climate. It also has the reputation of being a drought tolerant crop. Given these climate requirements, it could be an interesting crop for the NCA. Guar grows best in soils with pH 5.5 to 8.5, it is a legume and therefore helps to improve soil fertility.

One of the main issues associated with the development of indigenous plants is to obtain sufficient production to satisfy the market demand without destroying the natural population.
This is certainly an issue with devil's claw, there have been a number of trees which have been killed by over harvesting. It is often difficult to domesticate indigenous plants. It has so far proved virtually impossible to domesticate !nara.

9.3 Main competitors and comparative advantage

Namibia has few competitive advantages for growing most of the common essential oil or oleoresin, unless one can be identified from an indigenous plant. If this sector is targeted, efforts should focus on flavours rather than fragrances, as their demand is increasing more rapidly. One of the potentially interesting market opportunities is for lime oil. This is used in the manufacture of Coke Cola and Pepsi Cola. Analysts expect the Cola market to double within the next 10 years. Currently, lime oil is trading for about US$ 13 to 15/kg. The main market for this product is the USA and Europe.

The main countries producing other essential oils include China, Indonesia, Guatemala and India. The other main competitor for essential oils is from synthetic products. Often the fragrance characteristics of essential oils can be synthesised cheaply from inorganic materials.

The competitive advantage that Namibia might have for medicinal plants is that Namibia has a good infra-structure which could encourage companies to invest in the NCA. Medical companies, who often issue contracts for medicinal plant production, have to be sure that companies producing natural medicines are capable of producing a pure and uncontaminated product on a regular basis. Medicinal plants are grown in a wide range of countries.

The competitive advantage of exploiting indigenous plants is that they are adapted to growing in the NCA climate. Most of the crops discussed in the other chapters of this report are not well adapted to the NCA climate.

9.4 Market size

There are various estimates of the size of the world market, but Givaudan (a major broker of essential oils) estimate it to be worth at least US$ 6,500 million. Some basic information on the ten most widely produced essential oils are shown in Table 9.1. The market size for lime and vetiver oil is about 1,200 and 300 tonnes respectively.

<table>
<thead>
<tr>
<th>Product</th>
<th>Annual production (tonnes)</th>
<th>Market price (US$/kg) Nov 1995</th>
<th>Main sources of supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet orange</td>
<td>15,000</td>
<td>5.50</td>
<td>Brazil, USA, Central America</td>
</tr>
<tr>
<td>Mint</td>
<td>6,000 - 8,000</td>
<td>6.50</td>
<td>USA, China and South America</td>
</tr>
<tr>
<td>Lemon</td>
<td>2,000 - 2,500</td>
<td>20.00</td>
<td>USA, Argentina and Italy</td>
</tr>
<tr>
<td>Citronella</td>
<td>1,600 - 1,750</td>
<td>6.00 - 9.00</td>
<td>Indonesia, China, Taiwan and Guatemala</td>
</tr>
<tr>
<td>Eucalyptus</td>
<td>1,500 - 1,750</td>
<td>3.00 - 3.50</td>
<td>China, Portugal, Spain and South Africa</td>
</tr>
<tr>
<td>Lime oil</td>
<td>1,000 - 1,200</td>
<td>13.00 - 15.00</td>
<td>Mexico, Haiti, Peru</td>
</tr>
<tr>
<td>Lemon grass</td>
<td>900 - 1,300</td>
<td>8.80</td>
<td>India, Guatemala and China</td>
</tr>
<tr>
<td>Cedarwood</td>
<td>700 - 1,400</td>
<td>3.75</td>
<td>USA, China and Kenya</td>
</tr>
<tr>
<td>Litsa cubeta</td>
<td>500 - 600</td>
<td>9.25</td>
<td>China</td>
</tr>
<tr>
<td>Patchouli</td>
<td>500 - 550</td>
<td>17.50</td>
<td>Indonesia and China</td>
</tr>
<tr>
<td>Geranium</td>
<td>300</td>
<td>75.00 - 100.00</td>
<td>China, Egypt and Reunion</td>
</tr>
</tbody>
</table>
Source: - Volume and sources of supply - ITC Market Study (1986)  
- UK market price data - Fooks and French

South Africa offers a potential regional market opportunity for essential oils. They reportedly import about US$ 30 million worth of essential oils. Much of these imports will already have been formulated from a range of essential oils outside South Africa. Even if Namibia was able to grow essential oils, it will not be able to compete in the formulated market segment.

The market for aromatherapy oils is not well documented. However, there are a large number of buyers, mainly in the USA, UK and Germany.

The world market size for natural food colorants is difficult to estimate. However, most independent observers believe that it is expanding quickly as there is increasing pressure to reduce the usage of synthetic products in food. To attempt to put this sector into perspective, the world marigold food colorant market is worth about US$ 40 million (N$ 130 million). The main use for the marigold extract is in the colouring of chicken feed and chickens. There may be opportunities to develop other food colorants such as annato which is used to colour margarine. Annato is a shrub or bush which grows in a wide range of climates and is an ideal small holder crop.

The world pharmaceutical market is estimated to be about US$ 150 billion. About 25% of the finished medicinal products contain at least one compound extracted from plants. The world market for pharmaceuticals extracted from plants is estimated to be US$ 30 billion, and it is increasing extremely quickly. Some of these plant extracts are exceptionally high value and are very often labour intensive. Without doubt, this sector offers an interesting long term opportunity for Namibia.

