Ministry of Agro Industry and Fisheries

Strategic Options in Crop Diversification and Livestock Sector (2007 - 2015)

August 2007
Strategic Options in Crop Diversification and Livestock Sector 2007-2015 (Draft for Consultation)

August 2007

This document is merely indicative and consultative in nature. It should be viewed in the context of government and private sector policies.
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SECTION 1 - INTRODUCTION

With the need to review the Non-Sugar Sector Strategic Plan (NSSSP) 2003-2007 and complementary to the Multi Annual Adaptation Strategy (MAAS) in the sugar sector, and also to review our food policy, this document proposes a programme for the non-sugar agriculture for the period 2007-2015. It takes into account Government policy for promoting access to agricultural land, agribusiness, good agricultural practice, improving food quality and safety, reducing dependency on import, promoting export, and ensuring food security.

The overall goal of the programme is to significantly increase food and agricultural production in a competitive and sustainable manner by the year 2015 through innovative production methods, novel products development while opening access to new markets.

Aim of the Programme

The objective is to provide a much-needed strategic direction to stakeholders in the non-sugar agriculture. It takes account of the new environment (increasing tourist number, globalisation, and climate change among others) which warrants a fresh look and approach towards diversification for the period 2007 to 2015.

Thus the specific objective of this plan is to map out strategies to enhance the role of agriculture and in particular the non-sugarcane sector in the economy and society, with a view to:

(i) improving standards of living of the population and the increasing demand for better quality and safer food products;
(ii) enhancing the level of self-sufficiency in a number of selected agricultural products;
(iii) revitalising the livestock sector;
(iv) developing a modern agricultural sector in tune with the sophistication taking place in other sectors of the Mauritian economy;
(v) economically and technically empowering the agricultural community especially the younger skilled generation by giving them opportunities and appropriate support to enable them to emerge as agricultural entrepreneurs;
(vi) sharpening our competitive edge on the export front with quality and diversified products taking into account the trade liberalisation and globalisation process and cross border initiatives; and
(vii) seizing all opportunities on the regional front to develop Mauritius into an agro-business hub.

Structure of the Document

The document comprises a background and three sections which cover horticultural and livestock programme and support measures and services.
The contribution of agriculture to the GDP over the last 5 years (2001-2005) declined from 6.9% to 5.8%. This was attributed to a general reduction in the national agricultural production as indicated below:

<table>
<thead>
<tr>
<th>Agricultural Commodity</th>
<th>Production (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2001</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>5 792 000</td>
</tr>
<tr>
<td>Cane yield (t/ha)</td>
<td>79.1</td>
</tr>
<tr>
<td>Sugar production</td>
<td>645 597</td>
</tr>
<tr>
<td>Foodcrops</td>
<td>129 119</td>
</tr>
<tr>
<td>Abattoir slaughter- Carcass Wt (all species excluding poultry)</td>
<td>5 490.8</td>
</tr>
<tr>
<td>Poultry</td>
<td>27 200</td>
</tr>
</tbody>
</table>

On average the total food requirement of the country is estimated at 686 000 t annually, with a local production meeting only 23% of our consumption. In 2005, imports of agricultural and food products in 2005 amounted to some Rs 15 492 M (17% of out total import and an increase of 50% since 2000). This import bill keeps on increasing every year. The value of imports from the livestock sector stood at Rs 3 561 M, products from the crop sector were imported to the tune of Rs 6 312 M and the bulk was made of the staple food items (rice and flour).

Foodcrop production in Mauritius is dominated by small scale farming with an average holding of 0.25 ha and a few large farms that are greater than 10 ha. A wide range of crops are cultivated including potatoes, onions, tomatoes, chillies, crucifers, garlic, and ginger. Fruits other than banana and pineapple mainly come from backyard production. Crop production continues to be under rainfed conditions resulting in surplus vegetable production during the winter months and a shortage in the summer months. Since some years, foodcrop production for a limited number of commodities namely tomatoes, sweet pepper, cucumbers are undertaken under soilless protected structures to which Government has given incentives for its development. The annual domestic demand for foodcrops ranges from 90 000 to 110 000 t and a large amount of processed food is imported on a regular basis to meet local demands. The value of processed food imported on an annual basis is over Rs 761M.

The main constraints for increasing foodcrop production are availability of suitable land and labour, irrigation facilities, increasing cost of energy and theft, while pest and disease needs to be controlled.

The dependency on imported meat and milk continues to increase over the last 5 years. In 2005, the local meat production (excluding poultry meat) was 1 300 t and met only 6% of our requirement which amounted to 21 800 t. In respect to the demand for eggs and poultry, the country is self sufficient. Nonetheless almost all inputs for the poultry sector are imported.

Regarding milk and milk products the local production is estimated at 400 t for a total requirement of 21 700 t, i.e. the country is only 2% sufficient and the tendency in the sector is on the decline.
Overall Challenges of the Non-Sugarcane Agricultural Sector

The non-sugarcane agricultural sector in Mauritius is faced with several challenges. On the domestic front, the non-sugarcane sector which comprises of horticulture, livestock, and agro-industry faces weaknesses at production, marketing and institutional levels, which needs to be addressed.

Production is constrained by:

(i) access to new technologies to give a new impetus to the sector and to keep up with market exigencies;
(ii) high cost of key inputs mainly labour cost and high prices of agro-chemicals;
(iii) inadequate mechanisation and insufficient irrigation facilities;
(iv) inadequate planning of production as per market demand;
(v) scarcity of raw materials for agro-industries;
(vi) presence of various non-economic factors which affect predictability of production, such as pest incidence and adverse climatic conditions;
(vii) inadequate investment and planning in research, intensive technologies, and capacity building;
(viii) low uptake of modern management practices;
(ix) gradual erosion of the resource base, that is land and labour, in favour of more remunerative sectors such as manufacturing, tourism, and services;
(x) Failure of farmers grouping and
(xi) Resistance to change and unwillingness to take risk.

The absence of a proper marketing strategy with modern market facilities is another set of constraints to the development of the Mauritian non-sugar agricultural sector. In the present practice, there has been no efficient link between the production line and the marketing system, such that it has, up to now, not been possible to effectively plan production according to the market demand. As a result, the country, is often confronted to extreme situations whereby at times there is a shortage of certain items of foodcrops on the local market, while there is overproduction at other times.

At the institutional level, weaknesses, real or perceived, relate to coordination in information dissemination, strategy with the service-orientation to farmers/agro-entrepreneurs and response to the needs and requirements in the agricultural supply chain.

At the level of the planting community, attempts to regroup planters and farmers under associations and cooperatives have often been unsuccessful. This has hindered the possibility of the planting community of benefiting from existing facilities that they could have secured as a group (e.g. mechanisation and irrigation facilities).

On the international front, the combined effects of multilateral and regional trade liberalisation are causing unprecedented changes on the economic scene and are imposing major challenges on the competitiveness front. Agricultural commodities produced at lower prices in other producer countries will compete with local production both for domestic and export markets. Moreover, Mauritius being a vulnerable island state, it will be relatively
difficult to cut down cost of production to such extent as to compete with big producer countries which have a better comparative advantage.

Trade liberalisation within the Southern African Development Community (SADC), Common Market for Eastern and Southern Africa (COMESA) and the Sanitary and Phytosanitary Agreement of the World Trade Organisation (WTO) will increasingly open markets and encourage new entrants.

The geographical isolation and size of Mauritius limits the production capacity at competitive cost and result on high dependency on imports. The country is thus vulnerable to changes in world commodity prices, increasing freight cost and by currency fluctuations.
Vision for Non-Sugar Sector

The Country Strategic Plan of the Government of Mauritius (GoM), identifies the re-adaptation of the sugar sector, the need for technological maturity in the non-sugar sector as its key priorities for the agricultural sector. The governing principle of the GoM in these sectors is to restructure and consolidate, with a view towards exploiting new profitable opportunities, and venturing into the exploration of new technological avenues to engender economic growth, and by implication reduce poverty level. Thus, although the manufacturing, tourism, services and ICT sectors have gained important ground in presenting the back-bone of the Mauritian economy, agricultural development nonetheless remains a strategic priority as per following opportunities offered in the Government programme:

- Assist entrepreneurs in improving their productivity, quality and output.
- Assist agro-producers in marketing their products
- Assist stakeholders in the agro-industry in an export-oriented agro-production, including conservation techniques, value-addition, packaging techniques and market research and access.
- Access to land for the farming community and agro-entrepreneurs.

It is envisaged that land under sugarcane will be released at a greater pace consequent to the drastic reduction in sugar price. It is expected that by 2015, some 7 000 ha, now under sugarcane, would be available for agricultural and other uses. These include some 5 000 ha that are classified as difficult areas as they are found in highly rocky and sloppy regions or mountain slopes. These lands are cultivated by small planters and metayers.

It is considered vital for environmental and social reasons to keep these areas under cultivation in these regions. Soil erosion from less stable land use may cause sedimentation and eutrophication in downstream lagoons or water bodies. The implications on the coral reef would be particularly significant. Hence the maintenance of these lands under cultivation of fodder, trees and soil conservation species producing high biomass has been recommended.

With the promotion of SMEs in the agricultural sector, there is considerable scope to substitute a large volume of our food and processed agricultural products. It will be recalled that Mauritius imports a substantial volume of agricultural and food products. In 2005, imports of agricultural and food products in 2005 amounted to some Rs 15 492 M. This import bill keeps on increasing every year. The value of imports from the livestock sector stood at Rs 3 561 M, products from the crop sector were imported to the tune of Rs 6 312 M and the bulk was made of the staple food items (rice and flour).

Within the agricultural sector, the following main priority areas for medium term investment programme can be identified.
Priority I: Modernisation and Competitiveness of Agriculture.

- **Promoting value addition to agricultural produce, in particular through agro-processing**, building upon Mauritius’ capacity to deliver reliable industrial services, through increased support services and clustering. Processors would use domestic produce as well as primary produce from regional investments, as well as regional purchasing.
- **Promoting modern production techniques**, including intensification and greenhouse cultivation, protected cultivation, integrated pest management, and capacity building in production, handling, processing and sales.
- **Enhancing and monitoring the quality of produce** through strengthening of regulatory and inspection services including laboratory services (Food Technology Laboratory), as well as certification capacities, and through increased capacity building in crop management techniques to reduce pesticides residues, including Integrated Pest Management to meet international standards.
- **Improving the physical and operational conditions of markets** in Mauritius to enhance quality and food safety and to increase transparency in price setting and distribution, and developing an effective Market Information System which would provide information on market prices as well as production.
- **Developing niche products through market intelligence** for domestic and export markets, including organic agriculture (in particular in Rodrigues).

Priority II: Sustainable land management and water control systems. The development of efficient water control systems and of sustainable land management remains a priority in agricultural development in Mauritius.

- **Developing new large and small scale irrigation facilities** through the completion of the 2nd Phase NPIP and the construction of selected small scale schemes.
- **Improving the efficient utilization of water resources** in agriculture, through sensitization of irrigation developers and planters on efficient irrigation techniques, and strengthening the institutional set-up to oversee and promote efficient irrigation development.
- **Improving land preparation** through fine derocking for foodcrop growing.

Cross-cutting

- **Investing in the protection of watersheds** in particular through forest conservation, reforestation and improved land management (including sustainable grazing in Rodrigues).
Priority III: Agricultural research, technology dissemination and adoption.

- **Strengthening R & D support** in order to provide high yielding planting materials, precise and rapid diagnosis and treatment services in horticulture and livestock, efficient biological control mechanisms, modern production systems and soil-less cultivation techniques, environmentally friendly production techniques, efficient post harvest techniques and handling methods to minimize losses, optimized techniques for food preservation and processing to develop the local agro-industry.

- **Capacity building of scientific and technical staff** to improve service delivery, in particular technical training, in new and improved primary production techniques, land management and value-addition.

- **Technical training of planters/farmers in modern production techniques**, land management and value-addition.

- **Conservation of natural biodiversity and plant genetic resources** especially threatened endemic resources.

**Cross-cutting:**

- Establishing and maintaining a database on the agricultural sector.

Priority IV: Reducing factors of risk in food supply and addressing the needs of the vulnerable groups

**Climatic and environmental threats**

- Cyclone preparedness and damage mitigation.
- Insurance: Developing crop insurance schemes for the non-sugar sector.

**Rural and peri-urban poverty alleviation**

- Community development programmes for the vulnerable groups in deprived areas (pockets of poverty) including capacity building for income generation.
- Small scale livestock rearing and crop cultivation, small scale agro-processing and trading and crafts.
- Facilitating access to land for agricultural purposes to the vulnerable groups.
- Improved coordination between existing poverty alleviation programmes to align incentives and enhance impact.

Priority V: Environment

Priorities in environmental protection and sustainable management of natural resources related to rural development include:

- Judicious use of pesticide.
- Waste disposal management.
- Contamination of water.
- Prevention of erosion
SECTION 2 - HORTICULTURAL DEVELOPMENT PROGRAMME

The general objective of the horticultural programme during the planned period is to facilitate commercial production of crops to ensure food security and quality, foreign exchange savings and sustainable development as well as improving the health of the nation. As part of the operational strategy the programme has been divided into three sub-programmes namely foodcrops, fruits and ornamentals. These programmes will be supported by marketing, communication, engineering and crop protection. The specific objectives of the horticultural programme include the production of crops to meet consumption, extending the period of vegetable and fruit production, improve food quality and safety through adoption of Good Agricultural Practice and Good Manufacturing Practice and certification; producing novel and healthy food crops, increase export, strengthening of farmer organizations; improving research and farmer training.

The critical areas to be addressed during the planned period would be access to land and irrigation, clustering/networking of farmers, transfer of technology to producers, technology to process agro-products. Special attention would also be placed on the production and marketing of local agro-products for both the domestic and export markets, setting up of a functional Marketing Unit to identify and develop markets in the sub-region and lay emphasis on minimizing environmental damages.

The following parameters have been considered for best choice of crops a priori:

1. Reducing dependency on imports for food sovereignty and substitute imports as far as possible, with emphasis on crops for industrial products.
2. Promoting production of commodities that can serve as raw materials for value addition and processing.
3. Catering for increasing demands of both the domestic market and the tourist consumption.
4. Broadening the production base to include novel/underutilised crops.
5. Strengthening opportunities for export of selected commodities.

Situation Analysis

The average annual production of foodcrop over the last 5 years amounts to 100 000 t which are produced on some 3 500 ha of land on which approximately 2 crop cycles are achieved. With the new projection of tourist arrival, the natural increase of the population and introduction of novel crops it is expected that demand for foodcrop will increase to 125 000 t and an additional land area of 1 100 ha. In periods of shortage especially during cyclones
and drought the country imports fresh vegetables to supplement the local production. This amounted to some 1,300 t in 2005. Frozen vegetables and special agricultural commodities are imported throughout the year for the local market and the tourist industry.

**Scope and Opportunities**

With the expected increase in land availability, horticultural production is bound to improve.

- Local vegetable production must imperatively be kept at a self-sufficiency level since imported vegetables are costly and may lead to a loss in foreign exchange and opportunities in this sector are expected to broaden.
- Vegetables and fruits produced locally present great scope for minimal processing, transformation and value addition. It is an area where many benefits can be derived if appropriate post-harvest practices are utilized, such as the extension of shelf-life using packaging techniques, pre-cooling and cool chain management.
- The demand for fresh and processed vegetables is increasing in supermarkets, hotels and restaurants.
- Many vegetables can be used either singly or blended with fruits to produce juice.
- The agro-processing industry can utilize available horticultural produce as raw materials to manufacture dried, frozen and canned products.
- To further expand ornamental production.
FOOD CROP

Potato

Potato is a regularly consumed product both in fresh and processed form. This commodity is still imported to meet local demand during off season. The current consumption is estimated at some 24,000 t yearly. Currently, around 11,000 t (46%) are imported while the rest is produced locally. In addition, the country imports around 1,400 t of potato in processed form either as chips, powder for mash and frozen chips amounting to Rs 137.5 M in 2005. Over the period of 2001-2005, the cost of imports alone has risen by 47%. Given that the country produces only 54% of its requirement, excluding processed forms, there is considerable scope to increase production. Thus, with the increase demand in the tourist industry, the processing industry and natural increase in local consumption, the country needs to increase potato production significantly. To attain 70% sufficiency, an additional 13,000 t of fresh potato is needed requiring an additional land area of 625 ha to meet our consumption by 2015. One major limiting factor that needs addressing is the availability of seed potato.

Scope and opportunities

- Fresh and processed production
- Seed production

Accompanying measures

- Loan facility for diversification programmes (Derocking, installation of irrigation and fertigation, and purchase of machinery).
- Technical support in agronomy, pest and disease control and agro-processing.
- Facility for soil analysis by MSIRI, and Agricultural Chemistry Division of the Ministry.
- Availability of certified seeds (local and imported)
- Facilities from SEHDA to set up SME in potato processing.
- Leaflets and booklets on potato production are available to guide producers on the most recent improved cultural practices.
- The Small Planters Welfare Fund provides insurance to potato producers.
- Financial assistance is provided by Development Bank of Mauritius and commercial banks.
- Further scope to develop application of new technologies under the ATDS,
- The Agricultural Marketing Board provides the necessary marketing structure and regulates potato prices in addition to supplying of seed potato.
Tomato

The value of the tomato industry is estimated to be around Rs 300 M with an annual production of 14 700 t over an area of 935 ha and at a market price ranging from Rs 13.00 to 105.00 / kg. The production of salad tomato is estimated to be around 2 000 t yearly. The average per capita consumption of fresh tomato is around 12 kg/year.

Tomato Production and Area Harvested (2000-2007)

Tomato is also consumed in several processed forms like puree, ketchup, juice, canned and peeled tomato and are mostly imported.

Scope and Opportunities

- Release of land from sugarcane plantation.
- Government policy in terms of support to agro-processing industry.
- Value added to tomato through processing, i.e. production of processed products (whole peeled, paste, ketchup, tomato juice, dehydrated tomato, pickle, crystallised).
- High demand especially to cater for tourist industry (salad and cherry tomato).
- Production of planting material in terms of seed and seedling.

Land suitability and suitable areas

Tomato grows on all types of soil, but is best adapted in light, well drained and fertile soils with a neutral to slightly acid pH of 5.5 to 7.0. It can be grown throughout the year round in the Humid and Sub-humid zone. Peak production occurs during the months of November to January.

Target production

The local production of tomato should be increased to some 28 000 t by 2015 to meet the increasing demand of the growing population and the boost of the tourist industry taking into account our requirement for fresh consumption as well as for use as raw materials for the
processing industry. Thus, an additional 710 ha will be required and the infrastructure for post harvest handling and processing must be provided.

**Implementation Plan**

This projection has been done in order to achieve the set target over the 8 years as shown below.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (t)</td>
<td>10 922</td>
<td>12 839</td>
<td>17 500</td>
<td>28 000</td>
</tr>
<tr>
<td>Area (ha)</td>
<td>850</td>
<td>918</td>
<td>1 112</td>
<td>1 644</td>
</tr>
</tbody>
</table>

**Capital Required**

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation and de-rocking</td>
<td>108</td>
</tr>
<tr>
<td>Irrigation and fertigation</td>
<td>232</td>
</tr>
<tr>
<td>Provision of seeds</td>
<td>11</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>401</strong></td>
</tr>
</tbody>
</table>

**Accompanying measures**

- Loan facility for diversification programmes (Derocking, installation of irrigation and fertigation, and purchase of machinery).
- Technical support in agronomy, pest and disease control and agro-processing.
- Facility for soil analysis by MSIRI, and Chemistry Division of the Ministry.
- Availability of planting material (seeds) of locally bred varieties at Barkly ES and other centres and hybrid varieties from several private companies.
- Facilities from SEHDA to set up SME in tomato processing.
Onion

The onion industry represents an annual value of Rs 126 M. The crop is grown over some 300 ha with an average production of about 9 000 t. The annual per capita consumption of onion in Mauritius is around 8-10 kg.

The local consumption of onion has been increasing over the recent years and is presently at 14 000 t/year. Some 30% of our requirement is produced locally and the rest is met through imports worth some Rs100 M annually.

Onion production and import (2000-2007)

Onion is produced locally using sets as well as from seedlings. The quality of onion in Mauritius has been improving significantly through the use of better performing onion varieties, appropriate water and fertiliser management, pest and disease control and post harvest management.

Opportunities/Scope

Onion has a good potential as an import substitution crop since 70% of the local requirement is imported. The commodity is commonly used as dried bulbs or green onion. However, it can also be widely used in the agro-processing industry to make value-added products such as onion pickles, flakes and powder especially if supported by proper marketing.

The local production can be increased by making greater use of sets for early onion production and use of suitable varieties that allow for an extension of the usual growing season. The crop also offers a great potential in terms of opportunities for the mechanisation of production activities where equipment such as direct seeding machine, the bed former and the onion harvester can be used.

New onion growing areas with optimal agro-climatic conditions have been identified especially in the Northern districts to widen the scope for onion production. The crop is supported by a local breeding programme and new varieties are available to boost the production.
To substitute partly for imports and to cater for the growing local and tourist population, a target production of 19,000 t of onion is envisaged by 2015. This will require some additional 350 ha for cultivation.

Land suitability and suitable areas

Onion requires a fertile, well drained soil with pH of 6.0 to 6.8 and a temperature range of 20 to 25 °C for optimum production. It can be grown on various soil types such as Latosollic Brown Forest, high clay Latosol and sandy loamy to dark magnesium clay.

Implementation plan

To achieve the target production of 19,000 t by 2015, a planned phase of production schedule has been proposed as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production (t)</td>
<td>11,485</td>
<td>5,200</td>
<td>8,600</td>
<td>19,000</td>
</tr>
<tr>
<td>Area (ha)</td>
<td>336</td>
<td>253</td>
<td>340</td>
<td>550</td>
</tr>
</tbody>
</table>

It is also proposed that the target production would emanate in equal proportion from sets and seedlings.

Capital Required

<table>
<thead>
<tr>
<th>Items</th>
<th>Cost Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onion seeds for sets and seedlings</td>
<td>56.84</td>
</tr>
<tr>
<td>Chemicals (insecticides/fungicides)</td>
<td>20.80</td>
</tr>
<tr>
<td>Labour</td>
<td>33.20</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>10.90</td>
</tr>
<tr>
<td>Mechanisation</td>
<td>6.50</td>
</tr>
<tr>
<td>Set processing, storage &amp; marketing</td>
<td>2.00</td>
</tr>
<tr>
<td>Seed production and processing</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>131.40</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Financial support for the purchase of light machineries to reduce the cost of production. (Bed former, sowing machine, direct seeding machine harvester set planting machine)
- Financial support for set processing, storage and marketing.
- Soil analysis facilities provided by Agricultural Chemistry Division of the Ministry and MSIRI.
- The AMB coordinates all aspects of seed supply and marketing of onion. Producers need to register to obtain the facilities offered.
- Financial assistance is provided by the DBM and other commercial banks.
- SEHDA is providing information and assistance to potential entrepreneurs to set up SME in onion processing and marketing.
Chillies

An average annual production of 1 200 t of chillies over an area of some 230 ha has been produced over the last 5 years.

Scope and Opportunities

Some 7 t annually of processed chilli products in the form of sauce, paste or as chilli powder or preserved in brine, oil and vinegar and in pickles have been exported to different countries in the past. However, a large volume of about 400 t of chilli in the dried form and processed products (import value of Rs 8 M in 2005) is also being currently imported. This clearly indicates its potential as an import substitution commodity. Its utilisation as raw materials for the agro-processing industry already exists and this can be further enhanced as it holds numerous opportunities for transformation and value addition for the local and export markets.