The world market for guar is not very accurately documented. However, a recent survey of the Southern African market estimates that the regional market size is about 10,000 tonnes, 70% of which is used in South Africa. Most of the balance is used in Zambia. Guar has a value of about US$ 700/tonne, ie the regional market is worth about US$ 7 million annually. Virtually all of it is currently imported from India or Pakistan. Namibia should have a major transport advantage over the competition.

9.5 Gross margins and revenues

There is not sufficient data available to calculate the gross margins for the range crops discussed in this sector. If crop opportunities are identified, and then trials are performed, it will then be possible to calculate the gross margins. If novel crops are going to be introduced, it will be important to fully assess the factor that has the most influence on the gross margin, the selling price. This will best be done in conjunction with a processing or marketing organisation.

9.6 Scale of opportunity

The scale of the opportunity of this sector is very large, but it is very difficult to quantify. However, the time scale for achieving it may in the longer term.
To help put this in perspective, one private company in Zambia is earning N$ 13 million per year exporting marigold food colouring 4 years after starting trials with the crop. If an appropriate medicinal or indigenous plant, or indeed food colorant can be identified, then it could generate more income than most of the other crops discussed in the rest of the report. The regional guar market has the potential to generate about N$ 22 million.

Because of the research and development work that is required, it is unlikely that minor industrial crops will generate much revenue in the short to medium term. However, there is more potential for this sector than with most other crops discussed in this study. In the longer term, if two or three opportunities can be identified, minor industrial crops could generate revenues of N$ 20 to 30 million. Much of this revenue would add to the cash in the NCA economy because of their labour intensive nature. However, it should be re-stressed that a considerable amount of well targeted research and development will be required to achieve this target.

9.7 Recommendations and strategy for implementation

Minor industrial crops have been included in the report because some of them have the long term potential to become a significant cash earning group opportunities. One of the problems with most of the other crops described in the previous chapters is that they are not very well adapted to the climate in the NCA. If the mapping of the indigenous plants can be combined with seeking market opportunities, then it may be possible to identify crop opportunities which have considerable potential for improving the economy of the NCA. However, it must be stressed that this is a long term opportunity and considerable efforts will be required to identify and exploit the opportunities.

The more common essential oils oleoresins are not regarded as having significant commercial opportunities. However, there may be some opportunities in the flavouring sector and interesting possibilities for supplying the aromatherapy market with small quantities of extracts from some of the indigenous plants may arise. It is therefore recommended that the RDSP commissions a study to identify buyers of aromatherapy products and designs a strategy to promote the potential of Namibian products. This specialist would also review in more detail any opportunities Namibian producers may have in the more common essential oils, eg lime and vetiver oil.

The opportunities for food colorants and medicinal plants described in this section are outside of the range of the normal non-traditional cropping. Consequently it is recommended that the RDSP organises specialists to comprehensively investigate the potential for food colorants, medicinal plants and other minor industrial crops such as guar. The specialist should, in particular, attempt to introduce a number of pharmaceutical companies to opportunities of investing in Namibia. In addition users of aromatic plants in health products, such as the Body Shop in the UK, should be made aware of the opportunities caused by the unique combination of climate, soils and good infra-structure in Namibia. The RDSP should also have access to a range of specialists who can be contacted in case entrepreneurs develop ideas to exploit unusual plants. These specialists must have the knowledge to quickly give the entrepreneur an indication of the likely market opportunities and viability of the potential project.
The RDSP should encourage the NBRI to continue with the mapping of the NCA flora as quickly as possible. Help should be given to ensure that the work is clearly focused towards market opportunities. Laboratory work should be encouraged to identify the type of plant constituents that the market place requires. It is recommended that a short term consultant is identified to help the NBRI to be more clearly focused towards market opportunities. In addition, this consultant should contact a number of companies based in Europe or South Africa and introduce them to the work of NBRI. It is important that the Government, or possibly the RDSP, oversees the involvement because of the environmental implications of exploiting indigenous plants. The NBRI should be encouraged to interview traditional healers and other uses of these indigenous to discover the uses they have for these species. NBRI should be encouraged to communicate with other workers within SADCC who are working with the commercial potential of indigenous plants. Further RDSP involvement could become very important if research and development is needed to domesticate any of the identified indigenous plants.
CHAPTER TEN

OTHER CROPS
CHAPTER TEN
OTHER CROPS

10.1 Introduction

This chapter covers crops that have not been discussed elsewhere, but deserve mention because they could be of economic significance. They include:

- sugar - trials have been conducted resulting in good yields;
- thatching grass, marula, manketti nuts - products that can be economically harvested from the veldt and may merit assistance.

10.2 Agronomic issues

a) Sugar  It has been proved that sugar yields of 100 to 110 t/ha are achievable on a pilot project in the NCA. Sugar yields of cane is directly related to sunlight hours and intensity, both of which are abundant in Caprivi. The soil type is suitable and water availability from Zambezi is ample. Access to irrigable lands from the river is easy since the lift from water surface to fields is only a few metres and river banks lead directly to irrigable land in Caprivi.

Lake Liambezi is now dried up and provides scope for over 20,000 ha of irrigable land. Lonrho investigated the potential for sugar production in the dry lake and found that costs of bringing water from the Zambezi River was prohibitive since flood control measures would also have to be incorporated. The cost of earthworks would also be very high, and even if a scheme were established to irrigate this dried up lake, the rainfall patterns may change and it could become flooded again. Furthermore, the tail water would have to be drained into the Chobe River system. This waste water would be contaminated with fertilisers and possibly by agrochemicals imposing an intolerable risk on the environment in a highly sensitive area. This situation militated against investment in large scale commercial sugar production although agronomic conditions remain favourable.

It is conceivable that a low technology sugar industry could arise from production on the banks of the Zambezi near Bukalo ADC using a mobile pump on the river and supplying cane to a jaggery or non-centrifugal process if there were a market for the product. Jaggery sugar is used by low technology food processing in the production of jams and sweets. Currently there is no such demand and the likelihood of it arising is remote.

b) Thatching grass  A variety of indigenous grass - Eragrostis pollens, grows in the Burkea/Baikiaea woodland and compares for with cape reed grass for thatching. Cape reed grass which is currently imported to Namibia from South Africa. This Namibian grass is apparently not grazed and grows abundantly on maramba edges and along the Kavango River. Two other varieties - Heteropogon and Milancarpus occur in Caprivi and are harvested for sale. No environmental assessment has been made of the

75
harvesting of these grasses. It is clear that the plants should be cut and not uprooted and this message is being relayed by those who provide sickles to and purchase from the villagers.

c) **Marula** This is a large naturally occurring tree, *Sclerocarya birrea*, a which produces a sweet fruit with an oil rich kernel. The fruit is eaten fresh, used for brewing, can be made into jam and the kernels are used for oil production. Selection has produced a strain capable of producing 3 tonnes per tree per annum at maturity after about 15 years. While the trees can be cultivated in orchards there are very many large mature trees in the wild veldt that need simply to be harvested. The production of jelly, juice and oil could be organised at village level or on a mobile plant.

There is a traditional belief, prevalent in Caprivi and possibly elsewhere, that is unfortunate for agro-forestry prospects; it is thought that to plant a tree will make you die earlier! This belief and the land tenure system that militates against long term investment in the land, may help to explain why there are few cultivated trees of any kind in NCA.

d) **Manketti nuts** These are from the manketti tree - *Schinziophyton rautanenii* (formally known as *Ricinodendron rautanenii*) which occurs naturally in east and central NCA. Fruits are used for brewing and dry kernels are collected from under the trees and used for production of oil which is valued in villages.

10.3 **Main competitors and comparative advantage**

a) **Sugar** While sugar yields well in the Caprivi region and water resources are sufficient, the costs of capital developments and the environmental hazards associated with tail waters impose crippling limitations on prospects for developing a refined sugar industry. The jaggery system would provide some prospects for smallholder production if there was a market for jaggery sugar products. This is not the case.

There are sugar refineries in neighbouring countries where high yields are also obtained for less capital expenditure and environmental risk.

b) **Thatching grass** The grasses of Kavango and Caprivi are shorter at 120 cm than cape reed grass which is usually 150 cm, but in quality it is comparable. The advantages for NCA are that the thatching grass is nearer to the market and there is ample labour for cleaning and grading while harvesting is done by villagers in their own time between April and November.

c) **Marula** There is scope for development of marula juice for local consumption and there may be a market in South Africa if their sales increase beyond their own immediate capacity to fill satisfy demand. The size of this opportunity will be small.

d) **Manketti nuts** The trees are widely scattered in the area and can be harvested at little cost to the villagers. While there is no demand from outside the area there is also no apparent influx of nuts from elsewhere. The immediate prospects for the nuts lies entirely within the NCA until product development creates demand elsewhere.
10.4 Market size

a) Sugar There is a demand for refined sugar within Namibia but production is not viable in the NCA. There is currently no market demand for jaggery sugar. There would be a demand for a few tonnes per annum of sugar cane for chewing.

b) Thatching grass Grass is sold in bundles a bit larger than can be clasped in one hand. There is no standard diameter for these bundles which has given rise to complaints from thatchers that bundles from certain sources are too small, leading to high roofing costs. This issue can, no doubt, be addressed quickly and should not inhibit the expansion of this trade in the NCA. Sales are obviously closely linked to the vigour of the building industry and particularly to expansion in the tourist industry where it is used on lodges. The current state of the building industry leads to demands for about 180,000 bundles per month (2.16 million pa - thatching requires between 30 and 40 bundles per square metre and charges are around N$ 300 per square metre for finished thatching). There is no reason technical why the NCA product should not entirely replace the imported product which should then provide an income to dealers in NCA of N$ 2.16 million pa at N$ 1.00 per bundle. The grass is bought from villagers in bundles of 750 mm circumference (240 mm diameter) at approximately N$ 5 per bundle and these are then cleaned, graded and tied into thatching size bundles for sale.

c) Marula Currently the market is limited to villages and has not been quantified. Investments in oil extraction facilities, juice production and liquor manufacturing would expand the market. In RSA there is a growing market due to investment in such facilities and promotion of the liqueur ‘Amarula’. This may provide an export market from NCA for juice and links with the jam industry may be developed to accommodate NCA marula jelly. Uses for the oil (2% by weight of the fresh fruit) have not yet been clearly specified and aspirations for the market are based on speculation.

d) Manketti This is limited to market trade at village level until further development is undertaken by entrepreneurs on the basis of product development. The market size is not quantified.

10.5 Gross margins, revenues and scale of opportunity

Sugar and manketti nuts will not be discussed because the commercial opportunities for both are virtually non-existent.