Chilli can be cultivated on lands released from the sugarcane industry and also presents some opportunities for specialized activities such as seed and seedling production.

The local chilli production averages 1 200 t annually. A target production of 3 000 t has been set for 2015 to cater for the increasing demand. This will require a total of 600 ha of land.

Land suitability and suitable areas

Chilli grows well on all types of soils provided it is light, deep, well drained, rich in organic matter and slightly acid (pH 5.5-6.5). The crop can be grown all year round in the humid and sub-humid zone provided irrigation facilities are available.
Implementation Plan

To achieve the annual target of 3 000 t of chilli production by 2015, a planned phase of production schedule has been proposed as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>202</td>
<td>223</td>
<td>380</td>
<td>600</td>
</tr>
<tr>
<td>Production (t)</td>
<td>904</td>
<td>1160</td>
<td>1 888</td>
<td>3 000</td>
</tr>
</tbody>
</table>

Capital Required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation and de-rocking</td>
<td>26</td>
</tr>
<tr>
<td>Irrigation and fertigation</td>
<td>73</td>
</tr>
<tr>
<td>Provision of seeds</td>
<td>1</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>107</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Loan facility for De-rocking, installation of irrigation and fertigation, and purchase of machinery.
- Technical support in agronomy, pest and disease control and agro-processing.
- Facility for soil analysis conducted MSIRI, and Agricultural Chemistry Division of the Ministry.
- Availability of planting material (seeds) of local varieties at Barkly ES and other Centres and hybrid varieties from several private companies.
- Facilities from SEHDA to set up SME in chilli processing.
Crucifers

The most common locally grown crucifers are cauliflower, cabbage and broccoli. The annual per capita consumption is around 4-5 kg and 2-3 kg for cabbage and cauliflower respectively and the local production is around 6,000 t. Mauritius is self-sufficient in all these commodities, import is allowed only when there is post-cyclone shortage in vegetables. A significant amount is imported as frozen and as baby vegetables.

Scope and opportunities

With the growing health concern and awareness about the anti-cancer properties of crucifers, the increasing population and tourist industry an annual production of some 7,420 t is being targeted by 2015. This would require an additional 90 ha of land under crucifer cultivation. Summer varieties are under evaluation to cater for the period when production is limited. Opportunities exist for minimal processing and frozen products.

Land suitability and suitable areas

The crucifers prefer a Humic Ferruginous Latosol soil type and are particularly adapted to the climate of the central plateau and the southern districts. They are seasonal and thrive
best under cool to warm conditions of 15 to 25 °C with high humidity. Optimum growth occurs at a monthly average temperature of 15.5 – 18 °C.

**Implementation plan**

Based on the growing population and increase in tourist’s arrival and assuming a per capita consumption of 1.5 kg/year, the following production schedule is being proposed:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>310</td>
<td>333</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Production (t)</td>
<td>5938</td>
<td>6309</td>
<td>7422</td>
<td></td>
</tr>
</tbody>
</table>

**Capital Required**

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation and de-rocking</td>
<td>20.0</td>
</tr>
<tr>
<td>Irrigation and fertigation</td>
<td>32.0</td>
</tr>
<tr>
<td>Provision of seeds</td>
<td>2.4</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>17.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72.1</strong></td>
</tr>
</tbody>
</table>

**Accompanying measures**

- Loan facility for de-rocking, installation of irrigation and fertigation, and purchase of machinery.
- Technical support in agronomy, pest and disease control and agro-processing.
- Facility for soil analysis conducted by MSIRI and Agricultural Chemistry Division of the Ministry.
- Availability of seeds of local varieties at Barkly ES and other Centres and hybrid varieties from several private companies.
- Facilities from SEHDA to set up SME in agro-processing.
Carrot

The per capita consumption of fresh carrot averages 4 kg annually with a local demand of around 4 300 t annually. Carrot is also consumed in several processed forms like frozen, juice, canned and pickles. Around 3-4 t are imported annually in processed forms. However, special import permit for fresh carrots is granted to suppliers following bad weather conditions. A production target of 5 600 t can be envisaged by the year 2015. This will require an additional 80 ha to be cultivated.

Currently there is an increasing demand for quality produce and consumers are ready to buy imported quality carrot even at higher prices. Thus, there is a need to improve the quality of locally produced carrot. The poor quality of carrots is due to forking, splitting, secondary roots, greening, bruises and carrots of variable size/shape which arise from poor cultural practices at different production stages and unfavourable climatic conditions.

Implementation plan

Based on the growing population and increase in tourist arrival and assuming a per capita consumption of 4.0 kg/year, a production forecast has been worked out.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>699</td>
<td>262</td>
<td>400</td>
<td>530</td>
</tr>
<tr>
<td>Production (t)</td>
<td>11 461</td>
<td>3 934</td>
<td>6 000</td>
<td>8 000</td>
</tr>
</tbody>
</table>

An annual production of some 5 610 t of carrots should be envisaged by 2015. To attain this objective a total of 350 ha will be required.

Capital Required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation and de-rocking</td>
<td>17.8</td>
</tr>
<tr>
<td>Irrigation and fertigation</td>
<td>28.4</td>
</tr>
<tr>
<td>Provision of seeds</td>
<td>0.5</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49.4</strong></td>
</tr>
</tbody>
</table>
Scope and Opportunities

- Extension of shelf-life using packaging techniques, minimal processing, pre-cooling and cool chain management.
- Fresh and processed product for supermarkets, hotels and restaurants.
- Minimally processing of shredded carrot to local and regional markets.
- Transformed product into pickles and preservation in brine.
- Juice production.

Land Suitability

Carrot prefers light textured soil (sandy/sandy loam soils) with high organic matter. Ideally soils should be deep, friable, fertile stone free and relatively high in organic matter. Uniform soils, in good physical conditions with a soil particle structure providing good nutrient and water holding-capacity, and free of compacted layers are desired attributes. A soil pH of 6.0 to 7.5 is desirable. The climate and soil are particularly suitable in the central plateau, the northern and the southern districts.
Cucurbits

Cucurbits comprise pumpkin, cucumber, watermelon, squash (patissou), zucchini (courgette), melon, chayote (chouchou), bottlegourd (calabash), ridgegourd (pipengaille), bittergourd (margoze) and snakegourd (patole). Presently, the cucurbits production amount to 27 500 t over an area of 1 850 ha.

Scope and Opportunities

To cater for the increasing population and the expansion of the tourist industry, a target production of 33 800 t for the main cucurbits (pumpkin, cucumber, squash, chouchou, calabash and watermelon) has been set. This will require some additional 427 ha of cucurbits by 2015.

Most cucurbits can be grown on lands that are marginally suitable such as the ex-tea belt where the production of other vegetables is limited. Cucurbits can be grown on slightly sloping lands for soil conservation and erosion control.

Land suitability

Cucurbits can be grown on a wide range of soil types which are preferably light, well drained and rich in organic matter with a pH of 6.5 to 7.5. They are adapted to warm season and thrive best under temperatures ranging from 23 to 30°C.

Implementation Plan

In order to achieve the production target of 33 800 t by 2015, the following production schedules are proposed:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumpkin</td>
<td>Area (ha)</td>
<td>349</td>
<td>395</td>
<td>569</td>
</tr>
<tr>
<td></td>
<td>Production (t)</td>
<td>5113</td>
<td>5299</td>
<td>8340</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Area (ha)</td>
<td>510</td>
<td>440</td>
<td>544</td>
</tr>
<tr>
<td></td>
<td>Production (t)</td>
<td>6046</td>
<td>4906</td>
<td>7380</td>
</tr>
<tr>
<td>Squash</td>
<td>Area (ha)</td>
<td>258</td>
<td>125</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Production (t)</td>
<td>2683</td>
<td>1263.5</td>
<td>873</td>
</tr>
<tr>
<td>Chouchou</td>
<td>Area (ha)</td>
<td>234</td>
<td>180</td>
<td>195</td>
</tr>
<tr>
<td></td>
<td>Production (t)</td>
<td>5271</td>
<td>3761</td>
<td>426</td>
</tr>
<tr>
<td>Calabash</td>
<td>Area (ha)</td>
<td>357</td>
<td>399</td>
<td>428</td>
</tr>
<tr>
<td></td>
<td>Production (t)</td>
<td>4586</td>
<td>4602</td>
<td>5885</td>
</tr>
<tr>
<td>Watermelon</td>
<td>Area (ha)</td>
<td>99</td>
<td>100</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Production (t)</td>
<td>2529</td>
<td>2579</td>
<td>3059</td>
</tr>
</tbody>
</table>
Accompanying measures

- Loan facility for de-rocking, installation of irrigation and fertigation, and purchase of machinery.
- Technical support in agronomy, pest and disease control and agro-processing.
- Facility for soil analysis conducted MSIRI, and Agricultural Chemistry Division of the Ministry.
- Availability of seeds of local varieties at Barkly ES and other Centres and hybrid varieties from several private companies.
- Facilities from SEHDA to set up SME in agro-processing.
Maize

Maize is being grown in both pure stand cropping and in intercropping with sugarcane. It is used for both human consumption and for animal feed. Past production during the 80’s was mainly meant for grain maize for the livestock and poultry industry. As from 1986, the area under maize, which peaked 1 800 ha (quantity in t) declined due to cheap imports. Production has averaged 350 t over the last five years and is limited to green cobs mainly for the local market.

An average of 75 000 t of shelled maize is imported annually from Argentina at a cost of Rs 386 M. Over the last three years, the average price of imported maize c.i.f. was Rs 5 200/t and rose to Rs 8 500/t in 2007.

Scope and Opportunities

Given the escalating price of fuel oil on the international market, major producing countries such as Canada and Brazil are turning to biofuel as part replacement of fuel oil. Maize is actually being given priority for biofuel production rather than other uses. Hence, this may explain the abrupt increase in the import price of maize.

In this context, large-scale production of maize for animal feed can be feasible assuming that the above increasing price trend is maintained and that maize cultivation and processing is fully mechanised. In addition, maize stover once recuperated, is an excellent source of cattle feed due to its nutritive value, digestibility and palatability.

Production of maize as a dual purpose crop both for green cobs and baby corn can be envisaged given the demand for fresh baby vegetables to cater for the ever-increasing tourist market. There is scope for canned baby corn provided that optimal yields are obtained to offset the effect of high cost of production.

In order to achieve 100 % import substitution, 6 000 ha of land would be required. A safe and realistic working hypothesis would be to substitute 10% of total imports at a targeted projection of 7 500 t of maize by 2015 requiring 600 ha of land.

Land suitability

Maize can be grown throughout the year except for the coolest months on the Central Plateau (June – August) and during the cyclonic season (November - March). Optimal yields are obtained in the North, East and South under moderately to highly suitable lands at pH range of 5.0 – 7.5 and with irrigation facilities.

Implementation plan

To achieve the expected output (7 500 t of processed maize kernels), the following time schedule is proposed. In the first year, 75 ha of land will be cultivated and will require importation of 600 kg of seeds (seed rate: 8kg/ha).

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>45</td>
<td>75</td>
<td>225</td>
<td>600</td>
</tr>
</tbody>
</table>
Capital required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation and de-rocking</td>
<td>27.0</td>
</tr>
<tr>
<td>Provision of seeds</td>
<td>3.9</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>15.5</td>
</tr>
<tr>
<td>Equipment &amp; Mechanisation</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>52.4</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Financial support is required for the supply of good quality seeds to growers.
- Research and extension staff to provide support to growers on the GAP.
- Support from collaborating institutions (SPMPC, MOAIF, and SEHDA) to encourage clustering of growers to share mechanisation and input funds.
- Loan facility for de-rocking, installation of irrigation and fertigation, and purchase of machinery.
- Technical support in agronomy, pest and disease control and agro-processing.
- Facility for soil analysis conducted by MSIRI and Agricultural Chemistry Division of the Ministry.
Soyabean

A wide range of soyabean products is currently being imported including crude oil, soya sauce, dried soyabean, soya chunks, burgers, soyabean cake and soyabean milk. A total of 37 000 t of cooking oil worth Rs 720 M is imported annually 70% of which consist of soyabean oil.

Scope and Opportunities

Soyabean has a great potential as an import substitution crop especially for the production of cooking oil for the local market. There is an opportunity to recycle the used oil as fuel.

Soyabean is well adapted to our local agro-climatic conditions and a wide range of soil types. It is grown all year round with better yields in summer and requires a low input. Apart from oil production, soyabean can be grown as a green vegetable. By-product could be used as feed in the livestock industry. The crop also is processed into numerous value-added products like soy nuggets, soy granules, soy flour, tofu and soymilk.

Vegetable soyabean is a nutritive crop with numerous health benefits. It is rich in protein and a good substitute for other pulse crop. These can be used in various dishes. Consequently, the crop holds a good potential for future expansion due to the increasing popular health concern and awareness.

On account of its excellent future prospects, some 20 ha of land can be grown under vegetable soyabean by 2015 leading to a production of 200 t.

For industrial uses, the cultivation of soyabean over 600 ha per crop cycle (3 crop cycles per annum) can be envisaged to produce 730 t of oil worth Rs 14 M annually. This can yield some 2900 t of meal for livestock production. Soyabean can also be grown under the cross border initiative.

Implementation plan

Industrial soyabean

In the first phase, 3 t of seeds worth Rs 1 M will be imported and sown over 30 ha of land to produce 60 t of planting material. These will be sufficient to cultivate 600 ha and 60 t will be kept as seeds for next planting.

Vegetable soyabean

Vegetable soyabean, being a new crop, the area under its cultivation will have to increase gradually as shown below:

<table>
<thead>
<tr>
<th>Expected time frame for soyabean cultivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
</tr>
<tr>
<td>Production(t)</td>
</tr>
</tbody>
</table>
Capital required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of seeds</td>
<td>1.0</td>
</tr>
<tr>
<td>Irrigation</td>
<td>22.0</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>6.5</td>
</tr>
<tr>
<td>Equipment &amp; Mechanisation</td>
<td>6.0</td>
</tr>
<tr>
<td>A full press extraction plant</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42.0</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Technical support on cultivation of soyabean to be given to interested growers.
- Financial support to growers for the purchase of common facilities for mechanization.
- Support from collaborating institutions (SPMPC, MAIF, SEHDA) to encourage clustering of growers for the sharing of inputs.
- A good seed production programme needs to be implemented by the MAIF to address the problem of availability and viability of seed.
- Financial support for the purchase of the first 3 t of seeds costing around Rs 1 M.
- Technology for oil processing is essential.
Ginger

Ginger production has increased from 498 t over an area of 32 ha in 2000 to 1014 t over an area of 52 ha in 2006. It is being grown mainly for local consumption. Some 7 t are imported annually in processed form.

80-85% of the production of ginger is carried out in the districts of Pamplemousses and Flacq and one of the major production constraints is the susceptibility of our variety to soft rot caused by *Pythium spp.*

**Scope and Opportunities**

Ginger can be used as raw materials for the agro-processing industry. It can be transformed and utilised for the following:

- flavouring agent for use in the preparation of foods and beverages (ginger bread, biscuits, cakes, puddings, soups, pickles, ginger beer, ginger wine)
- supplementary ingredients in curry powder
- in preparation of confectionary ginger products (candied ginger, crystallized ginger, preserved ginger)
- in ginger tea and in medicinal products. Such processed products can potentially be exported through proper market studies.

Due to the high potential for value-addition, the flourishing pickle industry and the growing demand, a production of 2 000 t of ginger over acreage of 100 ha has been targeted by 2015.

**Land suitability**

Ginger is produced mainly in the regions of Crève Coeur, Long Mountain, Les Mariannes, Congomah and Clemencia on flat to moderately steep/steep grounds. Other regions of the humid and sub-humid zones can also be utilized as ginger thrives best in regions with an annual rainfall of 1500-2500 mm. However, in sub-humid regions, irrigation will be required. Super-humid regions are to be avoided.
The crop requires a temperature of 25 °C and a pH of around 6 for optimum growth and development. It is particularly adapted to loose, deep and well-drained soil types from low humic latosols, humic latosols to latosolic reddish prairie.

**Implementation plan**

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>32</td>
<td>54</td>
<td>62</td>
<td>100</td>
</tr>
<tr>
<td>Production (t)</td>
<td>498</td>
<td>1011</td>
<td>1200</td>
<td>2000</td>
</tr>
</tbody>
</table>

**Capital required**

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation</td>
<td>1.6</td>
</tr>
<tr>
<td>Planting materials</td>
<td>23.7</td>
</tr>
<tr>
<td>Agrochemicals</td>
<td>5.5</td>
</tr>
<tr>
<td>Equipment &amp; Mechanisation</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32.8</strong></td>
</tr>
</tbody>
</table>

**Accompanying measures**

- Technical support and technologies from AREU and other institutions on agronomy as well as processing of ginger.
- Assistance of SEHDA in the setting of a ginger processing unit for potential entrepreneur especially for export.
- Loan facility for de-rocking, installation of irrigation, and purchase of machinery and planting material.
- Technical support in agronomy, pest and disease control and agro-processing
- Facility for soil analysis conducted MSIRI, and Agricultural Chemistry Division of the Ministry.
FRUIT SECTOR

Fruit production is confined to backyard except for litchi, banana, and pineapple. As such its contribution of the agricultural economy has remained quite insignificant. Fruits have been grown mostly on land that not suitable for sugarcane and with a limited utilisation of resources such as, irrigation and know-how. Yet, fruit production presents numerous opportunities because:

(i) Fruit consumption is still low in Mauritius (estimated at 30 kg/capita) compared to European (45-90 kg) fresh fruit consumption.

(ii) The climatic and soil conditions of Mauritius allow the growth of up to 50 fruit species with minimum inputs.

(iii) Two fruit species, pineapple and litchi already enjoy a good name on the European market.

(iv) The tourist industry which is already accommodating 850 000 tourists annually and is targeting 2 M in the coming 3 years is a domestic market with a potential for significant consumption of fresh fruits, fruit juice and processed fruits. More importantly, if it judiciously integrates the fruit sector in its cuisine and tour operations (the agro-tourism concept), it can act as a local window for our export market.

(v) Many fruit species are already growing with minimum chemical inputs throughout the island and can be exploited as organic fruits for niche/ethnic markets or for innovative processed products.

(vi) New promising germplasm, production techniques, postharvest and processing technology are now available for commercial exploitation of locally adapted fruit species.

(vii) The small size of Mauritius can be a strength in the export of fresh fruit because any commodity harvested in the morning can be air freighted on the same day and can reach the destination within hours thus preserving the freshness of the produce.

(viii) The opening of our air space to new and more airlines creates opportunities for access to new niche markets (e.g. Dubai) of high purchasing power.

In order to enhance the development of the fruit sector an integrated approach must be applied in a properly devised national plan that would enable optimum utilisation of land suitability and other input factors. Hence the concept of delineating suitable zones for the production of specific fruits is valid. This would enable:

(i) optimisation of limited area for high value output

(ii) better logistic support for the activity

(iii) integration of fruit production in agro-tourism

(iv) Improved cost-effectiveness of businesses annexed to primary production.

(v) Development of quality products
Litchi

Litchi is the only fruit tree species which has been developed as an export crop for the last 25 years. Indeed the litchi from Mauritius has been fetching the highest price on the European market every year at the beginning of November (9-10 Euro/kg). This is a period when Mauritius is the only country in the world exporting litchi to Europe. Mauritius has this window of opportunity for a very short period (2-3 weeks), before Madagascar sea-freights containers of sulphur-treated litchi to Rungis, France.


Only Mauritian litchi is present during this period because its geographical position and the country’s relief contribute to factors which are conducive to early maturity of litchi in a specific zone of the country, i.e in the north, north east and east. Presently, only around 200 t of litchi are produced in this region over an area of 40 ha, while the European market absorbs 28 000 t yearly. If Mauritius wants to increase its litchi export market, it should encourage the development of as large an area as possible under litchi in that specific zone where litchi matures earliest. Difficult lands to be released in the Roches Noires region would be appropriate.

Opportunities/Scope

Adapted to all local soil types, the litchi is fairly resilient to cyclonic conditions, being able to recover quite fast after a cyclone. It is a low input crop and its cultural practices are well established. Technology developed for short-statured trees can reduce cyclone damage and bat damage while tree manipulation can promote flowering and increase yield. The local variety Tai So is the one presently on the export market and a new variety, the Yook Ho Pow with promising characteristics (earliness, high flesh to seed ratio, high sweetness) has potential for expansion. New export markets for fresh litchi can be exploited in the Middle East (new direct airline to Dubai) and the Far East (high purchasing power). Since technology has been developed for processed litchi (frozen litchi, litchi in syrup, litchi nuts, litchi wine and other sugar based processed products), novel markets for the latter can be tapped.

It is estimated that there are presently 345 ha under litchi trees, out of which 155 ha have been established during the last five years. The present production is estimated to fluctuate between 750 and 1 300 t. To attain a target of 4 000 t of litchi by the year 2015, a new area of 400 ha should be under cultivation by the year 2011.
Future projection

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulated new area under litchi (ha)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Expected Production (t)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>180</td>
<td>540</td>
<td>1440</td>
<td>2640</td>
<td></td>
</tr>
</tbody>
</table>

Accompanying measures

Land preparation
In order to rapidly convert the identified sugarcane fields into litchi orchards, the uprooting of the sugarcane and the holing for the litchi layers should be mechanized. Appropriate machinery and implements should be invested into.

Planting materials
To establish 100 ha of litchi orchards on an annual basis for a period of 4 years, 15000 rooted layers are required each year. Barkly Experiment Station has the capacity of producing 10 000 layers annually. The additional 5 000 layers can be obtained either from private nurseries or from existing orchards. 200 bearing trees can produce 25 layers each with a total of 5 000 over a 4-month period. A target of 1000 layers of Yook Ho Pow is aimed at in 5 years time.

Irrigation System
Commercial production of quality litchi in the north cannot be envisaged without an appropriate irrigation system, namely, the micro-sprinkler.

Windbreak
The litchi tree being a layer, it is very susceptible to cyclonic winds, while its flowers may be damaged by anti-cyclonic winds. Hence, the importance of adequate windbreak curtains around blocks of trees.

Packhouses
Packhouses with cold rooms respecting international norms have to be set up in order to handle & package the fresh & processed fruit for export. The packhouses will also be used for other fruits & vegetables off-season.

Certification
Proper certification mechanism should be in place to satisfy the export requirements in term of grades and standards.

Sensitisation & Training
Planters traditionally engaged in sugarcane production and VRS will have to be sensitized about the cost effectiveness of the conversion to litchi rather than other activities. Furthermore, the growers will have to be given training on orchard establishment & management, handling & post-harvest of horticultural produce, pest control, and optimum marketing of litchi for higher gross margin. All sugarcane growers are used to sending canes
to factories and to receive their return on sugar automatically. Marketing of a perishable horticultural produce like litchi requires a completely different mindset. The importance of grouping in order to use common facilities especially procurement of packaging materials, refrigerated transport and packhouse facilities has to be inculcated. Good Agricultural Practices and Good Management Practices must be encouraged.