Indications for thatching grass are that the current market in Namibia is about N$ 2 million per annum and that this could be expanded further if the building industry was in good health. A very high proportion of this revenue will go back to the NCA. There could be further prospects for export of thatching grass to the building industries of Botswana, Zimbabwe, Zambia, South Africa and, eventually, Angola.
Fresh marula fruit reportedly fetches about N$ 150/tonne at farm gate. The only costs involved are those of harvesting the fruit. If they were to be planted, additional costs would be incurred.

10.6 Recommendations

Sugar production on a large scale cannot be recommended because of the costs and environmental hazards. The introduction of sugar cane for chewing has already been made on a small scale and cash earning opportunities can be generated from irrigated gardens as with horticultural crops.

Thatching grass shows promise for cash earning opportunities and this should be promoted as a private sector entrepreneurial activity. However, since the sustainability of harvesting using the sickle method has not been substantiated, it would be wise to conduct an environmental assessment study to establish the effects of cutting grass. If the grass is uprooted at harvest and the roots cut off later, it is safe to assume that plant populations will diminish. It may be that the seed is consistently removed from the growing area and that this will reduce replenishment rates. A quarantine period of 28 days is imposed on the grass before it is permitted to cross the veterinary line in case ticks are transferred. It would be wise to establish that this is sufficient but not excessive.

Trade in marulas can only benefit the villagers, and promoting the planting of high yielding grafted selections would provide further income earning opportunities as well as all the benefits associated with aforrestation. Recommendations for planting beside houses and along roads and boundaries should be made through the extension services. Forestry nurseries should have a supply of marulas trees for sale and municipal councils should encourage its propagation in townships. Links with food processors in Namibia and RSA should be established to explore opportunities for export and processing.

In this final section, consideration should be given to honey production. Whilst it is not normally regarded as a crop, it is forest or bush product. There are very tracks of land in the NCA that could be used for producing organic honey which has a much higher selling price than normal honey. This opportunity should be investigated further.
CHAPTER ELEVEN

SUMMARY OF OPPORTUNITIES
AND RECOMMENDATIONS
CHAPTER ELEVEN

SUMMARY OF OPPORTUNITIES AND RECOMMENDATIONS

11.1 Scale of opportunities

a) Background. The NCA presents a harsh climate for cash crop production. Evapotranspiration rates far exceed rainfall and irrigation is limited to the land adjacent to the perennial rivers. The problem of low rainfall is compounded by its unreliability. The preponderance of very sandy soils and low inherent fertility also reduce the area’s suitability for cash crop production. Given these conditions, only drought tolerant crops or those which can justify the cost of irrigation should be considered for commercial production.

The main roads in the NCA are excellent, but the sandy soils inhibit rural transport. Traction power is provided by animals and a few very small tractors. Traditional agriculture is based on low input and low technology production methods. In the past, extension advice has not been freely available to the farmers. Given the harsh environment, cropping has traditionally been aimed at subsistence and home food security.

Most of the cropped area in the NCA is given to pearl millet (mahangu) with some sorghum. Maize and small areas of sunflower are also grown in the higher rainfall areas of the Caprivi region. Most of the cereals are traditionally inter-cropped with cowpeas, bambara nuts and cucurbits. This combination of crops combined with the livestock gave the population a degree of food security. However, in recent years, a series of poor rains coupled with an increasing population has resulted in food shortages.

There is very little trade in locally grown agricultural crops. However, a wide range of agricultural produce is imported from South Africa.

The predicament of the NCA farmers can be summarised by the following problems they face:-

- poor climate with increasingly frequent droughts
- soils with inherent low fertility and low water holding capacity which are unsuitable for most crop production
- limited choice of crops suitable for production
- most markets are supplied from sources outside of Namibia which enjoy considerable economies of scale, better climate and soils, cheaper inputs and better technical support
- limited transport facilities to the market
- poor access to inputs
- little access to credit
- little spare labour
- when labour is available, it is expensive
- limited access to extension advice, especially on new cash crops
- increased burden of commuting longer distances to fields.

It must be stressed that good entrepreneurs would find ways of overcoming many of the above issues if there were significant opportunities to generate cash from crop production. However, a good entrepreneur can not overcome the issues associated with the climate and soils - these are the main reasons why the NCA farmer is not competitive. The longer term choice of new crops have to respect these limitations.

This report has reviewed the options of a wide range of crops for generating cash in the NCA. This review has compared the scale of opportunities for the existing crops with potential new ones. It is appreciated that the there are temptations to introduce new crops, whilst not fully understanding their tolerance to annual changes in the climate or their disruptive effect on the existing farming systems. Also initial enthusiasm for new crops can often overshadow much greater benefits than can be accrued by minor adjustments to existing crops. For these reasons, new crops have been treated in this report with caution. The opportunities presented by existing crops have been investigated and compared with the new opportunities. The great advantage of investigating the benefits that could be accrued from improving new crops is that most of the issues associated with their production are already known and the farmers have a good understanding of the agronomic techniques, ie it is a much lower risk strategy.

b) Medium term opportunities. The major aim of this report has been to try to put into perspective the scale of cash generating potential of the crops considered. In the medium term, improving the output of mahangu is the best opportunity (Tables 11.1). It is estimated that this could have the potential generate N$ 55.8 million which would give a margin of N$ 21.6 million. These increases vastly outweigh the opportunities offered by any of the other crops. The major advantages offered by concentrating on mahangu is that most of the farmers understand how to grow it and it is well adapted to the harsh NCA climate. Additionally, it would require very little capital expenditure to generate this extra income.

Of the other cereals considered, maize has a reasonable chance to increase the cash in the economy, but only in a limited area, ie the Caprivi strip. There is very little chance to generate much of a margin from rice or wheat. By the time depreciation of the capital expenditure on these two cereals is considered, both would lose money.

Within the NCA, there are considerable efforts to develop horticulture. One of the objectives of this effort has been to reduce the amount of South African produce imported into Namibia. It must be appreciated that the South African farmers have major advantages over the NCA growers. These include much more favourable climate and soils which are well adapted to a wide range of horticultural crops, significant economies scale derived from growing for a much larger local market, inputs are cheaper and they have a much greater backing of technical advice. Indeed, there are areas within Namibia that are better suited to horticulture than the NCA. It
is estimated that in the medium term it may be possible to add N$ 3.75 million to the NCA economy by improved horticultural production. There are a number of NGO or Governmental subsidised fruit and vegetable gardens which are very badly managed; the farmers involved with these schemes are normally given such bad advice that they are detrimental to improving the horticultural skills in the NCA. Improved horticultural production targeted towards home production could be much more beneficial as well as help improve population’s nutrition.

Cotton production in the Caprivi and Kavango regions does have a major competitive advantage, it is excellent quality. The medium term target is N$ 4.3 million in revenue which would generate a margin of N$ 2.2 million. Cotton is a labour intensive crop and its promotion would add considerably to the NCA rural economy.

Already thatching grass is a significant cash generating crop in the NCA. It is estimated that sales are currently running at about N$ 2 million annually, mainly from the Caprivi region. It is estimated that most of this revenue comes back to the NCA rural economy. There is some thatching grass imported from South Africa. Import substitution represents the first expanded production target. The future for this crop is very dependant on the building industry within Namibia.

In the medium term the opportunities for generating extra revenue from vegetable oil crops, rain fed crops and minor industrial crops is limited.

c) Longer term opportunities. In the longer term it is even more important to focus on crops which are well suited to the climate and soils of the NCA. Unless this happens, other areas where the crop is better suited will compete more actively and reduce the margins for the NCA grower.

A considerable number of assumptions have had to be made in calculating the longer term projections (Table 11.2). Whether these targets will depend considerably on how much assistance, in terms of research and development and extension advice, is given to each crop. However, they do give an indication of the potential for the different crop sectors.

It is projected that the crop which has the potential for generating cash in the long term is mahangu. It is well adapted to the climate, most farmers know how to grow it, there is a very large market within the NCA and there are very few other competitors. There is very little potential for rice and wheat. In fact it is likely that the longer term potential for these two crops is worse than the medium term prognosis as it will become increasingly difficult for the NCA to compete against other countries which have much better growing conditions.

The next most important crop sector is minor industrial crops with estimated long term revenues of N$ 25 million and a possible margin returned to the NCA economy of N$ 12 million. It is appreciated that this is currently a very small sector within Namibia. However, there are enough indications from neighbouring countries that there should be opportunities for Namibia. If sensible support is given, especially to carefully chosen crops that are well suited to the climate and soils, then it offers much
greater potential than most of the other sectors. As there is currently very little current knowledge about this group of crops in Namibia, it is impossible to predict which will be the main crops. However, flavourings—colorants, pharmaceutical crops and industrial crops such as guar should be targeted. It is hoped that the work of the NBRI and short term specialists provided through programmes such as the RDSP, will identify suitable crops and quantify market opportunities. Crops such as guar should be investigated because they could also offer considerable environmental benefits as well as a positive margin.

If the cotton development progresses satisfactorily and a ginnery is established, then this crop should generate a revenue of N$ 24 million which would produce a margin of N$ 10 million to add to the NCA economy. This crop could only be grown as a rain fed crop in the Kavango and Caprivi regions. As with all the long term projections, there is a considerable margin for error. To achieve the cotton revenue and margin targets, there would need to be considerable production from the commercial, irrigated sector. If it was all the cotton was produced from rain fed crops, there could be a significant reduction in for staple food production. However, if cotton is properly promoted it should integrate well into the small-grower's farming system.

As noted in the medium term sector, it is recommended that the horticultural development is targeted at the “home production” sector, rather attempt to take on the South African imports directly. If home production is aided, it could have benefits for the nutrition of the population. More importantly, it will help generate a better “culture” of horticultural production within the community and could facilitate entrepreneurial horticulturists to gradually expand their production and trade further away from their production base. It is recommended that there is a considerable effort made to research a limited number of popular crops for home production. It is also recommended that a limited number of crops which are well adapted to the climate are developed as possible export crops. These are mangoes, dates and pistachios. The first two have the potential for improving home nutrition and some local sales. It is important not to develop horticultural production in badly managed and heavily subsidised gardens where the level of technical competence is low and the marketing skills virtually non-existent.

The only dry land crop that is really worth considering for support is Oriental tobacco; long term sales of N$ 2.3 million with a margin of N$ 1.6 million are projected. Again, this crop has been targeted for further research and development because it is suited to the harsh climate and soils in the NCA. It is appreciated that there could be a number of marketing issues that have to be addressed. Linkages with either South African or Zimbabwean tobacco companies could significantly reduce these marketing issues. It is also appreciated the successful development of Oriental tobacco will require a considerable effort to teach farmers how to handle the crop properly. However, if the crop is profitable it becomes much easier to teach the farmers to produce the requisite quality.

There few opportunities for vegetable oil production. Perhaps the main one is sesame, which could generate about N$ 2.6 million in revenue and N$ 1.4 million in margin.
The optimism for this crop is based on the fact that it is relatively drought tolerant. However, there needs to be considerable agronomic development to select varieties appropriate for the end use and the market needs to be developed.