### Budget

<table>
<thead>
<tr>
<th>Year</th>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>Land preparation (100 ha)</td>
<td>2.50</td>
</tr>
<tr>
<td></td>
<td>Planting materials (15 000 layers)</td>
<td>0.75</td>
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<td></td>
<td>Irrigation system (microsprinkler)</td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>Windbreak</td>
<td>0.20</td>
</tr>
<tr>
<td>Year 2</td>
<td>Land preparation (100 ha)</td>
<td>2.50</td>
</tr>
<tr>
<td></td>
<td>Planting materials (15 000 layers)</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Irrigation system (microsprinkler)</td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>Windbreak</td>
<td>0.20</td>
</tr>
<tr>
<td>Year 3</td>
<td>Land preparation (100 ha)</td>
<td>2.50</td>
</tr>
<tr>
<td></td>
<td>Planting materials (15 000 layers)</td>
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<td>Irrigation system (microsprinkler)</td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>Windbreak</td>
<td>0.20</td>
</tr>
<tr>
<td>Year 4</td>
<td>Land preparation (100 ha)</td>
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<tr>
<td></td>
<td>Planting materials (15 000 layers)</td>
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<td></td>
<td>Irrigation system (microsprinkler)</td>
<td>8.00</td>
</tr>
<tr>
<td></td>
<td>Windbreak</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>Packhouses</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>Participation in agricultural and tourism fairs</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Establishment of processing businesses, gift shops,</td>
<td>20.00</td>
</tr>
<tr>
<td></td>
<td>Access facilities (roads, interior transport for touring of orchards)</td>
<td></td>
</tr>
</tbody>
</table>
Pineapple

The local pineapple, cv Victoria, is the second horticultural produce after Anthurium, with the highest export volume. Indeed, since the early 80’s, the Mauritian pineapple has been permanently on the European market in spite of drought or cyclones. The export volume has increased from 10 t in mid 80’s to more than 600 t presently and the local variety, Victoria already earns a good name on the European market. Moreover, Baby pineapple is on high demand in niche markets. The technology for its production is already available.

Pineapple is very tolerant to cyclone, can be grown under rain fed conditions, is not a seasonal crop and rational planning of planting and harvesting through judicious use of floral induction, ensures consistent income throughout the year. Cultural practices for pineapple are well established and it is a potential crop for organic agriculture because it does not harbour major pests and diseases which are beyond biological control. It also has enormous processing opportunities (juice, wine, vinegar, dehydrated, crystallised, jam, marmalade, pickles and fruit paste).

Pineapple is therefore an ideal candidate for replacing sugarcane if its marketing structure is improved. The pineapple is grown mainly in two zones, the Camp de Masque/Clemencia region and the Congomah/Les Mariannes region. The pineapple growers have been in this business for 2 to 3 generations, growing on marginal lands (mountain slopes), which were not suitable for sugarcane. Yet, the cultivations have produced fruits whose quality is recognized on the European market. With the release of sugarcane land, pineapple can be grown under more suitable soil conditions. The latter, coupled with the inherent climatic conditions of Les Mariannes/Congomah region would be most appropriate for the establishment of a pineapple zone. Moreover, the topography of the land and its proximity with La Nicoliere Reservoir makes it highly suitable for integration in the agri-tourism concept. The latter will attract visits from tourists so as to encourage on site consumption and sale of pineapple gift boxes (fresh & processed pineapple).

Pineapple Production Area Harvested and Volume Exported

Opportunities /Scope

During the last ten years, there has been a steady increase in the area (x1.5) under pineapple, coupled with a similar increase (x1.5) in yield per hectare. With improved cultural practices, the actual yield per hectare can double (70 t/ha) by 2015. A target of 300 ha under
pineapple in 2015 can produce 21,000 t of fresh pineapple for the domestic market, the export market and the processing industry.

**Future projection**

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>134</td>
<td>185</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>Production (t)</td>
<td>4,884</td>
<td>9,250</td>
<td>21,000</td>
<td></td>
</tr>
</tbody>
</table>

**Accompanying measures**

*Irrigation System*

In the identified pineapple zone, supplementary irrigation is required only from October to December. An overhead irrigation system is appropriate being given the morphology of the plant. A mobile irrigation network can be designed to cover the zone at least once per week during the period when rainfall is deficient.

*Plastic mulch*

The use of black polyethylene sheets as mulch in pineapple plantation has multiple advantages, namely;

- control of weeds, reduced use of herbicides,
- conservation of water in the root zone, reducing supplementary irrigation,
- maintaining a warm temperature around roots, favouring growth & reducing crop cycle length
- reducing impact of heavy rains on soil structure & helping in soil conservation.

Concentrating the use of the plastic mulch in a specific zone helps in the organized disposal of the waste material.

*Packhouses*

Packhouses with cold rooms respecting international norms have to be set up in order to handle & package the fresh & minimally processed fruit for export.
## Budget

<table>
<thead>
<tr>
<th>Year</th>
<th>Items</th>
<th>Rs (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Land preparation (7 ha)</td>
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<tr>
<td></td>
<td>Planting materials (700,000 suckers)</td>
<td>0.700</td>
</tr>
<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>0.280</td>
</tr>
<tr>
<td></td>
<td>Packhouses</td>
<td>2.000</td>
</tr>
<tr>
<td></td>
<td>Establishment of processing businesses, gift shops, access facilities (roads, interior transport for touring of pineapple plantations)</td>
<td>15.000</td>
</tr>
<tr>
<td>2009</td>
<td>Land preparation (10 ha)</td>
<td>0.250</td>
</tr>
<tr>
<td></td>
<td>Planting materials (1 M suckers)</td>
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</tr>
<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>0.400</td>
</tr>
<tr>
<td>2010</td>
<td>Land preparation (25 ha)</td>
<td>0.625</td>
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<tr>
<td></td>
<td>Planting materials (2.5 M suckers)</td>
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<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>1.000</td>
</tr>
<tr>
<td>2011</td>
<td>Land preparation (25 ha)</td>
<td>0.625</td>
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<tr>
<td></td>
<td>Planting materials (2.5 M suckers)</td>
<td>2.500</td>
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<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>1.000</td>
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<tr>
<td>2012</td>
<td>Land preparation (30 ha)</td>
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<tr>
<td></td>
<td>Planting materials (3 M suckers)</td>
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</tr>
<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>1.200</td>
</tr>
<tr>
<td>2013</td>
<td>Land preparation (30 ha)</td>
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<tr>
<td></td>
<td>Planting materials (3 M suckers)</td>
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</tr>
<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>1.200</td>
</tr>
<tr>
<td>2014</td>
<td>Land preparation (20 ha)</td>
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<tr>
<td></td>
<td>Planting materials (2 M suckers)</td>
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<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>0.800</td>
</tr>
<tr>
<td>2015</td>
<td>Land preparation (10 ha)</td>
<td>0.250</td>
</tr>
<tr>
<td></td>
<td>Planting materials (1 M suckers)</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Irrigation system (overhead sprinklers)</td>
<td>0.400</td>
</tr>
</tbody>
</table>
Banana

Banana is the most consumed fruit in Mauritius (9 kg/capita/year). However, its unit price is relatively high (average of Rs 1.50 in summer & Rs 2.50 in winter) compared to imported fruits because of supply being often below increasing demand. Indeed, with the increase in standard of living, the rapid establishment of super/hypermarkets, the expanding tourist industry, the demand for quality banana is on the upward trend. With a hypothetical demand of one fruit per person per day from 50% of the local population and one fruit per tourist per annum, the requirements would be 26 350 t of fruit per year. Presently, around 520 ha of marginal land where sugarcane or other crops cannot be grown are producing a maximum of 12 000 t/year. There is potential for producing the additional 14 350 t on 400 ha of non-marginal wind-protected land.

The organisation of world banana production and marketing precludes any opportunity for the export of the local Dwarf Cavendish. However, a niche market exists for the ladyfinger types (“Gingely types”). The tourist market has to be fully explored in the first instance and ultimately the niche high mark-up export market tapped. This target is achievable with the availability of TC planting materials to renew Fusarium prone plantations.

A third opportunity exists in the exploitation of banana for the non-fresh fruit market. There are avenues to be exploited in:

- food products: chips, baby food, vinegar
- flour for animal feeding: livestock, pigs
- starch for glue production
- fibre
- applications for soap making
- fertiliser for organic production
- medical applications
- wastes for ethanol production
- bio-plastics
- paper production

Of these, banana chip production is already an emerging and promising enterprise. Varieties suitable for chip making have been identified. These will have to be planted on a large scale in order to supply the processing units regularly with quality raw material so that the enterprises become profitable & competitive on the export market.

The present yield of commercial banana is 22 t/ ha. A yield of 36 t/ha is achievable by the year 2015 with an improvement in orchard management.

Future Projection

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>489</td>
<td>521</td>
<td>560</td>
<td>900</td>
</tr>
<tr>
<td>Production (t)</td>
<td>8500</td>
<td>11580</td>
<td>13 800</td>
<td>26 400</td>
</tr>
</tbody>
</table>
Appropriate zone for banana
In Mauritius, banana should be planted in regions which satisfy the following:
- Protection from prevailing winds either from the natural relief or from natural/established vegetation.
- Soil pH is below 7.
- Absence of water stress during the whole year by supplementary irrigation during deficient period/s.

Such sites can be identified in
- The south & south west to supply processing and ripening unit/s in the south.
- The north & east to supply processing and ripening unit/s in the north.

Accompanying measures

Planting materials
A total of 800 000 tissue cultured plantlets will be required by year 2015.

Irrigation
Low banana yield in Mauritius has been found to be directly correlated to water stress. Therefore, yield optimisation cannot be achieved without appropriate irrigation system.

Capital required
Planting materials: Rs 24 M
Ripening/Processing Units: Rs 20 M

Other fruit species
Mauritius has a very diverse fruit germplasm, with around 50 species or more grown in the wild or in private yards. The underutilised fruit species (the annona group, papaya, mango, starfruit, guava, avocado, passion fruit, strawberry, acerola etc) and neglected ones (tamarind, jambelon, jambos, jamalac, jamrosat, bergamotte, bilimbi, Coeur demoiselle, fig, pomegranate, breadfruit, jackfruit, mulberry) can be developed according to an agro-economic zone plan (whereby farmers are encouraged to grow the right fruit species in the
right areas). With the implementation of networking, farmers' competitiveness can be strengthened. Economies of scale can be achieved to provide the critical mass and to reduce production costs.

The minor fruits are likely to play an important role in the initiative of the WHO/FAO (the 5 A DAY programme) to promote fruit consumption which is known to prevent several non-communicable diseases such as cardiovascular diseases, type II diabetes and cancer. They could also be the spearhead of ecotourism/agro-tourism development which is on the agenda of the new economic strategy of Government. Their display in rooms, lobby and restaurants could attract the curiosity of the tourists, promote their consumption and hence also induce production for export. Instead of using imported juice, fresh juice from local "exotic" fruits could be presented in restaurants and for the welcoming cocktail.

The wide range of fruits will also provide raw materials throughout the year for the agro-processing sector which is in full expansion. A targeted area of 100 ha under 20 minor fruit species will provide a potential of 3 000 t of ‘exotic’ raw materials for processing by 2015.
PROMISING CROPS

Aloe Vera

Aloe Vera commonly referred to as the miracle plant has a significant potential as a diversification crop to sugarcane. It has many applications in the pharmaceutical and cosmetic industry besides being used in health products. It is a low maintenance crop with a crop cycle of 5 to 7 years and may even be grown in marginal lands and difficult areas. Some 25 t of stabilized Aloe vera gel costing around Rs 1 M is being currently imported on an annual basis excluding imports in other forms such as in juice, pharmaceutical and cosmetic products.

Opportunities/Scope

Aloe Vera has wide range of application in nutritional, cosmetic and pharmaceutical products. The gel can be used as a supplement in many nutritional products such as juice, jam, yoghurt and health drinks. It has a direct potential as an import substitution commodity and as a future agro-industrial crop. In view of the growing concern and awareness about health and diet, the product has steadily gained popular acceptance. An anticipated increase in demand of the gel is consequently foreseen and may attain 300 t by 2015 especially if the product is developed on an agro-industrial scale with the necessary accompanying measures. Some 10 ha of land will be required to cultivate Aloe vera, necessitating an aloe vera processing unit for the production of the targeted quantity of gel.

Land Suitability and suitable areas

Aloe Vera can be grown in the humid and sub-humid zones of Mauritius and thrives better in the Northern and Western parts. It requires a well-drained and gritty soil with a low water regime. It is moderately salt-tolerant. The crop can even be grown on marginal and moderately rocky soils. A hot climate with abundance of sunlight is particularly desirable.

Implementation Plan and Cost

To achieve the target production of 300t of stabilized gel annually, the following plan phased of production is being proposed

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>0.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Production (t)</td>
<td>15</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

In year 1, 0.5 ha of land can be cultivated in order to serve as a nursery for production of suckers for the remaining acreage. Offsets produced will be used as planting material to cultivate the 5 t/ha in year 2. In year 2, sufficient planting material will be available to cultivate the 10 ha of land. As plants continue producing suckers, they can be sold as planting material and provide additional revenue.
Capital required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting material</td>
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<tr>
<td>Land preparation</td>
<td>160,000</td>
</tr>
<tr>
<td>Inputs</td>
<td>160,000</td>
</tr>
<tr>
<td>Processing plant</td>
<td>6,000,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,382,500</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Information on Aloe Vera production with improved cultural practices will be made available by AREU to guide producers along with provision for training on agronomy and agro processing.
- AREU will provide planting materials to cultivate the first 0.5 ha of land.
- Potential entrepreneurs interested in the setting up of an Aloe vera processing unit and other associated technologies for the development of pharmaceuticals and cosmetic products can be assisted through the Agricultural Technology Diffusion Scheme.
- Advice on the setting up of a processing unit and technology for the development of pharmaceuticals and cosmetic products can be sought from Indian companies.
Aromatic Herbs

Mauritius is self-sufficient in most culinary herbs such as coriander, thyme, mint, bunching onion, leek and parsley. However around 1.5 t of fresh temperate herbs (sweet basil, rosemary, chervil, dill, tarragon, sage, bayleaf and salsify) and 10 t of their dried forms are imported annually to meet the local and tourist market (NPPO, 2007).

Opportunities/scope

Opportunities exist for fresh herbs due to increased awareness of consumers for a healthy lifestyle. There is also good scope for transformation as dried or powdered form to add value to a wide range of dishes in hotels and restaurants. This represents a good potential for unemployed women wishing to embark as entrepreneurs in an agri-based business.

With a view to substitute imports, production is targeted to around 7.5 t of fresh herbs and 15 t of mixed dried herbs by 2015. This will require cultivation under 30 ha of land.

There are two main strategies to meet the above production namely (i) to extend production throughout the year and (ii) to promote intensive cultivation under protected structures.

Land Suitability and suitable areas

Aromatic herbs require well-drained, loamy soils with plenty of sunshine. Optimal pH ranges between 5.8-6.6 with an annual precipitation of 1500-2000 mm.

Moderately to highly suitable lands released in the North or South and equipped with irrigation facilities must be used to optimise production.

Implementation plan and estimated cost

To achieve the expected output, 30 ha of land will be required. As a starting point, 1 ha will be devoted to culinary herb production and the acreage will increase gradually to reach 30 ha.

Expected time frame for herb cultivation under 30 ha

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>1</td>
<td>6</td>
<td>30</td>
</tr>
</tbody>
</table>

Capital required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting material (seeds and cuttings)</td>
<td>0.330</td>
</tr>
<tr>
<td>Land preparation</td>
<td>1.320</td>
</tr>
<tr>
<td>Inputs</td>
<td>0.550</td>
</tr>
<tr>
<td>Equipment/Infrastructure for processing (solar dryer + post harvest unit)</td>
<td>1.500</td>
</tr>
<tr>
<td>Labour</td>
<td>2.200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5.900</strong></td>
</tr>
</tbody>
</table>
Accompanied measures and support

- Loan facility for De-rocking, installation of irrigation, and purchase of machinery.
- Technical support in agronomy, pest and disease control and agro-processing
- Facility for soil analysis conducted MSIRI, and Chemistry Division of the Ministry.
- Facilities from SEHDA to set up SME in agro-processing.
- Funds: Financial support in the form of grants for setting up of the processing plant.
- Technical support:
  a. Research and extension staff to provide information on the GAP for production of aromatic herbs.
  b. Expertise from consultants for setting up the technology for culinary herb drying.
Palm Shoot Production for Pejibaye

Palm trees are widely grown for their edible heart or cabbage. Traditionally, the only cultivated local species was the palmiste blanc de Maurice (Dictyosperma album var album). This species has a long crop cycle and is highly susceptible the insect pest attacks Brontispa limbata so that production has always lagged behind the local market demand. During the recent years, a new fast growing species known as Pejibaye (Bactris gasipaes) with very good potential under the local conditions has been introduced from Latin America. The plant grows fast and can attain harvest size in 2 to 2 ½ years. It produces suckers, hence no need to replant after 2 years. It has no major pests and diseases and is thus a low management crop. It is however more susceptible to cyclone damage than most other edible palms.

Cultivation of palm for palm shoot was grown in backyard but production started to extend following the commercial release of the Pejibaye species as from 2004. From 2004 to 2006, production has increased from 650 000 units to 850 000 units showing an increase in 100 ha of cultivated area. By 2015, production is projected to increase by 400 000 palm heart units to satisfy the local tourist market and export niche markets both as fresh and processed (canned, pickling) forms. This will require an additional amount of 200 ha of land in the humid and super humid regions.

Research is carried out by the MSIRI while AREU ensures that Good Agricultural Practices are passed on to progressive and new growers.

Palm cabbage is still new to many producers. It is presently grown mainly for the export and tourist market as fresh shoot. It is also possible to market it in processed form like pickle, in brine.

<table>
<thead>
<tr>
<th>Year</th>
<th>2003-04</th>
<th>2004-05</th>
<th>2005-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (ha)</td>
<td>200</td>
<td>345</td>
<td>445</td>
</tr>
<tr>
<td>Production (units)</td>
<td>400 000</td>
<td>650 000</td>
<td>850 000</td>
</tr>
</tbody>
</table>

Opportunities/scope

Palm cabbage is not known to many potential producers. It is a high value crop and is presently grown mainly for the export and tourist market. The harvested fresh shoot is less prone browning. The crop offers much potential for value addition and transformation. It can be marketed in the processed form such as pickles or in brine or as a canned product.

By 2015, production is projected to increase by 400 000 palm heart units to satisfy the local growing tourist market and export niche markets. This will require an additional of 225 ha of land in the humid and super-humid regions.

Land suitability and suitable areas

*Pejibaye is currently grown on marginal lands in the Humid and Super-humid regions where annual rainfall does not exceed 3000 mm as recommended by MSIRI. With the imminent release of lands from the sugar sector especially the non-mechanisable lands (Category A, B and C), pejibaye can henceforth replace sugarcane in these difficult regions. Other
suitable areas earmarked include La Flora, Rose Belle and Britannia of the 500 Arpent Scheme.

Implementation plan and estimated cost

To produce the expected output (400,000 additional palm heart units), this will require cultivation under an additional 225 ha of land.

Expected time frame for pejibaye cultivation under 225 ha

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulated area (ha)</td>
<td>450</td>
<td>490</td>
<td>675</td>
</tr>
</tbody>
</table>

Capital required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seedling production</td>
<td>8.8</td>
</tr>
<tr>
<td>Land preparation</td>
<td>9.0</td>
</tr>
<tr>
<td>Orchard establishment (labour costs + agrochemicals)</td>
<td>43.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61.4</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Financial assistance for the setting up for nursery facilities in order to ensure a sustained supply of seedlings to potential growers and establishment (seeds, land preparation, fertilisers, chemicals, irrigation facilities, fencing of orchard).

- Loan facility for de-rocking, installation of irrigation and fertigation, and purchase of machinery.

- Technical support in agronomy, pest and disease control and agro-processing

- Facility for soil analysis conducted MSIRI, and Agricultural Chemistry Division of the Ministry.

- Availability of planting material

- Facilities from SEHDA to set up SMEs in agro-processing.

- Research and extension staff to provide support to growers.

- Support from collaborating institutions (SPMPC, MOAIF, SEHDA) to encourage clustering of growers to share inputs such as mechanisation equipments

- Consultancy and training: These are required in the fields of processing and marketing to guide interested growers and potential entrepreneurs.
Pitaya

Pitaya is a new fruit unknown on the local market. It has a good potential as an alternative crop to sugarcane. The fruit is very attractive, refreshing, has a good shelf-life and fetches a high price on the export market (Rs 200/kg). Low grade fruits can be processed into jam and wine. Fruits are obtainable one year after crop establishment and a stable yield of 75,000 fruits/ha may be achieved after 3 years. The crop is not prone to major pests and diseases.

Pitaya is adapted to the humid and sub-humid zones and can be grown on marginal lands with less than 1500mm annual rainfall. The crop can be grown in difficult areas especially of the dry regions.
ORNAMENTALS

Ornamental crop production is an economically important sector. It is dominated mainly by Anthurium whereby 294t of blooms were exported in 2006 with an export value of Rs 96 M. However, during the recent years, a lot of interest has been shown in the production of other ornamental species such as Gerbera, Rose, Orchids, Foliage species, Heliconia, Strelitzia, Hanging lobster claw, Alpinia, Gladiolus, Lilium and various seasonal flowers. In 2005 cut flowers and foliage were exported for Rs 100 M and ornamental crop species have been imported for some Rs 8.6 M (2004). This indicates that there is a definite potential for the expansion of the ornamental industry for export as well as import substitution. The industry can be promoted through the empowerment of farmers, the provision of infrastructure facilities for intensive cultivation and additional technical know-how.

Scope / Opportunities

Our local tropical climate is ideally suited for the production of ornamental crops. With the expansion of the tourist industry, the increasing popular demand for ornamentals and its potential scope for export and import substitution, this industry can contribute significantly to the agricultural economy through job creation, provision of additional income to small planters and their families and in terms of earnings.

In addition, the floricultural sector carries the following opportunities:

- Landscaping
- Setting up of nurseries
- Fresh cut flower production
- Production of planting materials
- Bouquet of fresh and dry flower
- Value addition to flower (Dried, pot pourri, press cards, essence),
- Exploiting the technique of Bonsai
- Setting up of orchids / cactus garden.
- Renting and supply of potted flowering plants.
An additional 19 ha of land can be exploited to produce 1 million anthurium blooms, 600,000 units of tropical flowers, 300,000 units of bromeliads, 7 million roses stalks and 6 million gerberas stalks.

**Land suitability**

Soil selection is important for ornamental production. The soil pH should be from 5.5 – 6.5, salinity level not more than 1 ms/cm. The soil should be highly porous and well drained.

**Agro-climatic requirements**

Ornamental crops can be grown all year round locally in protected conditions in humid, sub-humid and super-humid zones. However, in open field conditions, rose, gladiolus and tropical exotics should be grown from end July to October only in sub-humid zone. Tropical exotics and foliage can be grown whole year round in open field condition in any zone.