11.2 Summary of recommendations

In the medium term, the biggest opportunity to improve the cash generating potential from crops in the NCA is by improving the output of mahangu. In fact mahangu has considerably more potential than the rest of the crops put together. There are considerable efforts being made by the RDSP to improve the mahangu output; obviously, this must be given as much encouragement as possible. There is some potential to generate cash from maize production, but this is opportunity is just for the Caprivi. The other cereal crops considered have very little potential. Even though wheat does appear to have a positive margin, when the depreciation on the investment in irrigation is taken into account, it would lose money. The potential for generating much surplus cash from rice would appear to be very limited. Unless the objective is to attempt to reduce Namibia’s reliance on imported wheat and rice, it is not recommended that further efforts be focused on these two crops. If there is an attempt to reduce imports by trying to grow these crops, either the producers would have to be subsidised or the consumers would pay to pay higher prices.

The opportunities for the commercial development of horticulture are very limited. It is suggested that instead of trying to compete directly with the South African imports, research and extension efforts should be targeted towards encouraging home production. It is recommended that only a limited number of fruits and vegetables are targeted. If the ethos of home horticultural production is encouraged, this will allow the more entrepreneurial growers to develop sales, and hence cash. There are a limited number of horticultural crops that are suited to the NCA climate and which have an export opportunity. These are mangoes, dates and pistachios. These export opportunities should be pursued. If it is decided to try to reduce Namibia’s dependence on imports of South African horticultural produce, a range of specific recommendations have been given. As noted above with wheat and rice, trying to reduce South African imports would either need considerable subsidies or the consumers would have to pay more for the produce.

Cotton has a natural competitive advantage for production in the Kavango and Caprivi regions; its quality is excellent. It is also a very good small-holder and commercial farming crop. If it could be developed sufficiently in the longer term, there is an opportunity to establish a ginning to further add value to the production. The recommendations for this crop revolve around encouraging production, in both the small-holder and commercial sectors, to a level which will attract outside to establish a significant presence in the NCA. It is also recommended that the RDSP provides short term inputs on behalf of the cotton growers to ensure that the best prices and advice are given by any ginning company trying to establish their position in the NCA.

The opportunities for vegetable oil are very limited. Small quantities of sunflower are already being grown in the Caprivi and there is an assessment of a manually operated oil expresser. This effort should be monitored and helped. If it is demonstrated to be successful, then sunflower should be promoted, but only in the Caprivi. There could be some potential for sesame. There needs to be considerable work undertaken on variety selection, market
development even before the economics for this crop can be accurately determined. It is recommended that some research on this crop is undertaken to more fully evaluate it.

Oriental tobacco is an interesting crop. It should adapt well to the harsh NCA climate and soils. If the issues associated with handling the crop and developing a market can be overcome, there may be an opportunity to add significantly to the NCA rural economy. It is therefore recommended that oriental tobacco is promoted and commercial organisations are attracted to invest in this crop. Part of this help should be directed towards attracting commercial tobacco organisations outside of Namibia to develop Oriental tobacco. However, it is recommended that some specialist independent advice is given to fully evaluate any offers to develop this crop.

There is considerable interest within the NCA in the production of castor. The main issue for the profitability of this crop is establish a market for the bean which will give a satisfactory return for the farmer. The other dry land crops considered, cowpeas and bambara nuts do not have significant commercial opportunities. However, they both have an important role to play in improving the cropping systems and improving the soil fertility. For these reasons, these crops have a role in the NCA farming systems.

Thatching grass has been reviewed. Already it is an important cash crop, especially in the Caprivi. There is some room for expansion of this market to replace imports from South Africa.