**Implementation Plan**

In order to achieve the target of an additional acreage of 19 ha under ornamentals the following schedule has been set for the production of Anthurium, tropical flowers, Bromeliads, Rose, Gerbera, Orchids, Ornamental foliage.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose (ha)</td>
<td>0.500</td>
<td>1.000</td>
<td>1.500</td>
<td>2.000</td>
<td>2.500</td>
<td>3.000</td>
<td>3.500</td>
<td>4.000</td>
</tr>
<tr>
<td>Anthurium (ha)</td>
<td>0.625</td>
<td>1.250</td>
<td>1.875</td>
<td>2.500</td>
<td>3.125</td>
<td>3.750</td>
<td>4.375</td>
<td>5.000</td>
</tr>
<tr>
<td>Gerbera (ha)</td>
<td>0.375</td>
<td>0.750</td>
<td>1.125</td>
<td>1.500</td>
<td>1.875</td>
<td>2.250</td>
<td>2.625</td>
<td>3.000</td>
</tr>
<tr>
<td>Bromeliad (ha)</td>
<td>0.125</td>
<td>0.250</td>
<td>0.375</td>
<td>0.500</td>
<td>0.625</td>
<td>0.750</td>
<td>0.875</td>
<td>1.000</td>
</tr>
<tr>
<td>Foliage (ha)</td>
<td>0.125</td>
<td>0.250</td>
<td>0.375</td>
<td>0.500</td>
<td>0.625</td>
<td>0.750</td>
<td>0.875</td>
<td>1.000</td>
</tr>
<tr>
<td>Tropical Exotics (ha)</td>
<td>0.625</td>
<td>1.250</td>
<td>1.875</td>
<td>2.500</td>
<td>3.125</td>
<td>3.750</td>
<td>4.375</td>
<td>5.000</td>
</tr>
</tbody>
</table>

**Capital required**

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of infrastructure</td>
<td>94</td>
</tr>
<tr>
<td>Supply of planting materials</td>
<td>63</td>
</tr>
<tr>
<td>Agro-chemicals</td>
<td>3</td>
</tr>
<tr>
<td>Cost of fertiliser</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>168</strong></td>
</tr>
</tbody>
</table>

**Accompanying Measures**

- Technical support and technologies to potential entrepreneurs on whole lines of production from cultivation to harvest, post harvest practices, packaging and value addition.
- Loan facilities to set up nurseries, greenhouse, shadehouse and purchase of planting materials.
- Growers can benefit from expertise mission assisted by the Agricultural Technology Diffusion Scheme.
SUSTAINABLE AGRICULTURE

Under the current intensive foodcrop production systems, farmers rely heavily on use of agrochemicals, particularly pesticides and chemical fertilisers which cause a lot of harm to the environment health (contamination of groundwater, air and lagoon water quality, soil degradation) and agro-ecosystem stability. The increase in price of fertiliser and labour has increased the cost of production while the yield and farm incomes have stagnated.

The promotion of sustainable agriculture through innovative and economically viable environmentally safe practices can address these environmental and social concerns conserve our natural resources to meet the challenges of today’s agricultural environment, including volatile climatic and market changes and evolving grades and standards. Sustainable agriculture is a approach that maximise reliance on natural renewable on-farm inputs while ensuring long term environment stability, health benefits and economic stability.

Sustainable land management

Due to the country limited land area, the development of sustainable utilization of land resources for agricultural purposes is crucial to maintain productivity, ecosystem stability and minimize environmental hazards. It can be achieved through

- capacity building for sustainable land management among farming communities
- land suitability assessments to identify most appropriate agricultural land utilization
- soil fertility conservation and management practices e.g. use of cover crop and biofertilisers
- assessment land quality changes in major agro-ecosystems to assess land degradation.
- regular training of farmers on sustainable agricultural practices, especially in sensitive areas

Development of sustainable fertilization programme

Since the present blanket type fertiliser recommendations do not take into consideration the nutrient availability from organic sources (poultry manure, cattle manure or scum) and the residual fertility in a cropping sequence. This often leads to over-fertilisation resulting in nutrients leaching particularly in the high rainfall areas with risk of environment pollution and health hazards. Hence the development of sustainable fertilization programme based on Integrated Plant Nutrient System (IPNS) which considers both inorganic and organic sources of plant nutrients as well as nutrients made available from previous crops or cover crops and use of new technologies to improve nutrient availability should be encouraged among farming community. It will help to reduce use of mineral fertiliser, hence sot of production while sustaining production and minimizing offsites environmental hazards.

Use of organic sources of plant nutrients is to be encouraged through:

1. In-situ composting of crop and animal waste and nutrient recycling
2. Production and use of biofertilisers which comprise beneficial microorganisms which help to maintain soil productivity through organic matter decomposition,
re-cycling of plant nutrients, biological nitrogen fixation, and phosphate solubilisation

3. Bio-fortification of composts using earthworms or biofertilisers

4. Customize fertiliser recommendation based on soil analysis and crop requirements

Irrigation and water management

The use of proper irrigation methods viz drip irrigation can help to improve crop productivity while optimising irrigation water use and minimising runoff and risk of salinity. The drip/ fertigation technology would be promoted among farming community through

- Introduction of small scale novel drip irrigation /fertigation technologies
- Provision of loan facilities for the setting up of irrigation / fertigation systems
- Technical assistance from AREU and Irrigation Authority on the design and establishment of irrigation system, its calibration and determination of crop water requirements based on agroclimatic data
- Training of farmers

Integrated Pest Management (IPM)

With the increasing consumer awareness of safer food and environment friendly practices coupled with the implementation of the zero pesticides residue regulations in the European Union, there is an urgent need to encourage an IPM approach for pest and disease control. The environment friendly techniques proposed are use of

- Resistant varieties
- Crop rotation
- Biological control organisms
- Biopesticides, pheromones, baits
- Sterile insect technique,
- Protective seed treatments
- Certified seeds and disease-free transplants or rootstock
- Timeliness of crop cultivation and improved timing of pesticide applications
- Sanitation
- Training of farmers in safe use of pesticides, crop scouting
ORGANIC AGRICULTURE

Organic agriculture refers to the production and processing of crops and livestock without the use of synthetic chemicals. It is based on a minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony. Though the market for organic products is currently experiencing rapid growth worldwide with the increasing consumer awareness on safer food and environment friendly practices, it is still a new concept in Mauritius. The potential of producing organic fruits and vegetables for tourist industry, agro-processing sector and export market exist in Mauritius. Organic production can help us to differentiate our export horticultural commodities such as litchi, pineapple and access to viable and value-added market niche and benefit from higher market price.

Organic production can also assist in reducing imports of agrochemicals as well as promote waste and nutrient recycling thus minimizing risk of environmental pollution. However, the major constraints in developing organic production locally is the absence of an organic production zone, absence of a national organic food inspection and certification system to encourage legitimate production marketing of organic produce and a lack of information on market demand. Presently there is only one commercial organic production is vanilla destined for a niche European market. Mauritius imports a range of organic processed food products but no official statistics is available.

Opportunities/ Scope and future projection

With the expected increase in number of tourists and the increasing consumer awareness of safe food and environment protection, the market for organic food is bound to grow in the coming years. Moreover, there is also potential to exploit the value-added niche market of organic fruit and vegetables.

Land Suitability and suitable areas

Organic production can be undertaken in all agro-climatic zones of the island provided the soil is well drain, fertile, with high organic matter content and irrigation facilities are available. The production should be away from the non-organic agricultural zone and residential zone.

Target production

In view of the expected increase in demand for organic food, the area targeted for organic production by 2015 is some 10 ha for an estimated production of 500 t of fruits including banana, pineapple, litchi and local exotic fruits and vegetables such as mainly salad crops, greens, fine herbs and soyabean.

Implementation plan

- Sensitizing and training of farmers in organic agriculture
- Selection of crops that are suitable for organic production based on low pesticide input requirement, season and crop rotation. The following crops can potentially be targeted (salad crops, vegetable crops and spices).
- Identification of appropriate sites for organic seed, fruit and vegetables production.
- Introduction of certified organic fertiliser, biofertiliser and organic crop protectants.
• Setting up of ‘organic village’ with 10 ha land using sustainable agricultural practices such as minimum tillage, mulching, sanitation, manuring, use of trap crops, use of leguminous crops, biofertiliser, green manuring, cover crops, organic fertiliser, IPM, biological pest control
• Recognition of foods from sustainable agricultural practices (fully organic, partly organic and integrated crop production)

**Accompanying Measures**

As support to the development of organic agriculture, the following measures are envisaged through

- Promotion of capacity building and awareness of farming community of opportunities of organic production,
- Investment in research and extension to bridge information gap and development of technical details on organic production under local conditions,
- Market Research on organic production
- Establishment of appropriate legal framework to regulate and certify organic production and allow legitimate marketing of organic produce,
- Promotion of composting and use of locally available organic fertiliser as well as use of biopesticides and biocontrol agent for pest and disease control,
- Incentives to assist interested farmers to invest into organic agriculture through interventions such as compensation for losses (as during conversion products cannot be sold as organic), tax reductions or preferential conditions for credit for infrastructure developments, certification and price differentiation of organic produce.

**Capital required**

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and capacity building</td>
<td>1.2</td>
</tr>
<tr>
<td>Establishment of appropriate legal framework</td>
<td>1.0</td>
</tr>
<tr>
<td>Compensation for loss during conversion form conventional to organic</td>
<td>1.5</td>
</tr>
<tr>
<td>Tax rebate and preferential conditions for credit for infrastructure developments/ certification</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6.2</strong></td>
</tr>
</tbody>
</table>
GOOD AGRICULTURAL PRACTICES (GAP)

With the fast changes in market requirements, the adoption of Good Agricultural Practices (GAP) in food production and processing has become increasingly important to ensure food safety and quality and access both the local (tourist, supermarkets) and international markets. GAP is based on HACCP principles and adoption of effective preventive measures programs to minimize risk of contamination. It in-cooperates Integrated Pest Management (IPM and Integrated Crop management (ICM) practices within the framework of agricultural production so as to ensure food safety, environment protection, workers safety and welfare and long term sustainability.

Proposed actions:

- Sensitization of stakeholders in GAP, quality and proper handling of fresh produce
- Provide training to farmers on the following fields: Storage and safe use of agrochemicals, record keeping, irrigation water management, assessment of soil moisture and irrigation scheduling, pest and disease identification, farm hygiene and cultural control of pests and diseases, composting
- Encourage the setting up of a traceability system in the agri-food chain to restore buyers confidence
- Review of legislative framework and enforcement of regulation to ensure that food production meets the appropriate standards and safeguard public health and facilitate exports
- Capacity building and establishment of necessary facilities to monitor pesticide residue, water quality, chemical and microbial load
- Establishment and implementation of a national code to practice (standard) to promote production of safe horticultural produce.
- working with accreditation bodies and ensuring compliance to legal and market requirements
- Provision of incentives to promote the adoption of GAP among farming community
- Provision of business mentoring to agribusiness entrepreneurs to assist in market identification and best practices

Accompanying measures

- Increasing growers’ awareness to the dangers associated with excessive fertiliser and pesticides use.
- Setting up of facilities for providing soil and plant analysis to farmers
- Strengthen institutional capacity for monitoring pesticide residue in food, and ground water quality through human resource development and supporting infrastructure
- Review cropping zone, crop species and varieties and cropping calendar to adjust to climate change
- Research for development of sustainable fertilization programme using locally available organic sources of plant nutrients
- Setting up of composting and bio fertiliser production units
• Encourage integration of crop and livestock production system
• Capacity building in the various fields related to sustainable agriculture (safe use of pesticides, soil conservation practices, land, water and nutrient management)
• Encourage the production and use of Quality Declared Seeds
• Promote the setting of nursery facilities for production of quality seedlings
PROTECTED CULTIVATION

Open-field cultivation is by far the most important vegetable production system being currently utilised by the local farming community despite major existing constraints such as scarcity of land, labour, water, presence of pests and diseases and adverse climatic conditions. Under this cultivation system, no major improvement in crop productivity as well as product quality has occurred over the recent years. New technologies had to be introduced in view of increasing both yield and quality of locally produced vegetables.

Crop production under controlled environment is a relatively recent concept, which however is gaining momentum. In 1999 there were 6 promoters involved in 25 hydroponics units. This number has consistently increased to 179 promoters producing in some 301 units in 2006. The current acreage under hydroponics cultivation stands at some 11.56 ha mainly under tomato, sweet pepper, green cucumber, lettuce, melon and ornamentals.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of Producers</td>
<td>6</td>
<td>9</td>
<td>33</td>
<td>41</td>
<td>53</td>
<td>90</td>
<td>150</td>
<td>197</td>
</tr>
<tr>
<td>Area Under Production (ha)</td>
<td>1.5</td>
<td>2.4</td>
<td>3.9</td>
<td>4.4</td>
<td>5.0</td>
<td>6.2</td>
<td>10.0</td>
<td>11.6</td>
</tr>
<tr>
<td>No of units</td>
<td>23</td>
<td>40</td>
<td>92</td>
<td>109</td>
<td>125</td>
<td>190</td>
<td>250</td>
<td>301</td>
</tr>
</tbody>
</table>

Number of Promoters, Protected Structures and Area under Production (2000-2006)

Scope and opportunities
With the rise in standard of living, purchasing power and with the development of the tourist industry and more sophisticated marketing channel, there is an increasing demand for quality produce in terms of appearance and of higher nutritive value. These can be achieved by adopting vegetable production under hydroponics which will improve both quality and yield per unit area. Decrease in the importation for crops like sweet pepper and melon.

Land suitability
Any type of land, but not sloppy, can be used provided that there is access to domestic water supply and electricity. Safety, against theft, around greenhouses is also important.
Target production

In order to cope with the increasing demand for Hydroponics vegetables a projected target of 26 ha of protected cultivation has been set mainly for salad tomato, sweet pepper, lettuce, melon and cucumber production.

Implementation Plan

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</tr>
</thead>
<tbody>
<tr>
<td>Acreage(ha)</td>
<td>9.7</td>
<td>10.43</td>
<td>11.53</td>
<td>13.7</td>
<td>16.22</td>
<td>19.48</td>
<td>21.89</td>
<td>24.32</td>
<td>26.00</td>
</tr>
<tr>
<td>Yield (t)</td>
<td>2 620</td>
<td>2 858</td>
<td>3 230</td>
<td>3 913</td>
<td>4 456</td>
<td>5 778</td>
<td>7 253</td>
<td>7 344</td>
<td>7 884</td>
</tr>
</tbody>
</table>

By year 2015, it is projected that the area under hydroponics production should gradually increase to 26 ha under different crops as listed below:

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salad tomato</td>
<td>7.5</td>
<td>7.7</td>
<td>8.1</td>
<td>8.8</td>
<td>9.7</td>
<td>10.8</td>
<td>11.6</td>
<td>12.4</td>
<td>13.0</td>
</tr>
<tr>
<td>Sweet pepper</td>
<td>1.5</td>
<td>1.67</td>
<td>1.93</td>
<td>2.38</td>
<td>2.9</td>
<td>3.6</td>
<td>4.12</td>
<td>4.65</td>
<td>5.0</td>
</tr>
<tr>
<td>Lettuce (ha)</td>
<td>0.2</td>
<td>0.34</td>
<td>0.43</td>
<td>0.9</td>
<td>1.32</td>
<td>1.88</td>
<td>2.3</td>
<td>2.72</td>
<td>3.0</td>
</tr>
<tr>
<td>Cucumber(ha)</td>
<td>0.3</td>
<td>0.43</td>
<td>0.64</td>
<td>0.97</td>
<td>1.38</td>
<td>1.92</td>
<td>2.32</td>
<td>2.73</td>
<td>3.0</td>
</tr>
<tr>
<td>Melon(ha)</td>
<td>0.2</td>
<td>0.29</td>
<td>0.425</td>
<td>0.65</td>
<td>0.92</td>
<td>1.28</td>
<td>1.55</td>
<td>1.82</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Capital required

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of infrastructure</td>
<td>289</td>
</tr>
<tr>
<td>Cost of seeds</td>
<td>6</td>
</tr>
<tr>
<td>Cost of Agro-chemicals</td>
<td>4</td>
</tr>
<tr>
<td>Cost of fertiliser</td>
<td>17</td>
</tr>
<tr>
<td>Loan incentives</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>335</strong></td>
</tr>
</tbody>
</table>

Accompanying measures

- Loan facilities at the Development Bank of Mauritius (DBM) Ltd.
- The technique of crop production using hydroponics involves high investments and to encourage its adoption, the biotechnology loan scheme was introduced by Government through the DBM Ltd in 1999.
- A number of agricultural equipments at exempted from duty and VAT.
- Technical Incentives
  - Introducing this new technology to growers.
  - Assisting grower in the writing-up of their project proposal.
  - Vetting of the project before sending it to the DBM Ltd.
- Helping growers in the implementation of their project.
- Giving advice on choice of crops and varieties.
- Provide training for new promoters to help them master all cultural practices in hydroponics cultivation.
- Carry out regular visits to growers and advice accordingly.
PLANT PROTECTION

Mauritius being a small island state and by virtue of its geographical isolation, has so far been successful to some extent in keeping away from incursion of dangerous exotic pests and diseases which can have a serious impact on our agricultural economy, biodiversity and ecosystem. However, existing agricultural pests and diseases are major constraints to agricultural production locally.

Plant protection measures form an integral part of the food production chain. Extensive and indiscriminate use of pesticides may result in accumulation of residues along the food chain, pest resistance, environmental pollution, secondary pest outbreaks, destruction of natural enemies and threat to biodiversity. The challenge of plant protection has thus always been to reduce the negative impacts of pests and diseases in Mauritian agriculture. In this context, pragmatic and sustainable measures have to be continuously developed.

Moreover, in order to meet our obligations on the Agreement of Sanitary and (Phytosanitary Measures (SPS) of the World Trade Organisation (WTO), and with the globalization process and liberalization of trade coupled with increased volume and speed of movement of goods and people, the risk of incursion of pests and diseases constitute a phytosanitary threat. These new challenges in plant protection and biosecurity will have to be addressed.

The trend towards free trade is placing many additional pressures on importation of agricultural commodities and planting materials which constitute a serious phytosanitary threat for introduction of new exotic plant pests into Mauritius. It is expected that with the phasing out of our preferences under the Lomé Convention Sugar Protocol, there will be a significant increase in importation of elite germplasm and planting materials for improved crop production.

It is imperative to maintain the integrity of the Mauritian biodiversity and to protect the health and prosperity of the country through the exercise of effective pest and disease control management strategies while at the same time maintaining an effective quarantine barrier against exotic pest incursions.

Research and Development in Pest and Disease Management

Reliance on chemical control methods constitutes a potential hazard to human health and the environment. Crop protection measures will have to address this challenge and manage the risks involved whilst protecting the country’s agriculture. In this context biological control programmes are presently being implemented for certain pests and diseases. As regards to other major pests and diseases of economic importance, the capacity of farmers will be strengthened through technical support groups to evaluate, adapt, disseminate and promote Integrated Pest and Disease Management (IPDM) strategies as well as protected agriculture.

Pest management will therefore continue to evolve with integration of available novel technologies with particular attention to the safeguard of our environment as well as improving plant health through modern technologies including generating of pest resistant germplasm.
Recommendations

- Integrated Pest and Disease Management (IPDM)
- Implementation of safe and environment friendly pest and disease control measures;
  - Integrated use of Sterile Insect Technique;
  - Introduction and evaluation of biocontrol agents.
- Monitoring of status of pests and diseases as well as associated natural enemies.
- Monitoring and management of existing and newly introduced pests and diseases.
- Evaluation of biopesticides/ biocontrol agents for organic crop production.
- Development of a rapid modern diagnosis service for the planting community identification keys for economic pests and diseases for the planting community.
- Strengthening capacity of farmers in crop protection technology (protected cultivation), IPDM and development of capacity packages in diagnostic skills for planters.
- Management of epidemics and resistance development in pests and pathogens.
- Development of early warning/ forecasting models for epidemics through rapid alert system.
- Evaluation of environmentally safe novel pesticides for pest and disease resistance management.
- Strengthening the programme of services to the planting community
- Introduction and evaluation of new germplasm for resistance to pests and diseases.
- Developing varieties resistant to pests and diseases through modern technologies (biotechnology, mutation breeding).
- Capacity building in plant protection.

Plant Biosecurity

With liberalisation of trade coupled with increasing movement of agricultural commodities in international trade and movement of people, the risk of accidental entry of new pests cannot be overemphasised. Once a pest or disease is introduced into a new area; there is a high probability for its establishment. Consequently considerable effort in terms of financial and human resources, equipment, transport logistics, chemicals, importation/ multiplication of biological control agents among others, needs to be employed for their containment/ suppression and/ or eradication particularly in small island state economies.

Presently there are new emerging and threatening pests of quarantine importance moving around the world and in particular the Sub Saharan region of Africa and Indian Ocean region. These pests constitute a potential threat to our agriculture. It is imperative to establish a proper pest surveillance system for early detection of exotic pests so as to reduce their negative impacts.
Internationally recognised quarantine treatment of agricultural consignments is a necessary prerequisite for development of export trade. In order to comply with our obligations under WTO/SPS and quarantine requirements of importing countries (as per International Standards for Phytosanitary Measures) as well as satisfying the concept of equivalence for treatment, there is an urgent need for the setting up of a modern multi-purpose treatment facility in Mauritius.

The need to have a modern and effective NPPO that is in conformity with various international obligations will be evaluated through the Phytosanitary Capacity tool under IPPC. The legal framework ensures the promotion of international trade with less technical barriers and ensures conformity to our international obligations in terms of implementation of ISPMs namely for Pest Risk Analysis (PRA). The creation of a PRA unit will help in phytosanitary trade negotiation, provision for risk mitigation measures and formulation of bilateral trade agreements.

Recommendations

- Implementation of control/ suppression or eradication actions as an emergency response to incursion of exotic pests and diseases.
- Upgrading and Strengthening of Plant Quarantine/ Biosecurity Facilities and services
  - Upgrading of SPS capacity.
  - Establishment of Quarantine Containment Facilities for the introduction, testing and rearing of biological control agents, genetically modified organisms (GMOs) and quarantine intercepted materials, with high security systems and appropriate safeguards to international standards.
  - Close monitoring of all future introductions of biological control agents.
  - Strengthening the national surveillance system for pests and diseases
  - Establishment of a multipurpose quarantine treatment facility (heat, chemical, fumigation, vapour heat etc)
  - Phytosanitary capacity evaluation
  - Establishment of Pest Risk Analysis Unit
  - Capacity building in plant quarantine/ biosecurity for border control.

Research and Development in Plant Quarantine

Rapid and appropriate diagnosis tools for pests and diseases are vital components to backup national surveillance system, early and prompt action in case of new pests observed. One of the main objectives as a support tool is to provide an effective and efficient service as first line of defence in protecting the agricultural economy. The National Plant Protection Office will envisage upgrading its inspection system protocol and developing a quality / procedure manual for officers implementing biosecurity measures at ports of entry. The list of quarantine pests and regulated non-quarantine pests and diseases will be reviewed and subsidiary legislations in form of regulations will be prepared to provide the necessary legal framework to implement the Plant Protection Act 2006. In order to meet our obligations under the SPS agreement, phytosanitary import requirements will be reviewed.
Accompanying Measures

- Enhancement of diagnostic capability, early detection and diagnosis of pests and diseases
- Development of inspection protocols for incoming agricultural commodities
- Development of quality and procedure manual for phytosanitary officers
- Risk pathway analysis for new, emerging and threatening pests in the region and globally.
- Drafting of new Plant Quarantine Regulations
- Updating of a list of Quarantine pests and regulated non-quarantine pests
- and diseases with increasing focus on new, emerging and threatening pests and diseases as well as invasive alien species
- Quarantine awareness campaign.
PLANT GENETIC RESOURCES (PGR)

Mauritius possesses a rich biodiversity comprising both endemic and exotic plant species. Similarly, crop biodiversity consists of wild types and landraces of cultivation which is continuously enriched through import of new cultivars mainly for commercial purposes.

Responsibility for crop biodiversity is presently shared by at least four institutions, the main one being the MAIF through its Plant Genetic Resources Unit, Forestry Services and National Parks and Conservation Unit for conservation of germplasm for the agricultural sector. Other institutions include the Agricultural Research & Extension Unit (AREU), the MSIRI and the University of Mauritius.