In the longer term the main sector for expansion should be the minor industrial crops. This includes a wide range of crops and often some processing, and adding value, can be easily undertaken. This sector has the advantage as there are a number of opportunities to develop crops which can be grown that are much better suited to the climate and soils of the NCA. It is recommended that considerable efforts are made to develop this sector by employing a number of short term specialists to investigate the potential of opportunities for food colorants, pharmaceutical plants and the less common essential oils. In addition, it is recommended that assistance is given to the NBRI’s team which are attempting to describe the flora of Namibia to help it become more clearly focused towards market opportunities.
<table>
<thead>
<tr>
<th>Crop</th>
<th>Revenue</th>
<th>Margin</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahangu</td>
<td>55.8</td>
<td>21.6</td>
<td>Low capital investment, farmers already understand how to grow the crop</td>
</tr>
<tr>
<td>Wheat</td>
<td>32.0</td>
<td>1.6</td>
<td>High capital investment, good yields will be difficult to because of the NCA climate</td>
</tr>
<tr>
<td>Rice</td>
<td>1.9</td>
<td>0.5</td>
<td>Considerable research and development required; probable environmental issues</td>
</tr>
<tr>
<td>Maize</td>
<td>7.5</td>
<td>2.2</td>
<td>Low capital investment; opportunity confined to Caprivi and East Kavango; price maintained artificially high by the NAB</td>
</tr>
<tr>
<td>Horticulture</td>
<td>7.5</td>
<td>3.8</td>
<td>Very high capital investment; considerable benefits if “home production” is promoted</td>
</tr>
<tr>
<td>Cotton</td>
<td>4.3</td>
<td>2.2</td>
<td>Has an inherent competitive advantage; would benefit from some commercial farmers with irrigation acting as nuclear estates</td>
</tr>
<tr>
<td>Sesame</td>
<td>0</td>
<td>0</td>
<td>Needs long term research and development</td>
</tr>
<tr>
<td>Sunflower</td>
<td>1.1</td>
<td>0.2</td>
<td>Crop limited to the Caprivi and dependant on the success of manual processing</td>
</tr>
<tr>
<td>Soya</td>
<td>0.6</td>
<td>0.3</td>
<td>Not an appropriate crop for the NCA for climate, soils and farming systems; reasons</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>0.6</td>
<td>0.3</td>
<td>Rainfall is not high enough nor consistent enough to make it profitable</td>
</tr>
<tr>
<td>Oriental tobacco</td>
<td>0.6</td>
<td>0.4</td>
<td>Needs considerable research and development as well as a large extension effort</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>0.6</td>
<td>0.4</td>
<td>Good crop to grow with mahangu, but limited market opportunities</td>
</tr>
<tr>
<td>Bambara nuts</td>
<td>0.5</td>
<td>0.4</td>
<td>Good crop to grow with mahangu, but limited market opportunities</td>
</tr>
<tr>
<td>Castor bean</td>
<td>0.7</td>
<td>0.4</td>
<td>The environmental and market issues have to be addressed</td>
</tr>
<tr>
<td>Thatching grass</td>
<td>2.0</td>
<td>1.5</td>
<td>Good returns to the rural community, future expansion will be based on import substitution</td>
</tr>
<tr>
<td>Minor industrial crops</td>
<td>1.0</td>
<td>0.5</td>
<td>Some of these crops may be well adapted to the NCA climate, but needs considerable research and development</td>
</tr>
</tbody>
</table>
### Table 11.2 Projected long term potential for crops in the NCA (N$ millions)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Revenue</th>
<th>Margin</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahangu</td>
<td>64.6</td>
<td>25.0</td>
<td>Low capital investment, should be able to make steady increases in yield through research and development and good extension advice</td>
</tr>
<tr>
<td>Wheat</td>
<td>20.0</td>
<td>1.0</td>
<td>High capital investment, production is likely to fall due to poor profitability</td>
</tr>
<tr>
<td>Rice</td>
<td>1.9</td>
<td>0.5</td>
<td>Considerable research and development required; probable environmental issues</td>
</tr>
<tr>
<td>Maize</td>
<td>10.0</td>
<td>3.0</td>
<td>Low capital investment; should be able to continue steady yield increases</td>
</tr>
<tr>
<td>Horticulture - local</td>
<td>10.0</td>
<td>5.0</td>
<td>Will continue to grow slowly as small-farmers continue to learn how to grow and market horticultural crops</td>
</tr>
<tr>
<td>Horticulture - exports</td>
<td>5.0</td>
<td>2.5</td>
<td>Considerable development work is required</td>
</tr>
<tr>
<td>Cotton</td>
<td>24.0</td>
<td>10.0</td>
<td>An excellent small-holder crop, but considerable extension effort will be required. A N$ 6.0 million investment is assumed for processing and adding value</td>
</tr>
<tr>
<td>Sesame</td>
<td>2.6</td>
<td>1.4</td>
<td>These revenue and margin targets are dependant on the successful development of suitable varieties and an appropriate marketing strategy</td>
</tr>
<tr>
<td>Sunflower</td>
<td>1.1</td>
<td>0.3</td>
<td>Unlikely to expand out of Caprivi region</td>
</tr>
<tr>
<td>Soya</td>
<td>0.6</td>
<td>0.4</td>
<td>Will only be grown in rotation with irrigated wheat</td>
</tr>
<tr>
<td>Groundnuts</td>
<td>0.7</td>
<td>0.4</td>
<td>Will always be a minor crop due to the low rain fall</td>
</tr>
<tr>
<td>Oriental tobacco</td>
<td>2.3</td>
<td>1.6</td>
<td>If this crop is proved to be well adapted to the climate and farming systems and a marketing strategy adopted, these targets could be exceeded</td>
</tr>
<tr>
<td>Cowpeas</td>
<td>0.6</td>
<td>0.4</td>
<td>The cash market will develop very slowly</td>
</tr>
<tr>
<td>Bambara nuts</td>
<td>0.7</td>
<td>0.5</td>
<td>This market may expand a little bit quicker than cowpeas, but will only be slow</td>
</tr>
<tr>
<td>Castor bean</td>
<td>1.1</td>
<td>0.6</td>
<td>Very dependant on developing a profitable marketing outlet</td>
</tr>
<tr>
<td>Thatching grass</td>
<td>2.5</td>
<td>1.8</td>
<td>These targets are dependant on the expansion of the building sector, especially the building of tourist facilities</td>
</tr>
<tr>
<td>Minor industrial crops</td>
<td>25.0</td>
<td>12.0</td>
<td>There could be tremendous potential in this area, but a major effort in research and development will be required; maybe low capital investment required</td>
</tr>
</tbody>
</table>
ANNEX 1

TERMS OF REFERENCE
1. Background

1.1 The RDSP seeks to reduce food insecurity and poverty in the Northern Communal Areas (NCA's) of Namibia. As one component of this policy the promotion of appropriate cash crops for income generation by smallholder (communal) farmers should be considered.

1.2 The basic factors hampering agricultural growth remain limited good land coupled with the erratic rainfall pattern and the scarcity of water generally, although current inaccessibility to markets, services and credit are also constraints in the NCA's. However, farming in the communal areas is seen as offering the greatest potential for increasing agricultural production and productivity to attain household food security, promote import substitution and achieve other national agricultural policy objectives.