AREU is involved in conservation of germplasm through maintenance of crops by vegetative means in field collections and through evaluation and use in crop improvement programmes. AREU is also responsible for the introduction of new crops varieties for experimental purposes which are propagated by seeds. The MSIRI is predominantly involved in conservation and utilisation of sugarcane, maize and potato germplasm and the maintenance of a national herbarium. The University of Mauritius is concerned with provision of training and maintenance of a crop museum.

Long-term seed storage falls under the responsibility of the Agricultural Services through the National Plant Genetic Resources Centre at Curepipe Seed Gene Bank. However, storage facilities are still inadequate. This enhances the risk of losing valuable germplasm especially those wild type varieties which are being replaced by higher yielding and hybrid varieties.

Lately, some issues as regards international free exchange of genetic resources have been increasingly in the limelight. Internationally, there is a growing concern for the protection of farmers’ and breeders’ rights. Since the fight against pests and diseases (which do not recognise man-made boundaries) is no longer one man’s one nation’s concern, international and regional cooperation are very important particularly in the present situation. This is so because crop improvement programmes in almost every country are dependent on exotic germplasm. Realising the need for such cooperation, many countries, including Mauritius, have become signatories of the International Plant Protection Council (IPPC) of the FAO and to regional plant protection agreements such as the IOC and SADC, with the objective of fighting the threat of pests and diseases all over the world.

The absence of such framework in Mauritius regulating Intellectual Property Rights and safe trans-boundary movement of crops will severely limit accessibility to new varieties for crop improvement programmes and to novel crops. The current legislative void also discourages production of new plant cultivars by local plant breeders as well as the emergence of new horticultural and agro-industrial sectors which make use of exotic germplasm.

There is the need to address the issue of Genetically Modified Organisms (GMOs), in terms of ability and capacity for detection, legislation to protect locally produced commodities and consumer rights as well as minimising harmful consequences to health (human, animal and plants) and the environment. The UNEP/GEF Biosafety project is assisting in addressing this issue.
PLANTING MATERIAL

There is increasing pressure towards meeting the requirements for better quality of planting materials due to the marked increase in the demand for crops, fruits and ornamentals. The adequate and timely availability of quality seeds and planting materials is a prerequisite for successful agriculture.

The annual national seed requirement for the major crops is estimated at 16 t (excluding bean and potato seeds). The Agricultural Services play a key role in the production of essential inputs for the local planting community in terms of seeds for vegetable crops and planting materials including seedlings, grafts, layers and tissue-cultured plantlets for fruit trees and ornamentals. The Ministry of Agro-Industry and Fisheries produces about 10 t of seeds annually, which represents around 60% of the country’s needs. Seed production caters for more than 40 locally grown crops species totalling about 90 cultivars. The remaining 6 t is met by farmers’ own seed production and through importation, mostly of hybrid seeds.

The import of hybrid seeds is on an increasing tendency despite relatively higher costs in comparison to locally produced seeds. This is essentially attributed to their higher productivity and good adaptability and also the rising exigencies with respect to quality which urges the planting community to respond accordingly.

Seed quality is determined on the basis of a number of parameters such as storage condition, disease resistance, viability, and purity. To ensure successful crop production, not only good quality of seeds is primordial, but its accessibility and adequate availability are also essential. Quantification of imported/hybrid seed

The key role of the Agricultural Services in the provision of seeds and other planting materials is indeed vital for the planting community in the actual context. However, the aim now is to restructure this service and gear production of planting materials towards even better quality and ensure its regular availability. It is therefore proposed to firstly have an inventory of the priority items of planting material requirement and accordingly provide the necessary support to meet this requirement. Seed production for export can become a viable activity which can complement export of fresh or processed products. This is achievable in the medium to long-term taking into account the strategic location of Mauritius together with its aim to emerge as a regional nursery for quality planting materials. In line with the above, there is a need to establish a seed certification agency for import and export purposes. The distribution aspect also needs to be given due attention to ensure better accessibility of the planting community to seeds and other planting materials at all times. The private sector should be encouraged to venture in the production and supply of planting materials.

Under the Quality Declared Seeds scheme, seed producers would produce seeds according to standard protocols set at a national level. This will help to guarantee the quality of seed put on sale through official seed testing and proper labelling with respect to variety, purity, seed health and germination.

To ensure our food security it is imperative that there exist sufficient planting materials for strategic crops for substitution of our staples for instance potatoes, maize, cassava, sweet potato, breadfruit and eddoes.
**Scope and opportunities**

With the increasing consumer awareness of the benefits of consuming more fruits and vegetables and the expected increase in the number of tourists, the demand for fruits and vegetables is bound to increase, hence the demand for high quality planting materials. Ensuring adequate and timely availability of high quality seed and planting materials to the planting community is vital for successful crop production.

To be able to cater for the increasing demand for vegetable seeds and planting materials of fruit and ornamental species, there is need to encourage production of planting materials as a viable agribusiness activity among individual, group of farmers and entrepreneurs. This will help to alleviate the pressure in meeting the local demand and improve the seed situation in the country while ensuring production and utilization of quality seed by farming community. Taking into account the strategic location of Mauritius, over medium and long term, the island may emerge as a regional nursery for quality planting materials with the establishment of Seed Quality Control and Certification Authority.

Currently, since the adoption of a fully certified scheme for seed production under our local conditions is difficult, the QDS scheme would be promoted to provide reasonable safeguards that the seed produced and offered for sale is of standard suitable for crop production. Seed producers would produce seeds according to seed production guidelines and standard protocols set at national and regional levels. This will help to guarantee the quality of seed put on sale through official seed testing and proper labelling with respect to variety, purity, seed health and germination.

The targeted crops for seed production would include cucumber, squash, brinjal, cauliflower, chilli, okra, lettuce, onion, tomato, asparagus bean, and soyabean which are in high demand locally.

**Land suitability and suitable areas**

The identification of seed production areas in the different agro-climatic zones is crucial for undertaking seed production according to the QDS guidelines with respect to isolation distance, buffer zone, appropriate climate conditions Humid or sub-humid conditions depending on crops, protection from strong wind and availability of irrigation facilities. Seed production can also be carried out under Cross Border Initiatives.

**Implementation plan and cost**

The target area to be devoted to seed production by 2015 is estimated to an additional 30 ha to be able to cater for 50 % of the increase in the national vegetable seed (excluding potato, maize, and groundnut) requirement and the project cost is estimated to be around Rs 4.5 M

<table>
<thead>
<tr>
<th>Additional Area for seed production (ha)</th>
<th>2008</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5</td>
<td>7.5</td>
<td>30</td>
</tr>
</tbody>
</table>
Accompanying measures

Production and supply of quality seed and planting materials to the farming community will require:

- Introduction of the Quality Declared Seed Scheme and the setting up of a regulatory framework and seed quality control/certification body.
- Incentives to seed producers
- Training of field inspectors for quality control and technical guidance.
- Training of seed producers and breeders (small farmers and private sector) in the techniques of seed production.
- Official registration of seed producers.
- Facilities such as seed testing, seed treatment, seed processing and seed storage.
- Availability of a buffer stock
- Price setting mechanism
- Identify suitable areas for seed production
- Produce seeds under CBI
- Support for joint ventures
- Strengthening of IPR
- Legislative Measures (Plant Breeders Rights, Seed and PGR bills)
- National Conservation Centre
- Review National Conservation Policies
RECOMMENDATION FOR HORTICULTURAL PROGRAMME

- Identify land availability and allocation
- Land Preparation and development
- Research and Development
- Availability of inputs
- Technical Support and training
- Technology Transfer
- Good Agricultural Practices
- Government Incentives
- Harvest and post harvest management
- Storage
- Marketing Intelligence and infrastructure
- Quality Control and branding
- Agro Industrial Development
- Support to agro processing
- Review of Institutional roles
- Legislation
- Cross Border initiative
## ACTION PLAN

<table>
<thead>
<tr>
<th>Project</th>
<th>Expected Output</th>
<th>Support Institutions</th>
<th>Expected completion date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify land availability</td>
<td>GIS database Land Bank</td>
<td>Remote Sensing Unit</td>
<td></td>
</tr>
</tbody>
</table>

1. Field operations (pre-planting and planting)
   - De-rocking and fine derocking
   - Land preparation (ploughing, furrowing, holing, etc)
   - Mechanisation of operations (sowing, harvesting and others)

2. Support of irrigation
   - Installation of irrigation network
   - Supply of water
   - Supply of irrigation equipment (dripper lines, drippers, sprinklers)

Promotion of GAP

3. Provision of planting materials
   - Seeds
   - Layers
   - Nursery facilities
   - Seedlings

4. Support of agro processing
   - Equipment
   - Post-harvest facilities (chill room, pack house, cold chain facilities, packaging, etc)

5. Research and development
   - Capacity building
   - Agro-processing
   - Biotech facilities
   - Upgrading of lab. facility

6. Support to marketing

---

2015
<table>
<thead>
<tr>
<th></th>
<th>Sustainable agriculture</th>
<th></th>
<th>Promote production of safe agricultural produce while taking care of minimizing environmental pollution</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research and capacity building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Establishment of appropriate legal framework</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compensation for loss during conversion from conventional to organic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tax rebate and preferential conditions for credit for infrastructure developments / certification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydroponics</td>
<td></td>
<td>AREU, DBM, MAIF</td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>Seeds + nursery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subsidy on loan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Capacity building</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seed production</td>
<td></td>
<td>Improving seed supply and quality of seeds on the local market while reducing dependence on imports</td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>Processing facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training of inspectors, for quality control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training of farmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Laboratory facilities for seed testing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crop protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review of Institutional roles</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Legislation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cross Border initiative</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION 3 LIVESTOCK DEVELOPMENT PROGRAMME

The general objective of the livestock programme is to increase production and marketing of locally produced milk, meat and poultry thereby increasing the contribution of the livestock sector to national development. In order to achieve this objective, the strategic plan would be implemented through four sub-programmes which are large ruminants, small ruminants pig & poultry and animal health. The livestock sector, apart from poultry, has been facing several challenges including limited number of commercial farmers; low input system of production and deficient husbandry skills of livestock farmers and insufficient lands allocated to livestock development and fodder production. However, significant opportunities exist to expand local production for the domestic market. The main objective therefore would be to further expand the market share of meat and milk. However, any livestock development programme has to be organised so that it is environment friendly and sustainable.

Situational Analysis

The dependency on imported meat and milk has been increasing over the last 5 years. In 2005, the local meat production (excluding poultry meat) was 1,300 t and met only 6% of our requirement which amounted to 21,800 t. In respect to poultry and egg demand, the country is self sufficient.

Production of fresh milk and milk products is estimated at 400 t for a total requirement of 21,700 t, implying that the country is only 2% self sufficient and the tendency is a continuing downward trend. The overall prices of milk and meat products continue to increases and are expected to be more pronounced in the coming years. This will have a negative impact on the supply on the domestic market.

There is therefore an urgent need to stabilise the decline in the national meat and milk production.
Milk Production

The dairy sector has largely been characterised by traditional backyard producers who have been operating on a low input - low output system of production. The last decade, has witnessed a steady decline in the number of farmers and cattle head from 2500 farmers rearing 9600 head in year 2000 to 1700 farmers owning 5800 heads in year 2006. Similarly, annual local milk production has decreased from 5 to 3.5 million litres representing only 2.2 % of the total consumption. Imports of milk and milk products account for some Rs 2 Billion annually. Yearly demand for milk and milk products was around 22 000 t from 2000 to 2005. Demand for dairy products is expected to rise and more so for fresh milk which is expected to increase by two fold by 2015. It is therefore essential that the various constraints affecting the dairy sector be addressed urgently to prevent the further decline of the local herd and boost local milk production.

- Local milk production has decreased from 5 to 3.5 million litres representing only 2.2 % of the total consumption.
- There are some 1100 lactating cows reared mostly under low input traditional system production.

**Imports of Milk and Dairy Products**

**Imports of Live Animals**
## Status of Milk and Dairy Products

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2005</th>
<th>2010*</th>
<th>2015*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Per capita consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fresh milk (L)</td>
<td>6.18</td>
<td>5.42</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>- Powdered milk (kg)</td>
<td>13.56</td>
<td>14.21</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td><strong>Local production (million L)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fresh milk</td>
<td>5</td>
<td>3.5</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td><strong>Importation (t)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Powdered milk</td>
<td>15731</td>
<td>14167</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Liquid milk and cream</td>
<td>3285</td>
<td>2828</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Condensed milk</td>
<td>899</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Cheese</td>
<td>2531</td>
<td>2867</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>c.i.f value (Rs M)</strong></td>
<td>1,100</td>
<td>1,800</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (t)</strong></td>
<td>22122</td>
<td>21161</td>
<td>22000</td>
<td>23000</td>
</tr>
<tr>
<td><strong>Self sufficiency (%)</strong></td>
<td>3.0</td>
<td>2.2</td>
<td>4.5</td>
<td>10</td>
</tr>
</tbody>
</table>

* Projection

### Constraints

Major constraints limiting the development of the dairy sector are:

- Acute shortage of breeding animals (difficulty of importing breeding animals at a competitive price)
- Unavailability of land
- High investment requirement for starters
- Poor management and husbandry practices
- Poor productivity of local herd
- Inadequate Veterinary Service
- Lack of good quality fodder and high price of compounded feed
- Lack of financial support
- Insufficient facilities and poor management for waste disposal
- No structured marketing system

### Opportunities

Opportunities exist in terms of import substitution to attain at least 10% self-sufficiency in milk. To achieve this objective in the short run the country must be able to produce 20 million litres of milk per year. This implies that the number of lactating cows must be increased to 6,000 compared to the actual number of around 1,100. In an endeavour to promote the local dairy industry and increase opportunities for development in the non-sugar sector, the Ministry of Agro-Industry and Fisheries has proposed the setting up of “Milk Villages”. The increasing trend in the price of imported milk creates an urgent need to produce milk locally.

Opportunities also exist in milk processing and there is an increasing demand for flavoured milk, fresh cream, soft cheese, mozzarella, yoghurt and ghee. Given the short shelf life and the low return on fresh milk production, producers should be encouraged to embark into the production of value-added products in order to cater for the niche market and reduce...
imports. Actions to set up a milk processing laboratory to train entrepreneurs and farmers are ongoing.

Recommendations

In view of the above it is vital to set up multiplier dairy farms with a component on importation of breeding animals and setting up of fodder plantations. These farms will be able to supply the necessary breeding stock to build up the local herd required to achieve the targeted level of production. Dairy farming can be carried out throughout the island, however the humid and sub humid zones including Rose-Belle region are more suitable with appropriate methods for control of *stomoxys* flies.

The success of the programme depends on:

- Reviewing incentive packages for dairy industry to encourage investment in this sector
- Promoting commercial farms.
- Promoting commercial fodder production
- Providing Livestock insurance schemes
- Improving herd management
- Encouraging and providing the necessary framework for promoters to invest and bring modern technology while at the same time integrate the small and medium scale farmers so that they could benefit from the facilities developed by these promoters.
- A planned annual importation programme for 1 500 adult heifers of the Holstein/Friesian breed over a period of 3 years starting from 2008 for the setting up of multiplier farms.
- Availability of land to encourage setting up of multiplier farms, on sites specifically identified for the purpose, in compliance with strict environment conditions.
- Strengthening the public veterinary services (human and infrastructure) to be able to address issues regarding animal health and reproduction (disease control and surveillance, artificial insemination, embryo transfer) so as to offer quick and better service to the farming community and to support research and development programmes.
- Recruiting and training technical support staff for regional postings.
- Providing incentive packages to encourage small cane planters to diversify their activity and convert their land into dairy farms.
- Encouraging and facilitating (through appropriate schemes) establishment of fodder plantations and pastures.
- Reviewing policy to enable cow breeders to have regular supplies of bagasse and molasses.
- Creating a proper marketing mechanism for milk and milk products.
- Ensuring implementation of environmental norms and animal welfare.
Accompanying measures

- Lease of state land and release of sugar-cane lands to set up dairy farms and fodder plantations.
- Provision of necessary infrastructure on an area of 50 ha within 2 years.
- Importation of adult heifers.
- Performance assessment of imported animals.
- Provision of a temporary incentive scheme to give confidence to entrepreneurs to improve productivity and quality.
- Provision of loan facilities at concessionary rates and a repayment moratory period for purchase of breeding animals, construction of farm building and purchase of dairy equipment.
- Provision of a livestock insurance scheme (sudden death of animals).
- Training of farmers on modern methods of dairy farming (school of farmers).

Research and Development

- Improve farm productivity through better management and breeding programmes.
- Develop alternative feeds and fodder conservation strategies.
- Prepare and implement fodder development programmes.
- Set up of cost-effective waste management plans.
- Conservation, genetic characterisation and utilisation of the Creole breed for eventual use in breeding programmes.
- Develop protocols for value added milk products.
- Biotechnology: Silage inoculants to increase the nutritive value and enhance rumen digestion, use of microbes to improve digestibility of cellulose feedstuff and embryo transfer.
Beef Production

Fresh beef supply, on the local market, is undertaken by a few small private companies together with the backyard farmers. The private companies import young animals which are fattened until slaughter while the small livestock farmers use mainly the male calves originating from the dairy sector.

Local beef production (including animals from Rodrigues but excluding imported animals fattened for slaughter) has witnessed a drastic decline over the years from 450 t in 1990 to reach 240 t in 2000. In 2005, the local production reached its lowest level of 72 t. With increased consumer affluence and the increasing number of tourists, it is expected that the demand for beef will increase from 6kg/yr to 8kg/yr by 2015.

With a target of 10% self sufficiency of consumption from local production by 2015 it is estimated that production will have to be increased to 1 000 t. This can be achieved through slaughtering of around 5 000 heads.

Imports of Meat Products

- Local beef production has declined to reach 72 t in 2005.
- Only a couple of private companies import young animals for fattening before slaughter while the small farmers use mainly the male calves originating from the dairy sector.
Projection of Production, Imports (t) and Consumption (kg)

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita consumption</td>
<td>6.18</td>
<td>5.70</td>
<td>7.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Local production - Mauritius</td>
<td>153</td>
<td>38</td>
<td>500</td>
<td>1000</td>
</tr>
<tr>
<td>- Rodrigues</td>
<td>87</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importation - live</td>
<td>2297</td>
<td>2411</td>
<td>2800</td>
<td>3400</td>
</tr>
<tr>
<td>c.i.f value (RS M)</td>
<td>227</td>
<td>386</td>
<td>4239</td>
<td>4672</td>
</tr>
<tr>
<td>- Frozen</td>
<td>4239</td>
<td>4239</td>
<td>4500</td>
<td>4400</td>
</tr>
<tr>
<td>Meat Imports (excluding offals &amp; meat preparation)</td>
<td>5370</td>
<td>4672</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offals &amp; Meat preparation</td>
<td>Na</td>
<td>1858</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>180</td>
<td>112</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self sufficiency (%)</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Constraints

Major constraints to the development of the beef sector are:

- Unavailability of calves for fattening.
- Unavailability of land.
- Lack of good quality fodder and high price of compounded feeds.
- Lack of economies of scale.
- Lack of financial incentives.
- High cost of production.

Opportunities and Future Development

Mauritius is considered disease free regarding major diseases affecting cattle. Opportunity exist in terms of import substitution to reach 10% self sufficiency. An opportunity exists for processing into meat products.

Recommendations

- Importation of around 1500 live animals every year for fattening purposes. Importation of live animals for slaughter will have to be maintained.
- An additional 600 ha of land will also be required for fodder plantation
- The necessary infrastructure (fencing, road access, water & electricity supply) will have to be developed and around 5 ha of land will be required for fattening of the animals in feedlots.
- Provision of loan facilities at concessionary rates and a repayment moratory period for purchase of breeding animals, construction of farm building and purchase of equipment.
- Provision of a livestock insurance scheme (sudden death of animals).
• Training of farmers on modern techniques of beef farming (school of farmers).
• Reviewing policy to enable beef producers to have regular supplies of bagasse and molasses.
• Ensuring implementation of environmental norms and animal welfare

Accompanying measures
• Measures mentioned regarding milk production will have to be extended to the beef sector namely lease of land for fattening purposes, loan facility for setting up feedlot systems and purchase of equipment, insurance scheme and training of farmers in beef production.
• Provide facilities for importation of animals for fattening.
• A quota of 5 000 t of bagasse and molasses each per year to reduce the cost of production of beef and to give a boost to the sector.

Research and development
• Improve farm productivity through better management and breeding.
• Prepare and implement fodder plantation programmes.
• Develop alternative feeds; protein supplement like Lucerne, acacia and conservation strategies (hay, silage).
• Develop protocols for value added meat products.
• Set up of cost-effective waste management plans.
• Biotechnology: Silage inoculants to increase the nutritive value and enhance rumen digestion, use of microbes to improve digestibility of cellulose feedstuff.
Venison

Deer farming has established itself as a full-fledged economic activity and as an integral part of the livestock sector. With the gradual decline of the local cattle population, venison has become the main source of red meat. Most of the venison comes from some 60 production units. Of these, 50 produce venison on an extensive basis in chassees while the remaining are engaged in intensive deer farming.

The total area occupied by the deer sector amounts to 25 000 ha of which 15 000 ha are privately owned land while the remaining of 10 000 ha are state forest lands. The local deer population is estimated at 70 000 heads of which 10 000 heads are reared on state lands and 60 000 on private lands. These include a population of about 10 000 heads reared in intensive farms (feedlots) on about 1000 ha of private lands.

Local production and consumption of venison

![Graph of Production (t) vs. Per Capita Consumption (kg/annum)]

Venison production in 2005 reached a record of 540 t. The total production of venison is disposed quite easily on the local market with a per capita consumption of 0.44 kg/annum. Most of the deer meat is put on the market exclusively during the hunting season which extends from June to September. About 80 t of good quality meat is produced during the close season from intensive farms, carcasses being processed at the Central Abattoir and marketed by the Mauritius Deer Farming Co-operative Society Limited.

Assuming a per capita consumption of 0.60 kg/annum in 2015, the production of venison should increase to about 750 t.

Constraints

The main constraints affecting the further development of the deer sector are:

- Lack of land for pasture development.
- Poaching.
- Non compliance to EU and other international standards of the Central Abattoir which limits export.
- Lack of prompt and efficient Veterinary Service.
- High land rental and wild game farming/stalking annual fee.
Opportunities and Future Development

Opportunity exists to increase venison production by 40%. In the wake of WTO and the strengthening of regional co-operation, rapidly growing sectors such as tourism, agro-industries, etc, will put more pressure on the sector as the demand for venison will automatically rise. The annual production should therefore increase substantially by the year 2015. An increase in production of the order of 200 t may easily be absorbed in the local market.

Production from the present set-up is unlikely to increase substantially to reach 750 t. In that case, the additional 200 t (from slaughtering of 7500 heads) will have to come from newly developed intensive farms. With a carrying capacity of about 16 heads/ha and with the provision of some basic infrastructure and animal requirements, an additional area of some 2000 ha will be required. Areas in the western region with irrigation facilities, ex-tea lands and Piton du Millieu areas are suitable for production and can be exploited.

Recommendation

- Develop the necessary infrastructure for the setting up of feedlot systems and pasture.
- Encourage the processing of venison into value added meat products such as choice cuts, steaks, etc.
- Strengthen the food safety aspect through the modernization of the central abattoir and ensure production of venison in conformity with international norms for export. This will automatically prompt deer farmers to increase their investment and produce more venison, hence increasing their income.
- Encourage the revalorization of by-products such as hides for tanning into leather for garments and hard antlers for the production of handles, buttons and handicrafts.
- Strengthen and enforce laws on poaching.
- Control of stomoxys flies at national level.