1.3 The GRN's recent policy document for discussion amongst staff, farmers and the general public states that there is to be a concentration of government resources on meat and grain production for agricultural growth and employment, at least for the immediate future. Other commodities, such as vegetables, fruit and milk, important for their nutritional value, will receive attention particularly at farm household level. The diversification of agricultural production to increase income and employment generation is also to be encouraged. However, at present there is a lack of information and specific policy on cash crop production by smallholder farmers in the NCA's.

1.4 On a commercial scale, the Namibia Development Corporation (NDC) has a number of large-scale projects producing millet, sorghum, dairy products and vegetables. Individual large farmers or commercial companies have grown or are growing maize, wheat, tobacco, cotton, fruit, cashew nuts and vegetables.

1.5 There have been proposals to grow large areas of both rice and sugar in the Caprivi sub-region on a commercial basis but implementation of all but pilot areas has been stymied by the problems of water rights. Recently the GRN has encouraged the establishment of a cotton ginnery in the Okavango sub-region, but there seems to have been little if any detailed study of the agronomic feasibility of the growing of cotton in the region.

1.6 A limited number of smallholder farmers sell surpluses of cereal crops in years of good harvest, but there is very little income received from other cash crops. Farming families depend heavily on income receipts from non-farm sources, for example wages earned in urban areas and pensions, and, in cases of sudden large demands for income, sales of livestock, principally cattle.

1.7 The GRN is taking steps to bring the cattle herd in the NCA's into the general national market for meat production and the policy is being implemented through the veterinary department of the MAWRD. There is, however, no such co-ordinated policy for cash crop production.

1.8 Whilst the general picture for crop production potential in the NCA's is one of limited soil fertility, severe lack of water and erratic rainfall, in the eastern Caprivi it has been estimated that there are approximately 15,000 ha having high potential for dryland crop production, and
11,300 ha of medium potential for irrigation. These areas are scattered widely throughout the sub-region. The figure may well now be higher, since the survey was carried out in 1982 before the drying up of Lake Liambezi, which has a large area of potentially irrigable land. Elsewhere in the NCAs the choice is limited to riverine areas, where there is potential for small scale simple technology irrigation, or dependence on 350 to 600 mm annual rainfall over a period of four to five months.

2. Objectives of the consultancy

1. Thorough agronomic, economic and socio-economic investigation of the potential for cash crop production in the NCA's.

2.2 Production of a report which will suggest suitable crops for further investigation, and, where possible, which crops may be given immediate attention by the planning, research and extension branches of the MAWRD.

3. Possible crops to be considered and aspects of their development potential

3.1 The table below suggests crops which may be considered, amongst others, for development as cash crops for the NCA's.

<table>
<thead>
<tr>
<th>Mainly for food security and/or import substitution</th>
<th>Mainly having potential for export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl millet</td>
<td>Groundnuts</td>
</tr>
<tr>
<td>Sorghum</td>
<td>Soya beans</td>
</tr>
<tr>
<td>Maize</td>
<td>Tobacco</td>
</tr>
<tr>
<td>Wheat</td>
<td>Chillies</td>
</tr>
<tr>
<td>Groundnuts &amp; bambara nuts</td>
<td>Paprika</td>
</tr>
<tr>
<td>Beans</td>
<td>Cotton</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>Pecan nuts</td>
</tr>
<tr>
<td>Cassava</td>
<td>Cashew nuts</td>
</tr>
<tr>
<td>Bananas</td>
<td>Sugar-cane</td>
</tr>
<tr>
<td>Pawpaws</td>
<td></td>
</tr>
<tr>
<td>Mangoes</td>
<td></td>
</tr>
<tr>
<td>Avocados</td>
<td></td>
</tr>
<tr>
<td>Citrus</td>
<td></td>
</tr>
<tr>
<td>Grenadillas</td>
<td></td>
</tr>
<tr>
<td>Fresh-market vegetables</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
</tr>
</tbody>
</table>
3.2 The emphasis in government policy is on the development of the farm family unit in the NCA’s, and these farming systems should be given highest priority in considering crops for development. However, the possibilities of large-scale commercial farming should also be considered, where appropriate. In this aspect the consultants will need to seek the guidance of MAWRD officials to ensure that their recommendations are in line with current policy objectives.

3.3 The consultants will need to consider the comparative advantages of growing the crops under consideration and provide indications of the value of their cultivation from the points of view of a) household food security; b) household income; c) possible socio-economic effects; d) national product.

4. Suggested methodology

4.1 The consultants should, after initial meetings with MAWRD, NDC and other officials in Windhoek (up to one week), travel throughout the NCA’s for two to three weeks and then return to Windhoek to present a preliminary report (three weeks for this phase).

4.2 After presentation and discussion of this preliminary report at a panel discussion forum the consultants should prepare their final report, a draft of which should be presented before departure from Namibia (three weeks for this phase). 

4.3 The final report should be available to the MAWRD and the RDSP not more than one month after the departure of the consultants.

5. Qualifications of the consultants

5.1 The two consultants should combine the disciplines of agronomy and agricultural economics with an understanding of production and marketing economics and sociological issues within their CV portfolios.

5.2 Each should have an appropriate academic degree with at least ten years of relevant experience which should include a substantial proportion in agricultural development in sub-Saharan Africa.

6. Timing of the consultancy

6.1 As soon as possible (not season-specific).