Accompanying measures

- Release of sugar-cane lands in difficult areas and ex-tea lands for setting up feedlots and for pasture development.
- Improved slaughter facilities to meet international norms.
- Provision of loan scheme to set up deer farms.
- Provide for a yearly quota of 5 000 t of bagasse and molasses each for supplementary feeding and to reduce cost of production.
- Review rental fee and wild game farming/stalking annual fee.
Poultry

Over the past decade, there has been a remarkable growth in local chicken meat production which increased from 12,500 t in 1990 to 33,000 t in 2005. The per capita consumption which was 21.8 kg/annum in 2000 increased to 25 kg/annum in 2005 representing 70% of the total meat consumed. This is considered low compared to other developed countries where per capita consumption of chicken meat is 33 kg/annum. Due to rising incomes, improved standard of living, change in food habits and a flourishing tourist industry it is inevitable that the demand for chicken meat will continue to grow. It is estimated that the per capita consumption will increase to 34 kg/annum by 2015.

In addition a significant amount of processed poultry products are imported. Thus, there is plenty of scope for further development of the chicken meat industry.

- Self sufficiency exists in the poultry sector.
- 33,000 t of chicken meat were produced and 120 million eggs were produced in 2005.
- Per capita consumption is increasing and will reach 30 kg poultry meat and 125 eggs by 2015.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chicken Meat</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per capita per annum (kg)</td>
<td>21.88</td>
<td>26.2</td>
<td>30</td>
<td>34</td>
</tr>
<tr>
<td>Local production (t)</td>
<td>25,600</td>
<td>33,000</td>
<td>40,000</td>
<td>45,000</td>
</tr>
<tr>
<td>Frozen imports (t)</td>
<td>50</td>
<td>283</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Total (t)</td>
<td>25,650</td>
<td>33,283</td>
<td>35,200</td>
<td>40,200</td>
</tr>
<tr>
<td>Export (t)</td>
<td>336</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>self sufficiency%</td>
<td>100</td>
<td>99</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td><strong>Eggs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production (M units)</td>
<td>115</td>
<td>120</td>
<td>150</td>
<td>165</td>
</tr>
<tr>
<td>Per capita Consumption (units)</td>
<td>100</td>
<td>105</td>
<td>115</td>
<td>125</td>
</tr>
<tr>
<td>Production of DOB (M units)</td>
<td>19</td>
<td>25</td>
<td>29</td>
<td>33</td>
</tr>
<tr>
<td>Production of DOL (units)</td>
<td>465,000</td>
<td>420,000</td>
<td>540,000</td>
<td>600,000</td>
</tr>
</tbody>
</table>

Trend in local production, importation and consumption of chicken meat and eggs
Similarly, regarding egg production, supply has always responded to demand. Assuming an increase of approximately 2% per year, it is expected that by 2015, per capita consumption will reach 125 eggs/year.

**Per Capita Consumption and Local Production of Chicken Meat**

Constraints

Major constraints affecting the poultry industry are:

- Disease threats especially Avian Influenza.
- Increasing price of imported feed ingredients which impacts on the cost of production.
- Waste management and disposal.

Opportunities and Future Development

To meet the demand by 2015 production of chicken meat and eggs will have to be increased to 45 000 t and 165 millions units of eggs respectively. Production of day old broiler and layer chicks will have to be increased to 33 million and 600 000 units/year respectively by 2015. The present set up with some upgrading should be able to cope with this increasing demand.

Indeed, the private sector (both suppliers of chicks and feeds) already has the capacity to respond to the increasing demand. However, new avenues need to be explored especially regarding export to COMESA and SADC countries. Some export of day old parent stock to African countries is already on-going.

Major issues that need to be addressed are:

Protection from disease specially; Avian influenza. In this respect the laboratory facilities available at the Division of the Veterinary Services need to be reinforced. The industry should also be protected against dumping from low cost producing countries.
Ducks

Production, excluding backyard, was estimated at 250 t in 2006. Local production of duck is mainly carried out by private companies which are involved in the importation of parent stock and production of ducklings for fattening purposes. The Ministry of Agro-Industry and Fisheries is promoting the production and consumption of ducks and in this respect a unit for the production of ducklings, with a capacity of production of 1500 ducklings per week, has been set up at Reduit. Ducklings are being supplied to farmers and AREU is supporting the farmers through training and demonstration activities.

It is expected that duck keeping activities will pick up and assuming a per capita consumption of 0.5 kg/annum by 2015 production will have to be increased to 600 t. To meet this objective production of day old ducklings will have to be increased to 300 000/year by 2015. This can be achieved through the empowerment of prospective entrepreneurs.

Research and Development

AREU has already embarked on programmes to promote rearing of ducks through setting up of duck units on Model Farms and Demonstration Centres. Training of farmers and entrepreneurs is on-going. This should be reinforced at a later stage especially regarding processing and value addition.

Other poultry species

Production of species other than commercial chicken is also carried out by private companies and these include Poulet fermier estimated at 400 t/year and guinea fowls at 75 t/year. Opportunities also exist for production of local chicken especially the Rodriguan chicken, turkeys and quails. Rodriguan chicken has a special taste which is preferred by many consumers and quail eggs have medicinal value for respiratory problems. These are strong opportunities that can be exploited commercially. Entrepreneurs will have to be encouraged in this direction.

Biosecurity Measures

Because of imminent dangers from existing and emerging diseases (e.g. Avian Influenza) the non-industrial scale producers have to be encouraged and supported to take all measures as recommended by the Veterinary Services and the Environment Division. AREU has already initiated action in this respect through sensitization and training activities.

Waste Management

In order to protect and conserve the environment producers and other stakeholders will have to be continually supported to adopt the mitigating measures recommended by the authorities. AREU’s actions in this direction are on-going in terms of sensitisation and training activities.
Pork

Pork production involves some 465 primary producers, with a total of about 18 000 heads. There are 25 registered butchers at the Roche Bois Central Abattoir and 4 processing plants, which also import choice cut for transformation.

The primary breeders are mainly backyard, part-time producers that are scattered in the rural and coastal regions. The pig industry is slowly evolving from a low-input system with many small breeders to a more intensive system with few larger breeders. Self sufficiency was 100% during the years 1991-1992, however due to various reasons this figure has decreased to 64% in 2000 and 54% in 2005.

In 2005 out of 750 t of pig meat produced locally only 250 t were further processed, while 650 t pig meat were imported for further processing. 1062 t of finished products were also imported in 2005 with a fob value of about Rs 68 million. The per capita consumption of pig meat was 0.93Kg/annum and that of bacon, ham and sausages was 1.08kg/year in the year 2005.

Projected Local Production, Importation and Consumption of Pig Meat.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per capita Consumption (Kg/annum)</td>
<td>1.02</td>
<td>0.93</td>
<td>0.95</td>
<td>1.0</td>
</tr>
<tr>
<td>Production (t)</td>
<td>891</td>
<td>750</td>
<td>900</td>
<td>1 500</td>
</tr>
<tr>
<td>Frozen imports (t)</td>
<td>492</td>
<td>640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self sufficiency %</td>
<td>64</td>
<td>54</td>
<td>70</td>
<td>100</td>
</tr>
</tbody>
</table>

Constraints

Major constraints limiting production of pig meat are
- Poor management and feeding practices.
- Poor carcass quality and absence of a carcass grading system.
- Unstructured marketing.
- Waste disposal in compliance with environmental norms.
- Unavailability of land.
- High feed cost.

**Opportunities and Future Development**

There is scope to attain 100% self-sufficiency in pig meat production. Assuming a per capita consumption of 1.0 kg/annum and with the increase in visiting tourists, local production will have to be increased to 1500 t. This can be achieved by increasing the number of pigs slaughtered to 21,500 by year 2015.

Entrepreneurs are being given support to develop professional activities and it is expected that more entrepreneurs will join the business.

**Recommendation**

- Identification of appropriate sites for pig breeding activities.
- Delocalisation of pig breeders operating in residential areas.
- Ensure compliance with environmental regulations - producers will have to be encouraged and supported (through training and demonstrations) in order to adopt relevant mitigating measures when disposing wastes etc. in order to conserve the environment.
- Restructuring the marketing system with a well organised carcass grading system at the central abattoir and payment should be made according to grade.
- Supply of breeding and fattening animals of good genetic stock – creation of breeding /multiplier farms.
- Importation of new blood to upgrade local stock – Use of AI with semen of improved breeds is also an option.
- Efficient Veterinary support.
- Adoption of cost effective production systems by producers.

**Accompanying measures**

- Lease of state land for pig breeding activities.
- Provision of necessary infrastructure.
- Provision of loan facilities and a repayment moratory period for purchase of breeding animals, construction of farm buildings and purchase of equipment.
- Setting up of an insurance scheme (sudden death).
- Training of farmers on modern methods of pig production.
Goat

The goat population has witnessed a drastic decline from 72,696 heads in 1983 to 16,328 heads (2,283 farmers) in 2005. However, a recent survey by AREU showed that this declining trend is being reversed since both the goat population and the number of goat farmers have increased to 23,151 heads and 3,005 farmers in 2006.

Local production of goat meat based on abattoir slaughter data showed significant decline in both the number of animals slaughtered from 7,319 heads in 2000 to 4,117 in 2006 with corresponding decline in the total carcass weight from 56.2 t in 2000 to 29.3 t in 2006. On the other hand, there has been a significant increase in the slaughter of imported goats from 30.2 t in 2000 to 65.2 t in 2006 to satisfy local demand for the meat.

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of animals slaughtered</td>
<td>Local*</td>
<td>7319</td>
<td>3467</td>
<td>5000</td>
</tr>
<tr>
<td></td>
<td>Imported</td>
<td>2226</td>
<td>4403</td>
<td></td>
</tr>
<tr>
<td>Total carcass (t)</td>
<td>Local</td>
<td>86.2</td>
<td>25.4</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Imported</td>
<td>30.2</td>
<td>78.8</td>
<td></td>
</tr>
<tr>
<td>Importation of fresh chilled or frozen meat (mostly frozen meat) (t)</td>
<td>150.9</td>
<td>44.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Local includes animal imported from Rodrigues (about 1500/year)
Figures do not include illegal slaughter

Constraints

- Acute shortage of breeding animals.
- Lack of good quality fodder and high price of compounded feeds.
- Lack of proper management system.
- Lack of marketing system and market structure.
- Inadequate veterinary support.
- Indiscriminate slaughter of animals.
- Unavailability of land.
- Lack of financial support.

Opportunities and Future Development

Opportunities exist for import substitution to attain 35% self-sufficiency in goat meat. During the years 2005-2006 a regain of interest among existing or prospective farmers to undertake or further exploit the goat sector has been observed.

To attain 35% sufficiency 90 t of goat meat will be required by 2015.
Multiplier farms with some 800 breeding females will be required to produce 1300 goats annually.

Assuming per capita consumption is maintained at 0.16 kg/annum and an increase in self-sufficiency ratio from 19% to 35% by year 2015, local production of goat meat is expected
to increase from 36 t to around 90 t by 2015. This can be achieved by setting up farm units with a total of 800 breeding females that will produce about 1,300 goats/year for breeding or fattening.

Potential also exists for marketing the meat as; choice cuts to be used in different recipes, marinated meat for grills/barbecues, roast meat slices and further processing as minced meat, prepared meat balls, sausages, burgers and deli products. Action needs to be undertaken in this direction.

**Recommendations**

- Development of necessary infrastructure (buildings, access road, waste management facilities) and utilities (water and electricity).
- Importation of 800 breeding animals of the Anglo Nubian breed over a period of 2 years, starting from 2008, for the setting up of multiplier farms.
- Strengthening of veterinary services to be able to address issues regarding animal health and reproduction (disease control and surveillance, artificial insemination).
- Ensure a quick and better service to the farming community and to support research and development programmes.
- Set up an appropriate mechanism to discourage slaughter of potential breeding females.
- Enforcement of legislation to prevent illegal slaughter.
- Encourage and facilitate (through appropriate scheme) establishment of fodder plantations and pastures.
- Policy decision regarding a yearly quota of bagasse and molasses (500 t each) to be used as feed ingredients in livestock production to give a boost to the sector.
- Development of niche markets for novel locally manufactured products such as goat milk, cheese and skin care products based on the milk.
- Development of niche market for processed goat meat.

**Accompanying measures**

- It is proposed to set up a number of multiplier farms of 100 females each in the Rose Belle region or Northern and Western districts. Each farm unit will extend over an area of 4 ha to include fodder plantations.
- Provision of necessary infrastructure on an area of 5 ha within 2 years.
- Importation of breeding animals by Government and sale to farmers
- Provision of loan facilities and a repayment moratory period for purchase of breeding animals, construction of farm buildings and purchase of equipment
- Setting up of an insurance scheme (sudden death)
- Training of farmers on modern methods of goat farming
Research and Development

- Evaluation of imported breeds on Government farms an on-farm.
- Studies to improve animal productivity and carcass quality and evaluation.
- Nutritional studies to decrease the typical goat meat flavour for processing purposes.
- Promoting the utilization of browse species by goats as supplement alternative.
- Conservation, genetic characterization and utilization of the local goat in breeding programmes.
- Promotion of national goat development projects using an integrated approach through the empowerment programme.
- Artificial insemination of goats to alleviate need for importing breeding bucks
Fodder

Fodder cultivation to feed cattle is not a common practice in Mauritius. The tradition is to collect fodder free wherever available and sugar-cane tops during the crop season. Recently with urbanization, other development projects and extensive use of herbicides etc. the availability of this precious input has reduced drastically. Farmers have been complaining about this shortage. This issue can now be hopefully addressed in the context of release of sugar-cane lands for diversification, the democratization process regarding land availability to more producers and the potential use of ex-Tea lands.

The ex-tea lands and other humid regions in the Central Plateau are suitable areas for fodder cultivation. Entrepreneurs who are planning to set up multiplier farms will be able to source their fodder requirements relatively easily. Fodder species that are suitable for these areas are elephant grass, herbe d’argent, setaria, Guatemala and star grass.

In line with the proposal regarding setting up of multiplier and fattening farms it is proposed that by 2015, 1600 ha of land not suitable for crop activities and located in humid and super humid area be used for the cultivation of fodder. The ex-tea lands can also be considered.

Implementation

- Setting up of nurseries of different grass species on stations and supply of planting materials for establishment of fodder plantations
- Importation and distribution of seeds (mainly legumes) for establishment of fodder plantations

Accompanying measures

- Release of sugar-cane land and ex-tea lands for establishment of fodder plantations.
- Distribution of planting materials.
- Loan scheme and repayment moratorium for establishment of fodder plantation.
- Duty concessions on purchase of equipment and machinery used in land preparation, harvesting and conservation of fodder.
- Training of farmers on modern methods of fodder production.
Rabbit

Rabbit production is carried out in a rather traditional manner and caters for a selected/niche market in terms of meat consumption and secondly for the pet “industry”. However by virtue of its prolificacy and rapid rate of growth rabbit rearing ranks highest amongst the livestock species in terms of expansion potential. It can become a major source of protein and income but there is the need to create the demand.

Although there are 272 farmers owning some 3 400 rabbits, rabbit rearing on a “commercial scale” is carried out by a few farmers only. The annual production of rabbit meat since 2000 is estimated to be around 25 t with a per capita consumption of 0.2 kg/annum.

Opportunities and Future Development

The market for rabbit can be developed through value addition in terms of dressed carcasses and choice cuts and eventually as ready to cook rabbit products (e.g. seasoned/marinated cuts). The tourist industry can absorb a significant amount of rabbit meat provided food safety parameters are satisfied.

The development of the rabbit sector requires importation of new blood with better growth and good processing potentials. Production units need to be integrated to processing units for value addition. It is expected that with the setting of such units and combined with campaigns on the benefits of rabbit meat consumption production can be expected to increase to 100 t by 2015. This implies that around 66 000 heads will have to be made available for slaughtering purposes by 2015. In order to promote the consumption of rabbit meat external resources like Ecole Hotelière could contribute in terms of culinary preparations and tasting sessions.

Pet Animals

In Mauritius the trend to rear small animals as pet is increasing. Supermarkets are already devoting specific shelves for pet lovers. The demand for rabbits, quails, guinea fowls and turkeys etc. will be on the increase. This is an opportunity to empower entrepreneurs to produce animals in order to meet this demand.
RECOMMENDATION FOR THE LIVESTOCK PROGRAMME

It is a fact that the considerable changes in the international trade environment are likely to bring about a large impact on the local livestock sector. Issues that are emerging with the trade liberalisation process will need to be addressed in a regional, as well as, an international context. With the world becoming a global village, and the creation of regional blocks to capitalise on trade opportunities, it will not be possible for Mauritius to operate in isolation. Instead, a critical strategy will be required that would allow us to address the emerging issues in a judicious manner and safeguard our interests as far as possible.

Objectives:

- To produce 20 million litres of milk, 1000 t of beef, 750 t of venison, 1500 t of pork, 90 t of goat meat, 45 000 t of chicken meat, 600 t of duck meat, 100 t of rabbit meat and 165 million eggs annually.
- To develop infrastructure for setting up of commercial farms.
- To facilitate the establishment of 15 units of 100-cows multiplier farms.
- To facilitate the establishment of 8 units of 100-does multiplier farms.
- To facilitate establishment of 50 units of commercial beef farm.
- To identify suitable pig production sites throughout the island.
- To facilitate establishment of 40 units of 40-ha deer farms using feedlot system.
- To facilitate establishment of 1700 ha of fodder.
- To upgrade the central abattoir to meet international norms.
- To strengthen the Veterinary service.
- To setup a structured marketing system.
- To promote animal welfare.
- To ensure good animal husbandry practices in compliance with environmental regulations.

Favourable Environment

Land
Within the context of the democratization of the economy land could be released for livestock production. Around 3 700 ha of land (50 ha for housing cattle, 2 ha for goat sheds, 2 000 ha for deer in feedlots and 1 700 ha for fodder plantation) will be required to achieve the above objectives.

Infrastructure
Provision of necessary infrastructure (buildings, access roads, waste management facilities) and utilities (water and electricity) in specific areas identified for livestock activities.

Breeding stock
Provision of breeding animals (cattle, goat, rabbit and ducks having attributes for production of fatty liver) that are well adapted to local conditions and with good production performance.
Marketing
Market studies to assess the potential for livestock products and develop marketing strategies to respond to the need of the entrepreneurs. To review the operation of the AMB regarding milk collection and marketing and setting up a proper system for milk quality assessment. To set up a proper system for carcass grading and meat quality assessment.

Feeds/Forages
Encourage and facilitate (through appropriate schemes) establishment of fodder plantation and pasture to ensure sustainable production.

Setting up of nurseries and provision of planting materials (seeds, cuttings, seedlings of fodder trees and shrubs) for fodder/pasture establishment. Policy decision should cater for a quota of bagasse and molasses to be used as ingredients for feed preparation for livestock production and to give a boost to the sector.

Animal Health
Strengthen the DVS (human and infrastructure) to better address issues regarding animal health and reproduction (disease control and surveillance, artificial insemination and embryo transfer) to offer an improved service to the farming community and to support research and development programmes.

The Creation of an Animal Health Trust Fund to be responsible for research and training in animal health and also the setting up of a contingency fund for use in the event of sanitary crisis (e.g. Avian Influenza) to be managed jointly by the public and private sectors.

Animal Welfare
Promote good animal husbandry practices and ensure compliance with norms regarding animal welfare.

Agro Processing
Setting up of incubators for milk and meat processing for demonstration and training of entrepreneurs.

Food safety and certification
Ensure that products meet established quality standards.

Traceability
Implement approved methods for traceability of locally produced commodities in line with international standards. Appropriate legislation may be necessary.

Waste Management
To set up pilot projects using an integrated approach regarding environmental issues related to livestock production (anaerobic digestion and production of energy, processing of solid waste into value added products, compost, etc.) and production of biofertilisers.
Strategic Alliance
Develop and reinforce linkages among the following institutions: Agricultural Services, (APD, FTL, DVS, LFPS, Engineering Division), AREU, MMA, AMB, UOM, WPSA, Prison Services, Cooperative federation and other stakeholders and share resources that would facilitate implementation of research and development programmes.

Contract farming
Encourage contract farming and strengthen links among producers, entrepreneurs and market operators. Appropriate environment need to be created and the element of trust to be considered.

Public Private Sector Partnership
Encourage and provide the necessary framework for promoters to invest and bring modern technology while at the same time integrate the participation of small and medium scale farmers so that they could benefit from facilities developed by concerned promoters.

Training
Provide high level training to farmers and entrepreneurs in specialised areas.
<table>
<thead>
<tr>
<th>Activity</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop infrastructure for commercial farms</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Develop fodder plantation</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Importation of breeding stocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set up units of multiplier dairy farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Set up units of multiplier goat farms</td>
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<td></td>
</tr>
<tr>
<td>Set up units of 40-ha deer farms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set up units of 10 sows for piglet production</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Set up units for 100 piglets for fattening</td>
<td></td>
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<td></td>
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<tr>
<td>Importation of beef type animals</td>
<td></td>
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<tr>
<td>Set up unit of 200 beef fattening farms</td>
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<tr>
<td>Training of farmers/entrepreneurs</td>
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<tr>
<td>Upgrading of central Abattoir</td>
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<tr>
<td>Strengthening of DVS</td>
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<tr>
<td>Review policy and set up schemes/incentives</td>
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<tr>
<td>Setup a structured marketing system</td>
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<td>Setup Incubators</td>
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<td>Project Type</td>
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<tr>
<td>Develop infrastructure for commercial farms</td>
<td>100 ha</td>
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<tr>
<td>Develop fodder plantation</td>
<td>20 ha under fodder</td>
<td>150 ha under fodder</td>
<td>300 ha under fodder</td>
<td>600 ha</td>
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<tr>
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<tr>
<td>Set up units of multiplier dairy farms</td>
<td></td>
<td>2 100-unit farms</td>
<td>5 100-units</td>
<td>5 100-units</td>
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<tr>
<td>Set up units of multiplier goat farms</td>
<td>1 100-doe units</td>
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<td>Set up units of 40-ha deer units</td>
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<td>Set up units of 10 sows for piglet production</td>
<td>5 10-sow units</td>
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<td>40 10-sows units</td>
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<td>Set up units for 100 piglets for fattening</td>
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<td>Importation of weaner cattle</td>
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<td>Strengthening of DVS</td>
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<td>Review policy and set up schemes/incentives</td>
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<td>Develop fodder plantation</td>
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<td>Land preparation</td>
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<td>Setting up of 40 units of 40-ha deer unit</td>
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<td>Setting up of 10 units of 10-sows for piglet production</td>
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<td>Setting up of 10 units 100-piglet fattening farm</td>
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<td>Setting up 50 units of 200-beef fattening farm</td>
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<tr>
<td>Upgradeing of Central Abattoir</td>
<td>2007-2008</td>
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<tr>
<td>Strengthen DVS</td>
<td>2007-2008</td>
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<tr>
<td>Training of farmers</td>
<td>2007-2008</td>
<td>500</td>
<td>500</td>
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<tr>
<td>Setup a structured marketing system</td>
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<td>Setup Incubators</td>
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</table>
APICULTURE

Apiculture is practiced mainly as a part time activity in Mauritius. There are currently 240 beekeepers keeping some 2000 bee colonies in Mauritius with an average annual honey production of 35 tons. Honey importation is around 150 tons per year. The majority of beekeepers have one to ten bee colonies while some 20 beekeepers have at least 50 bee colonies each.

Mauritius is among the rare countries in the world which is free from important pests and diseases related to honey bees which can have serious negative impact on honey production. Varroa, European Foulbrood and American Foulbrood are absent.

Main apiary sites are found at Rivière Noire, Tamarin, Bras d’Eau, Poste la Fayette, Roche Noires and Nouvelle France. Major melliferous plants include Campèche, Eucalyptus (white and red), Wild Pepper, Tamarind, Terminalia and Litchi. Citrus fruits, peach, cherry, strawberry, sweet melon, water melon and jamrosat are also used as nectar sources by honey bees. Several other fruit, vegetable and flower species are used as minor melliferous plants.

Good honey yield is dependant upon adequate food supply, i.e. nectar sources with different natural and cultivated melliferous plants. Unfortunately, the area under melliferous plants, especially Campèche and Eucalyptus has been decreasing over the years to provide space mainly for urbanization. This has been the major limiting factor for the expansion of apiculture in Mauritius.

Opportunities

Honey, the main apicultural product, is a highly nutritious food with antioxidant properties and containing vitamins. It is also known for its medicinal uses, having antiseptic and antibacterial properties, among others. Additionally, other bee products such as bees wax, royal jelly and propolis can be exploited by beekeepers.

The production of queen bees for sale to beekeepers is also a worthwhile beekeeping activity as queens have to be replaced regularly in beehives for optimum honey yields.

It is common knowledge that bees are good pollinating agents. Provision of pollination services is thus another beekeeping related activity. Hives can be sold or rented out to farms and orchards to increase yield of vegetables and fruits. Additionally, valuable pollination is also provided on the producers’ own farm.

In view of release of land from sugarcane for other agricultural uses, apiculture can be boosted up, assuming that part of the crops that will be planted would be suitable as melliferous plants.

Accompanying measures

- Technical support and advisory services
- Training in general apiculture and in queen bee production
- Loan facility for purchasing hives and equipment
- Setting up of honey standards for regulating the quality of honey sold on the local market
SECTION 3 – KEY SUCCESS FACTORS

The success of the crop and livestock development programme depends on the support measures as well as empowerment of new and existing entrepreneurs. New farmers are to be empowered to play a constructive role in the development of agriculture. It is necessary that they should have access to support services. The first challenge is to improve and expand the existing support services to meet the needs of all farmers. This includes the continuation of a range of ongoing activities such as the strengthening of service delivery institutions for research, financial services, market access & development, training and skills development.

LAND MANAGEMENT AND PHYSICAL DEVELOPMENT

Agricultural Land

Presently, significant proportion of the island of Mauritius to the tune of over 70% is under agriculture and forest lands. In the coming years, incentives provided to restructure the sugar industry will result in significant land areas moving out of agriculture. It is therefore desirable to use a rational physical development plan to guide such land release while optimising short-term and long-term benefits. Furthermore, as the sugar industry implements its mechanisation programme, the area presently leased to small planters for intercropping as rotational land for non-sugar crops will inevitably be reduced.

The National Physical Development Plan, prepared as part of the National Environment Action Plan and approved by Government in 1993, has set out a planning strategy which should prove useful in any further economic development. Its basic concept is balanced development in a compact settlement form which are two interlinked and interdependent strands. Balanced development implies, amongst others, balance of population distribution between the urban groupings and the four ‘rural’ regions, balance between work locations and residing region of the working population, between urbanisation and green areas, and between economic development and environmental protection. Compact settlement form implies that urban development should be focused on larger settlements to make more efficient use of human, financial, economic, physical and social resources. This also implies that urban land uses will be developed so as to take only as much land as is required but will be of an integrated nature so as to enhance human development.

Land Potentially available for Agricultural diversification

In line with Government land reform policy to promote access to agricultural land, MAIF is currently implementing two distinct courses of actions namely (a) release of land under the 500-arpent scheme project and (b) release of land under the ex-tea belt. Furthermore, the MSIRI has identified some 5 000 ha of sugarcane lands as ‘difficult areas’. These consist mainly of mountain slope and rocky lands where a 36 % reduction in the preferential sugar price will adversely affect revenue from sugarcane production. Some potential areas for agricultural diversification purposes on these lands have been identified.

Difficult areas under sugarcane

According to the MSIRI (MSIRI Occasional Report No.32. September 2006) the difficult areas for sugarcane refer to land that cannot be mechanized on account of severe physical and edaphic constraints. Some 12 300 ha of such lands has been identified and where
abandonment of sugarcane cultivation will give rise to environmental, economic and social problems. These lands were categorized as follows:

Category A: Land moderately to marginally suitable for sugarcane and located on the seaward slopes of 3 mountain ranges: the Moka – Long Mountain range, the Grand Port range and the Black River- Savanne range. (4 642 ha) (3 433 small scale planters ≤ 42 ha)

Category B: Inlands slopes of the same Mountain ranges as Categories A and one on the flanks of an isolated mountain along the Eastern to Southern edges of the Central Plateau.

Category C: Flat to moderately sloping land. (6 334 ha including some 2 085 ha occupied by small holders of the ex-tea land).

The map of these categories of land prepared by the MSIRI is annexed for reference. Although there is a strong case for these lands to be supported and kept under sugarcane for environmental and social reasons, it is anticipated that a substantial part of these lands will be shifted towards other land uses, among which are diversification into other crops as per MAAS. Since these are ecologically sensitive areas, prone to degradation, the choice of alternative crops is a very crucial one. Some potential crops identified as alternative to sugarcane lands are presented below

<table>
<thead>
<tr>
<th>Land category</th>
<th>Horticultural crops</th>
<th>Fruits and others</th>
<th>Ornamentals</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Pejibye</td>
<td>Pineapple</td>
<td>Tropical Exotic flowers</td>
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<tr>
<td></td>
<td>Palm (local species)</td>
<td>Litchi</td>
<td>Foliage</td>
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<td></td>
<td>Aloe vera</td>
<td>Avocado</td>
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<td></td>
<td>Vetiver grass</td>
<td>Passion Fruit</td>
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<td>Banana</td>
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<td></td>
<td></td>
<td>Mango</td>
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<td></td>
<td></td>
<td>Papaya</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Pejibye</td>
<td>Strawberry(under protected culture)</td>
<td>Tropical Exotic flowers</td>
</tr>
<tr>
<td></td>
<td>Palm (local species)</td>
<td>Pineapple</td>
<td>Foliage</td>
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<tr>
<td></td>
<td>Aloe vera</td>
<td>Passion fruit</td>
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<td></td>
<td>Vetiver grass</td>
<td>Strawberry</td>
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<tr>
<td>C</td>
<td>Mixed cropping</td>
<td>Pineapple</td>
<td>Tropical Exotic flowers</td>
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<td></td>
<td></td>
<td>Passion fruit</td>
<td>Foliage</td>
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<td></td>
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<td>Strawberry(under protected culture)</td>
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<td></td>
<td></td>
<td>Banana</td>
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<td></td>
<td></td>
<td>Litchi/Mango/Papaya (North Eastern area)</td>
<td>Foliage</td>
</tr>
</tbody>
</table>

Since these are sensitive areas it will be imperative that any diversification is conducted following good land and soil management practices to minimize land degradation that could have serious onsite and offsite effects. There is also a range of agro-climatic diversity within
each category that can lend itself to specific diversification purpose and this needs to be assessed on a site specific basis. The economic success of these enterprises will depend on a large extent on the strength of the forward linkages with the overall economic development of the country.

The 500-Arpent Scheme

Under this scheme, 500 arpents of sugarcane land has been earmarked for release to the farming community for undertaking of non-sugar agricultural activities. The land consists of 100 arpents from the Mauritius Sugar Producers Association (MSPA), 100 arpents from the SIT Land Holdings Ltd. and 300 arpents from the Rose Belle Sugar Estate.

The land under the scheme will be leased to potential entrepreneurs and is meant for the development of agro-based enterprises and businesses with emphasis on innovations and technologies. Both the crop as well the livestock sectors are concerned. Land earmarked for crop production has already been allocated, while amenities, such as water supply and electricity are being put in place at the site for livestock activities.

### Priority areas/sectors identified for diversification

<table>
<thead>
<tr>
<th>Target</th>
<th>Proposed crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export market</td>
<td>Litchi, Pineapple, Palm cabbage</td>
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<tr>
<td>Import substitution and Industrial treatment</td>
<td>Potato, onion, maize, Soyabean, pulses</td>
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<tr>
<td>Oil crops</td>
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<tr>
<td>Domestic market (supermarkets/hotels)</td>
<td>Palm cabbage, Mushroom, Fine herbs, Vegetable seed production</td>
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<tr>
<td>Potential for agro processing</td>
<td>Tomato, chilli, pineapple, banana, Medicinal plants, Aromatic plants</td>
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<tr>
<td>Livestock development</td>
<td>Village laitier, Multiplier Farms, Goat and Sheep production</td>
</tr>
</tbody>
</table>

The allocated plot size under the scheme range from a minimum of 0.5 arpent to a maximum of 1.0 arpent except for the livestock sector, which require an additional amount for specific projects. The initial period of lease is set at 8 years; some restrictions have been imposed whereby hydroponics and long-term crops like litchi, palm and aloe vera will not be allowed.

The lands earmarked by the MSPA belong to 17 sugar estates and are scattered over the island. Those of the SIT are found at Beau Climat in La Flora. For the Rose Belle SE, the lands are located at Banane (200 arp), Beemanique (30 arp) and St Hubert (70 arp). All the lands from the 500 arpent scheme have been surveyed and a schematic map (pertaining to each site) is provided in annex.

**Ex-Tea Land**

Following the implementation of tea diversification policy in 1996, tea plantations in the Central Plateau have gradually been replaced by sugarcane and other foodcrops cultivation.
The ex-tea lands are located within a well-defined area of the uplands, mainly around villages of Belle Rive, Midlands, Vuillemin, La Pipe and Nouvelle France. With its high rainfall and characteristic acid soils, tea was a cash crop that was adapted to the regions. The ex-tea lands occupy an area of around 6,000 arpents. The area is divided into 28 sections which are contiguous, with rivers or corridors of natural forest or other natural features like mountains as separations. Plaine Sophie (near Mare aux Vacoas) is the only region that is excluded from the cluster but the whole area has already been leased to small farmers for vegetable and fruit cultivation.

An assessment of the agricultural suitability indicate that this zone provides good opportunities for agricultural diversification programmes, namely mixed cropping, fruits, livestock or fodder production and forestry. Hydroponics systems can also be set up in places where electricity and water supply can be secured.

Possible land utilization is as follow:

- Forestry development: 339.5 ha
- Conservation forest: 266.2 ha
- Mixed cropping, fruits and ornamentals: 1090.5 ha
- Livestock development and fodder: 952.6 ha

**Land Management**

A major concern that will need to be addressed is the conservation of fertile agricultural land and that of green landscapes. The country will therefore need a well-organised land management information system to reflect the status of land use among the different economic activities and specific to particular agricultural sub-sectors. With scarcity of fertile agricultural land resources in Mauritius, it is imperative that there is a continuous monitoring of the extent and type of both state and privately owned land available in each region, and its utilisation. On the other hand, maintenance of green landscapes should be given due consideration. Natural places will be essential both for the social well-being of the local population and for development of green tourism.

The efficient use of remote sensing and global positioning techniques could strengthen the proposed land management information systems by ensuring effective monitoring of land use, and eventually helping the sustainable management of land and natural resources. The Land Index information is available at the MSIRI and can be put to more effective use for better planning of land utilisation.

Due to high pressure for efficient land use, certain zones may be identified for particular activities. This will curtail cost of setting up infrastructure which may be shared among operators (e.g. electricity and water networks for running hydroponics projects), and in the case of livestock projects, it will avoid environmental problem that arise in the localisation of these projects while ensuring a proper waste management.

Land can be better managed by the creation of larger blocks through regrouping. This will allow efficient use of resources and economy of scale.
Recommendation

- ensure that land conversion is done in a rational way in line with the National Physical Development Plan;
- set up a task force to study and make recommendations with regard to the establishment of a land management information system; and,
- Set up of a land Bank
- Review the mechanism for land allocation
CLUSTERING

In order to ensure optimal efficiency within the whole agricultural sector, it is imperative that activities be efficiently coordinated with proper sharing of information within a prompt responsiveness mechanism between all institutions involved within a sector. For productivity to be attained, it is essential to set up a framework that promotes utilisation of resources in an organised manner to meet established objectives. In this context, clustering provides an appropriate medium in triggering such a process.

Concept of Clustering

Clustering is a new concept worldwide which has proved itself in triggering a constructive synergy between various stakeholders within a system. The concept of clustering of interrelated institutions through a central coordinating body has proved very effective in a number of countries in optimising the utilisation of resources and in the productive application of research findings to meet established objectives. There exists a successful model of this concept in the local textile industry, whereby members have managed to achieve better efficiency in their activity through a sharing of resources, whilst maintaining their competitiveness. Equally relevant to the agricultural sector, such a system would allow proper networking between partners and thus enable the merging of effort between all major players in the sector including the research, academic and business platforms.

A clustering mechanism would provide a proactive interactive interface between the public and the private sectors fostering a spirit of shared responsibilities and benefits and will thus provide the basis for an organised channelling of resources for a more efficient, target-oriented and demand-driven service provision and product development. Such an interplay between stakeholders is particularly vital for the agricultural sector which is frequently confronted to new challenges and thus relies heavily on prompt responses to problems encountered.

CLUSTERING IN THE FRUIT SECTOR

Imported fruits represent a major share in the local market as compared to the local fruit production. However, only local pineapple and litchi have been exported. There is an opportunity for broadening the export market for these fruits through tapping new market in the Middle East, Gulf areas. Clustering at the production level and marketing for export will enable the sector to position itself to meet this new opportunity.

Clustering for other fruits namely, strawberry, papaya and passion fruit for the local market are also envisaged.

The marketing of fresh fruits for local market is not currently well structured; therefore there is a need to review the wholesale market for fresh fruits.

CLUSTERING IN THE FOODCROP SECTOR

The foodcrop producer groups have not been able to improve their production systems. One of the reasons is that they have been operating as individual units. This sector is now facing increasing competition from globalisation. The only way forward is through investing in technology and clustering to take advantage of economies of scale.
Hydroponics
Farmers are being encouraged to integrate into the hydroponics village and cluster their operations, purchase of inputs, and common use of facilities – post harvest, marketing, planning and production.

Post-Harvest / Minimal processing
Farmer groups (WUA, Cooperatives) should be encouraged to embark upon improving post harvest operations and form cluster groups to have access to minimal processing facilities. This activity mainly will benefit producers of onion, carrot, cabbage and salad crops.

Service Providers cluster
Farmer’s organisation will be encouraged to import inputs (pesticides, fertilizers, seeds) to benefit from bulk order.

Another line of clustering will target the services to the farming community namely, spraying service, land preparation, direct sowing and marketing. This activity will benefit all producers of vegetable, fruits and ornamentals.

CLUSTERING FOR IMPORT SUBSTITUTION
A number of crops should be targeted for production in view of import substitution namely, maize, bean, soyabean, spices, medicinal plants, oil crops, among others. This activity will only be economically viable when undertaken on a large scale and under mechanised conditions. Planters embarking on such production activities need to be clustered, sharing production equipment and other processes.

CLUSTERING IN THE LIVESTOCK SECTOR
The livestock sector is being reorganised from the backyard system to a more professional farming system. To alleviate the problems associated with the environment and not to disturb the inhabitants, the livestock production should be clustered in specific zones (with access to utilities).

The use of livestock by products will be promoted and the use of compost from animal waste will be encouraged to alleviate the problem of waste disposal.

The following are essential for livestock project to be sustainable

- dedicated support services for feed, and veterinary services,
- financial assistance at subsidized rate of interest
- modern slaughter house according to international norms

CLUSTERING IN THE DAIRY SECTOR
The producers are to be regrouped and the concept of dairy village be promoted for sustainable development. The producers would benefit in term of scale of production, availability of inputs, and in the marketing strategy. This would also facilitate the tasks of the breeders to form networking in marketing of dairy products such as cottage cheese, ghee and others. The clustering of breeders and networking would enable the concept of 'heifers farms'; which would take care of the heifers and allow the dairy farms to concentrate on milk
production. Clustering of dairy farmers would also involve fodder production and supply animal feed purchase, multiplier farms for breeding animals.

CLUSTERING IN THE GOAT SECTOR

The breeders should be given incentives to embark in multiplier farms for goat. The multiplier farms would supply breeding stock and allow other farmers to focus on fattening of animal only. The cluster will have bargaining power for purchase of inputs such as feed and fodder.

CLUSTERING IN SMALL LIVESTOCK ANIMALS (DUCKS, RABBITS, QUAILS).

The small animals have received little attention and need to be promoted as they represent a good opportunity for diversification. They also cause fewer nuisances to the environment. Clustering could be at regional level and at village level. They also represent a good source of animal protein from duck, rabbit and quail. Here also the concept of multiplier farms would be essential.
FARMERS’ ORGANIZATIONS

To develop and improve management of a few existing farmer groups, members should be exposed to training in groups dynamics and the mechanics involved in the operation of a successful group. The linkage with Farmers, Research and Extension needs further strengthening. The farmers liaison meeting at regional level ensures the participation of all the major stakeholders in the sector. This empowers farmers to address their problems/needs more effectively and encourage group/cluster development.

TRAINING

The key to success in the diversification of agriculture lies in training. Knowledge and skills need to be acquired by the operators who have to be conversant with the latest technologies and be able to operate the modern equipment in order to be competitive.

A Training Centre exists at AREU since 2005 located at St Pierre Extension Department. It already has regional centres at Mapou, Flacq, Rivière des Anguilles, and Plaisance (model farms/demonstration centres) where training is being given. The centre is registered at Mauritius Qualification Authority. The centres are equipped with small farms for practical exercises. The training centre also comprises an agro processing centre where training in agro processing is imparted. It is proposed to add small incubators to support start up projects. The AREU is now proceeding with the setting up of a Farmer Training School at Wooton.

Training courses are targeted towards a wide range of clients, namely: the actual farming community, potential agro entrepreneurs, women, youth, retrenched workers, unemployed and members of the vulnerable groups and members of the Early Retirement Scheme and Voluntary Retirement Scheme of the sugar industry. The courses cover a wide range of subjects technical as well as management ones such as hydroponics, livestock, crop, fruits and flower production, irrigation, mechanisation, processing and farm management. The courses will be both non award and award type.

Training needs assessment of clients will be carried out on a regular basis so that the school can respond adequately to the demand.

Memorandum of Understanding has been signed with IVTB and similar MOUs need to be ratified with other stakeholders namely, MES, University of Mauritius, Regional Training Centre so as to have a synergistic approach in training.

Collaboration is also envisaged with training organisations at regional level and international level. Recourse to resource persons in specialised field from other institutions is also planned.

Training – Information Needs

Information is already available on the websites of the ministry. It is planned to set up a new internet based information and communication technology (ICT) to improve communication between Research, Extension and farmers. New avenues should be explored to communicate research findings and information to farmers.
The following improvement in addressing farmer needs for information is proposed:-

1. E-brochure.
2. Online discussions
3. Announcement of news and events
4. Question and answer and FAQs
5. Market information data base.

Recommendations

- establish a scheme such as the Young Agricultural Entrepreneurial Scheme (YAES) with incentives for young entrepreneurs to acquire agriculture-based training at all levels.
- establish the training needs of staff in terms of scientific, social, and business skills and prepare an appropriate framework for staff development and training of agricultural stakeholders;
- strengthen extension activities among agricultural entrepreneurs;
- work in close collaboration with the Empowerment Programme, University of Mauritius and the Industrial and Vocational Training Board (IVTB) in establishing priority fields of study in agriculture in tune with the training needs within the sector; and,
- devise specific tailor-made training programmes based on the needs of the planting and farming community.
IRRIGATION

At present, about nineteen irrigation projects have been set up in Mauritius. These are being operated by the Irrigation Authority and Water Users Associations of the respective projects. It is estimated that 21,000 ha are under irrigation and a survey carried out by IA has shown that an additional 12,000 ha are potentially irrigable, mostly under sugarcane. The Northern Plain Irrigation Project constitutes a major share of irrigation in the country. Water from Midlands Dam is channelled to La Nicolière Reservoir for irrigating the northern plains, where there is a high demand for water due to insufficient rainfall.

Various types of irrigation systems are presently being used in Mauritius. The most common ones for irrigation of sugarcane are the Centre Pivot, the Rain Gun overhead system and the Drip system. In addition to these systems, drag line irrigation system, mini sprinkler irrigation system and portable/semi portable sprinkler irrigations are used by planters for non-sugar crops. Due to scarcity of water, there has been a tendency to shift towards drip irrigation system. The latter apart from providing a precise application of water, enables fertigation. This contributes towards a higher crop yield compared to crops that are not fertigated.

Gravity-fed drip irrigation systems are gradually gaining popularity among farmers of the non-sugar sector due to its simplicity and low cost where no pump is required. This type of irrigation system will be beneficial for small scale farmers cultivating on marginal lands.
**RESEARCH & DEVELOPMENT**

The role of research and technology transfer is primordial to spearhead the improvement in production and sustainability of the agricultural sector being aimed at. It is important to invest in strategic research and to build up the appropriate mechanism to coordinate demand-led research in a constructive framework to reach the above aim.

However, sustainability would require the sector to be its own driving engine. The agricultural sector should be financially self-reliant, to a certain extent, to better foster its further development and growth. Research and development, which is an important component for the growth of any agricultural sector of economic significance, requires considerable financial investment. In this context, the introduction of user-pay services would be the driving motor in sustaining proactive research and development and technology transfer initiatives. With such a system, the planting community and agricultural stakeholders at large would be responsibly involved in problem diagnosis and hence would assist in prioritisation of projects and programmes within the sector. It would foster a spirit of shared responsibility and benefits and would thus assist in the more appropriate channelling of resources with a demand-driven research framework.

**Recommendations**

- encourage private sector participation in the agricultural reform programme by devising a framework for a demand-led research and development programme; and,
- encourage private sector involvement in the optimal use of existing facilities as well as the use of Food Laboratory.
- Availability of Research Funds
- Set up of a digitalised research library
- Conduct research to address needs
TECHNOLOGY

A critical look at the current situation prevailing in the Mauritian agricultural sector, taking into account the country’s strengths and weaknesses in this field, further reiterates the need for a gradual transition from traditional practices towards modern sophisticated technologies.

In view of the characteristic changes in demand for quality and quantity coupled with accentuating competitiveness at the international level, the development and success of our agricultural sector relies largely on the adoption of modern technologies.

Information Technology in Agriculture

Being conscious of the role of Information and Communication Technology (ICT) in providing the necessary support to development of any sector, Government is placing great importance to promote the adoption of ICT. With vast application in a number of key economic sectors, ICT as an important component in establishing an agricultural information system will also act as a major driver of agricultural development in Mauritius.

Setting up of an Agricultural Information System

The setting up of an agricultural information system has become vital in today’s context where easy and speedy access to information has become crucial. The agricultural information system would combine human; computer and communication based resources and will in turn result in efficient collection, storage, retrieval, communication and use of data. Such a system within the sector finds important roles at different levels in supporting development in agriculture.

At Government level, the information system, by providing a clear indication of trends within the sector, would be vital in assisting in the formulation of plans and policies and the overall decision making process. This information system will allow regular access to such data that would help in the reviewing and readjustment of policies and plans with a view to channelling resources and targeting priority areas in a more productive manner. Such a system would also help Government to monitor the implementation of policies.

At the sectoral and institutional level, such information would enable better utilisation of data and information for efficient management of operations and planning of activities.

At the production level, timely and accurate data and information to producers and farmers on all aspects of production and marketing is absolutely vital. Such information is imperative if production is to be planned in an organised and structured manner to be in tune with the market needs and tendencies. In this respect, the agricultural information system will have a central role to play in determining the success of the agricultural sector.

Recommendations

- The Ministry is aiming at establishing individual sectoral information system which will network with each other and will be linked to the centralised information system of the Ministry. The Ministry's information system will form the basis of a portal which producers and farmers and other interested parties can access to through direct internet. This portal would also aim at directing its users to other potential sources of information according to their needs.
• It is proposed to carry out an information needs assessment, based on the objective and mandate of each institution within the Ministry, to gauge the kind of data to be collected, stored and provided access to by potential users.
• It is also proposed to create awareness among producers, farmers and other agricultural stakeholders as to the benefits that can be accrued from the use of ICT.
• With a view to assisting producers and exporters in looking for market outlets and boost up export within the sector, AREU is managing Market Information System (MIS). This database, on one hand, is helping the stakeholders concerned to be more ICT literate and, on the other hand, allowing spontaneous access to market information on the export front.

Eventually this network, by providing speedy collection and dissemination of market information, would also potentially help in regulating prices at the national level and hence ensure a reasonable margin of profit to producers, resolving the present difficulty encountered due to intermediaries.

Food Technology
In the present context whereby concern is being increasingly raised with respect to consumer needs and safety, the need to ensure food safety and quality and protection of consumer health within the food sector has become an issue of paramount importance. With the coming into force of increasingly stringent international norms within the food sector, ensuring that food products have appropriate composition and meet regulatory standards is crucial.

Facilities for proper food analysis to ensure conformity to norms are almost non-existent which poses enormous problems particularly to the local agro-industrial sector. In the current system such analyses are effected in foreign laboratories which not only involves exorbitant financial implications but also is very time consuming and cause enormous delays in activities.

The Ministry has set up a Food Technology Laboratory. This laboratory has been equipped with the finest sophisticated technologies which serve as a rapid service provider to various stakeholders involved within the food sector including importers, exporters, agro-industries as well as consumers at large. The main objectives of the laboratory include:

(i) provision of a range of routine but essential tests with regard to food safety and quality;
(ii) timely and cost-effective analysis of food products of both animal and plant origin;
(iii) safeguard of imports of food items into Mauritius;
(iv) provision of the necessary analytical back up to product development; and,
(v) assistance to the local food processing industry and exporters of food commodities to ensure compliance to export requirements and international norms and in a timely manner.
Agricultural Technology Diffusion Scheme

- The scheme aims at improving production through the adoption of new and innovative technologies. The assistance provided is in terms of non-refundable grants to meet costs of:
  - Technical assistance for the introduction of new farming techniques and technologies aimed at improving quality, productivity and efficiency;
  - Technical assistance for the development of agro-processing activities and added value to products;
  - Training in management, packaging, marketing of agro-processed products;
  - Use of IT in farming activities;
  - Participation in commercial trade fairs, exhibitions and study tours with a view to acquire knowledge and exchange experience.

- Subsidy on planting materials: seeds and plantlets sold by the Agricultural services
TECHNOLOGY TRANSFER

There are around 12,000 registered growers in crop production and about 6,400 livestock farmers who operate on their own farms mainly in backyards.

Technical advisory services and other support services are provided by existing institutions to farmers to promote an effective technology transfer and help the farmers to improve their productivity and standard of living. Despite their small scale of operation, the farmers are becoming more sophisticated and the demand for services is beyond mere technical issues.

Farmers are being encouraged to adopt an agri-business approach in their farming activities. The support services extended cover business plan, planning, budgeting, record keeping. This trend has led to the emergence of an agri-business type farmers who have embarked on intensive vegetable, ornamental, orchard production, hydroponics/protected cultivation, minimal processing of vegetables and marketing, livestock farmers with relatively larger number of animals and housing system.

The non-sugar sector is expected to be modernized throughout the supply chain. The operators in this sector need to perform as agri-business entrepreneurs, with full control of the factors of production. The sector has been moving at a slow pace as adoption of new technology requires a thorough evaluation until adoption. Recently the change from open field to protected cultivation has been witnessed. New technologies in terms of seedling production, direct sowing, seed bed preparation, fertigation, among others have been introduced in the non-sugar sector.

The demand for agricultural commodities is constantly changing and consumers are expecting new, high quality and safe produce to meet their new lifestyle. The European Union has already implemented a quality assurance system for agricultural products entering the Union. In the light of mentioned changes/challenges new innovative methods need to be developed to assist farmers to reach the set objectives. The producers have to evolve at the same pace and be proactive to satisfy the consumer demand. They have a vital role in producing quality products that are up to the required standards and that would fit in the healthy diet of the consumers. This would be only possible if the producers adapt their production practices with modern technology and with the necessary infrastructures in place. Producers need to be supported with innovative technologies. The Extension team operating at field level should have the necessary support from other institutions. The institutional networking is very important and needs to be strengthened.

In view of strengthening the support to the farming community, the service provided by the Extension Department of the AREU, should be reinforced to meet the above challenges. The Extension should also aim at a "Filière" approach to support emerging specialised groups.

Over the years, technology transfer has focused primarily on a production oriented approach with provision of technical information. There is now a new orientation towards a more business like approach. It focuses on meeting market demand/opportunities, provision of business profiles containing economic and market information. Potential agri-business opportunities will be packaged in support to eventual entrepreneurs.
Moreover, the institution’s extension network and particularly model farms will be put to full use to that effect. These farms will become regional training centres and focal points for technologies and information.

The following innovative thrusts are being or will be adopted to spearhead the development process in the sector:

- Micro projects where beneficiaries are technically and financially supported in the adoption of new technologies. Ceiling of funding will vary according to innovativeness of the venture (availability of fund).
- Model plots (farms) simulating commercial ventures.
- Incubator facilities will be offered where entrepreneurs will have the opportunity to test their ventures.
- Entrepreneurs will be encouraged in the agribusiness support service sector among which production of planting materials, mechanized service, spraying service, and marketing.
- Forward contract and linkages with the commercial sector where farmers are offered a guaranteed market and a minimum price for their produce will be encouraged and supported. This will ensure stabilisation of production. Contractual agreement will have to be developed.
- Export market opportunities will be explored and producers’ capacity to engage in this activity supported. This implies an understanding of the trade chain and market norms.
- Professionalisation of farm activities: use of management tools
- Compliance to production and quality norms
- Thrust will be on quality of horticultural produce, restoring consumer’s confidence and adoption of sustainable production practices; sensitising producers on their responsibilities to the environment through the adoption of good agricultural practice – GAP Codes of practice for different production levels have already been developed.
- Use of ICT
  - Recourse to ICT (internet, SMS) will ensure rapid and effective communication to producers. The ‘SMS disease alert’ will ensure rapid response of producers to pest/disease development.
  - E-marketing opportunities.

For technology transfer to be effective there is also a need to consider the following:

- Provision of special incentive schemes reserved to professional full-time farmers, as a way to reflect the reorientation of national agriculture
- Encourage production planning by professional planters association
- Structured market
- Review the land allocation mechanism.
  - Encourage formation of large commodity blocks
  - Release of prime lands
- Encourage entrepreneurship attitude
• Empower farmers for decision making and risk management
• Provide risk reducing mechanism (Insurance, welfare fund)
• Encourage clustering

The following critical issues need to be addressed in order to move ahead with the projected agricultural diversification options.
• reallocation of sugarcane land for new agricultural development
  o crops
  o livestock
  o agro industry
• Scarcity of labour in the agricultural sector
• Regulatory framework protecting the environment
• Support services for the non-sugar sector
  o Land preparation
  o Fine derocking scheme
  o Seed/planting materials
  o Contracting services

The agro industries developed around local agricultural products will be supported with a more defined product range. Outsourcing of new materials for value addition is to be addressed along cross border initiative programs as well as through planned production. In this respect, clustering of farmers and farmer grouping is a very important issue.
MARKETING

The overall vision of Government in the non-sugarcane agricultural sector is to make it a profitable industry with an eventual export orientation. This implies that emphasis has to be laid, in the first instance, on a sustained increase in production of quality and diversified primary and secondary products; and secondly, on an increase in value-added products. Production, however, needs to be complemented with a dynamic marketing system which will play the role of a catalyst between the producer and the consumer and ensure efficient and profitable product absorption.

It has been noted that marketing in the agricultural sector has so far been a rather randomly conducted activity, undertaken by producers and prospective local exporters with no documentation and information system on market potential and tendencies for an effective market and product analysis. As a result, it has not been possible to derive maximum benefits from our agricultural exports, either because the wrong markets were often targeted, or because the products do not often meet the customers needs and demand for better presentation. Also, products exported do not always suit the requirements of the markets, where the tendency is more towards ready-to-consume and time saving commodities.

In line with the context of the plan, whereby quality and diversity of production in the non-sugar sector is being actively encouraged, the need to establish a dynamic and fully functional marketing system becomes imperative to ensure optimal marketability of our produce both locally and internationally. This system should be designed in such a way as to guarantee the sustainability of the Mauritian agricultural sector by efficiently reconciling the needs and expectations of all the stakeholders, be they farmers, marketing agents, food processors, exporters or consumers.

A functional and effective marketing mechanism should allow agricultural producers to plan investment according to consumers’ needs in terms of quantity, quality and timing with respect to product demand. Efficient allocation of resources would avoid physical losses of produce as well as financial setbacks, and at the same time, would ensure that all agricultural activities become economically profitable.

For the period 2007-2015 the marketing strategy will focus on the following:

- Provide market intelligence for farmers as well as hotels, restaurants and service sector.
- Develop a brand for local crops and meat products.
- Development of an export market within the sub-region.
- Facilitate and provide training for farmers in areas of trade and post harvest technology.
- Implement promotion campaigns for agricultural products.
- Facilitate the movement of products from the farmer to the hotels and restaurants.

Export Market

Viability of investment in high technology will depend on the capacity to consolidate our present markets and most importantly, to tap new potential opportunities arising from endeavours to achieve a competitive edge. The local market being very small, the right
strategy would be to develop more attractive export avenues in our existing niche markets, and, to seriously consider potential that exists in the region - mainly the Indian Ocean Rim countries, and the wider international market, such as Japan, the European Union, and the United States. The latter three economies have large domestic markets but exports can be hampered by cost of air freight, distance and proximity of competitors to them. Strategies to tap these markets should be geared towards products with higher value-added and longer shelf-life. As regard the USA markets, opportunities under the AGOA need to be fully tapped.

Continuous and consistent knowledge of market outlets for specific commodities will be the key instrument for the country’s export strategy. Information that would be essential to the agricultural stakeholders includes:

- market tendencies with a good reflection of the change in demand, customer taste and preferences, prices and buying intervals;
- appropriate conditioning and ideal packaging of products with reference to value-added items; and
- chain of distribution and channelling of the products at the export end.

Recommendations

- restructure and improve the existing infrastructure at auctions market in accordance with international norms and regulations;
- study the possibility of introducing a grading system for fruits and vegetables;
- devise a price setting mechanism within the auction system to ensure that producers derive a decent margin of the profits. The mechanism should also ensure that the profit margins derived by the auctioneers and intermediaries do not result in exorbitant selling prices to customers;
- ensure that the appropriate authorities (Ministry of Health and MAIF–Phytosanitary Division, Agricultural Chemistry Division) closely monitor the operation of the auction to ascertain conformity to norms on sanitary parameters, quality, grading and food safety;
- redefine the role of the Agricultural Marketing Board to ensure inter-alia the proper function and monitoring of the auction system;
- reinforce the Market Information System for compilation of statistics and provide latest data on product demand to producers and exporters;
- set up a Marketing Intelligence Unit which will have as responsibility to:
  - continuously monitor market;
  - adjust market strategies;
  - provide continuous feedback to local agricultural stakeholders as regard to market exigencies, norms and standards to enable continuous upgrading of our agricultural products.
- work out, in collaboration with the Mauritius Standards Bureau, a mechanism for the proper labelling of foodcrops:
• sold on the local market, to enable easy identification of premium varieties; and,
  o meant for export, to impart a standard Mauritian branding.

  • devise a mechanism to ensure rapid and efficient traceability, particularly for exported commodities;
  • look into the possibility of allocating a certain number of reserved stalls for cooperatives at market places;
  • provide appropriate training for primary value-addition, such as efficient packaging techniques, with a view to enhancing quality standard of products sold locally; and,
  • review the freight rebate scheme to cater for new foodcrop commodities with a view to allowing potential export avenues to take off.
FOOD QUALITY, SAFETY AND CERTIFICATION

Quality of food is becoming an issue of increasing importance in today's world with increasing health awareness among the population and the unprecedented rise in the occurrence of diseases linked to poor eating habits. Mauritius, in fact, has a very high rate of Non-Communicable Diseases such as diabetes, hypertension and cardiovascular diseases (CVD) which are all, to some extent, associated to food habits.

Quality is not characterised by the physical appearance of food but, most importantly, to its intrinsic properties, mainly with regard to presence of toxins, chemicals residue content, and the percentage composition of certain substances such as fat content. Quality is therefore an important factor to be taken into consideration whilst planning a strategy for the development and expansion of the agro-industry. It is vital that such development be carried out in conformity with international norms and standards with regards to food safety and quality in order to ensure sustainable investment within the sector.

With the trend towards globalisation and increasing health awareness, agricultural commodities are increasingly being required to comply with certain norms in order to qualify for trade. These issues call for effective traceability in the agro-food chain from producer to the final retailer. This also implies better accountability from the part of agricultural entrepreneurs to the buyer of their products.

Pesticide residue content will increasingly dominate the trade of agricultural produce with the enforcement of regulation on pesticide residues by the European market. With the fixation of Maximum Residue Levels (MRLs) for every crop, ACP export of tropical fruits to Europe would be dramatically affected owing to the present tendency of abusive use of chemicals in common agricultural practices. Mauritian exports within the agro-industrial sector using local raw materials would not be spared either, if the proper remedial action with regard to controlling chemical inputs at the production level is not adopted.

Therefore, in this context, it is essential for the country to be endowed with the necessary analytical capacity, legislative framework and enforcement agencies in order to ensure that food production and processing meets the appropriate norms, to safeguard public health, to ensure competitiveness of products, and to facilitate exports. In this respect, it has been noted that existing laboratory facilities under the aegis of the Ministry of Agriculture are not adequate.
AGRO-INDUSTRIAL SECTOR

Overview
Agro-industry forms an important part of the socio-economic framework of Mauritius. This sector encompasses a wide range of activities with enterprises having different levels of organisation ranging from relatively large ones to small cottage and backyard activities. It is estimated that this sector employs around 10 000 people, and satisfies a relatively small share of the total domestic demand, contributing to only around 2% to GDP.

Current Status
Over the years, a number of agro-industrial enterprises have managed to successfully establish themselves and have steadily developed their activities of transforming raw materials into value-added products. A few large processing plants have emerged principally in the areas of edible oil refining, animal feed compounding, wheat flour milling, and tuna canning. Some enterprises import fruits and vegetables which are processed for the domestic market. A few smaller scale enterprises have managed to develop in areas of foodcrop processing and preservation through a wide variety of exotic recipes, using locally available raw material.

Markets
The primary objective of local agro-processing industries was to supply the domestic market. However, over time, owing to the limited size of the domestic market, some enterprises started to tap regional niche market opportunities (e.g. wheat flour). A few smaller scale agro-processing companies have also managed to tap export markets through their variety of exotic products at the regional and international level.

Raw Material for the Agro-Processing Sector
Most raw materials used for the local agro-processing industry is today imported with only around 5% emanating from the local horticultural production. Also, most processed food consumed locally is imported accounting for a Food Import Bill of around 15 % of the total import bill in the year 2005. This strong reliance on imported raw material as primary inputs can be accounted for by a number of inherent constraints to the sector. These can be summarised as follows:

(i) land scarcity which hinders large scale production;
(ii) high cost associated with local production of agricultural produce coupled with a rising cost of labour; and
(iii) adverse agronomic and climatic factors.
(iv) Appropriate varieties for agro-processing

These contribute to a limited and erratic supply of raw materials from local sources which are also generally associated with high prices. It has also been noted that the varieties and quality of the local produce do not always suit the requirement of the agro-processing industry. As a result, the local companies are compelled to turn to imports which not only provide a cheaper alternative, but also to a certain extent, ensure reliability and regularity of supply, over and above quality and variety assurance.
General Trend

The local agro-industrial sector has so far been able to survive owing to the policy framework of Government aiming at an import substitution strategy which has led to the imposition of trade barriers to protect the local market. Exports have been possible within the sector owing to the preferential access of Mauritian products to the European market, Mauritius being part of the ACP countries. Preferential Trade Agreements under the previous Lomé Convention has imparted to Mauritius a competitive edge in its export endeavours over its non-ACP competitors.

However, with liberalisation of trade, local agro-processing enterprises are already subject to harsh competition by imported products on the domestic market which may severely threaten their performance and sustainability. The globalisation process will inevitably entail gradual erosion of trade barriers which will further expose local enterprises to severe foreign competition in the sector. Therefore, local agro-processing industries are likely to lose their domestic competitive edge with cheaper value-added products entering the local market coupled with the rising cost of imported raw material. The gradual erosion of export subsidies on the other hand will have direct adverse impact on the development of export within the sector. It is therefore crucial that the current situation within the agro-processing industry be reassessed and the right strategy devised to give a new orientation to the sector.

Attributes of Mauritius for the Development of Agro-Industry

Despite the numerous constraints elaborated above, Mauritius is endowed with certain attributes that may be efficiently harnessed to boost its agro-industrial sector. The country, for instance, already harbours a pool of core competence, know-how and technology in the field that offers it a comparative advantage over its regional counterparts. Some established agro-processing companies are already operating under international licenses and franchises. This imparts an advantage to Mauritius in the global network. Furthermore, modern infrastructural facilities such as sophisticated port and airport logistics and good internal and external communication networks are added merits to plan further development and expansion of the sector. The Freeport with its objective to offer state of the art logistics such as modern warehouses, cold rooms and processing centres, will give an additional competitive edge to the development of the local agro-industry. Mauritius also has skilled local core competence in relevant scientific research areas of food technology to provide the necessary technical back up to such development.

Future Objectives

All these taken into consideration, it is felt within Government and the private sector that the future development of agro-industry in Mauritius lies in embracing a regionalisation approach. This would open up the possibility of Mauritius to use advantageously the resources and facilities available in neighbouring countries to produce primary products on large scales at competitive prices for its local agro-industry. Such a process would assist Mauritius to emerge as an agro-processing hub in the long term. The model of Singapore, another net importer of food like Mauritius, can be adopted in this regard. This country has managed to successfully emerge as an international agro-processing hub, using the production capacity of its neighbouring countries through proper utilisation of its know-how, innovative technologies and efficient communication and port and airport logistics.
There also exist possibilities whereby the country could benefit through the development of franchising between local entrepreneurs and experienced international operators in specific areas of agro-processing. Such possibilities would not only provide a relatively higher degree of security in terms of establishment of business, but would also allow the necessary transfer of technology and training of Mauritians in relevant fields of technology application and business management such as marketing, selling and other operational aspects.

Recommendations

- identify primary products usually imported for agro-processing, that can be cost-effectively produced locally and regionally;
- devise appropriate strategies to ensure production and supply of raw materials for processing at affordable prices at the local level with a view to reducing the dependence on imported raw materials;
- investigate into the possibility and feasibility of using the region as production base for raw materials;
- sensitise potential entrepreneurs on existing schemes for agro-industrial development;
- provide specific training to potential entrepreneurs in the agro-processing sector;
- provide the appropriate level of support to the local agro-industries in terms of export marketing intelligence through the proposed Marketing Intelligence Unit;
- promote foreign investment in the agro-industrial sector in Mauritius through joint ventures;
- Use the Food Technology Laboratory to allow timely and affordable technical and analytical support to the local agro-industry, to encourage the local development of processed foods, to ensure that food production is done in conformity with the required norms and to facilitate exports;
- provide additional incentives in the form of soft term loans for the acquisition of agro-industrial equipment;
- encourage grouping of producers to achieve quality production with a view to promoting agro-industrial development;
- provide incentives under an ‘Innovation Scheme’ to promote the development of new commercial transformed products;
- set up a permanent joint Government/private sector committee to discuss all matters related to agri-business;
- set up an ‘Agro-Industrial’ cluster that would regroup all agro-industrial entrepreneurs with a view to promoting the concept of sharing of resources towards better efficiency within the ;
- sign bilateral agreements regarding the protection of Mauritian investment in the region;
- ensure that the new opportunities arising from regional cooperation through SADC, COMESA and IOC Trade protocols are efficiently tapped;
- consider new trade opportunities with the USA in the agro-processing sector through the AGOA;
• reinforce research in food-processing technology mainly geared towards finding efficient means of preservation of specific seasonal food commodities;
• encourage local entrepreneurs to further explore opportunities of franchising through the proposed marketing intelligence; and,
• explore the possibility for local entrepreneurs to have recourse to international loan facilities for the expansion of agro-processing activities.
AGRO TOURISM
Expansion of agriculture tourism linkages would be a major area of focus. Government would intensify its efforts to coordinate the supply of local produce to the hospitality sector. Production of specific crops to meet the requirements of the sector would be encouraged. A special feature would be the development of local fruits to be served in hotels and restaurants on a regular basis.

CONSERVATION
However with the decline in the sugar industry, maintenance has diminished and the level of erosion has apparently increased. There is a need for the development of a land management unit to assume the soil conservation role and to implement mitigation measures.
RISK MANAGEMENT

Agriculture is per definition an industry that is confronted by risk in the form of climatic variation, pests, disease and unpredictable price fluctuations, as well as natural disasters such as cyclones and drought. Theft is a huge problem in the crop sector and legislation must be strengthened to deal with this issue.

An effective risk management strategy is critical for the promotion of risk management tools such as crop insurance and asset protection.

A protocol for dealing with SPS emergencies and plant/animal health matters is being formulated, along with the establishment of an independent food safety body with increased capacity for improved control. In the light of the move to a free trade dispensation in the SADC region, Mauritius must promote regional cooperation on SPS matters (building of capacity, harmonisation of standards and procedures).

Price risk is, per definition, part of a deregulated agricultural market. Dealing with price risk by applying various risk management tools such as futures market will become important for all farmers. Government, in collaboration with the private sector, should launch a comprehensive training and awareness programme among farmers to encourage the use of risk management tools. Market and price risks are also reduced through good and timely market information. Here Government, through its statistical capacity, still has a major role to play, while other initiatives such as the creation of a Marketing Intelligence Unit will also be encouraged. These efforts will provide farmers and agribusinesses with the market intelligence required to make informed business decisions and minimise market and price risk.

Mauritius currently has limited agricultural support schemes and no permanently functioning institutional structures for disaster management. In this light the creation of an institutional capacity to implement disaster management and to establish comprehensive schemes to deal with disasters such as floods, fires and droughts in the agricultural sector is underway. Such schemes will include risk insurance programmes that will be designed in partnership between Government, farmers and private insurance firms.

Food shortages can be managed by adopting a strategy of storage and control of supply. In this effect the Cluny store managed by AMB would be very useful. A buffer stock of food commodities, and their inputs such as seeds is essential to ensure food supply and quick establishment of plantation post calamity period.

The non sugar strategy of the corporate sector must be complementary to the government programme to harmonised production and utilisation of resources.
REGIONALISATION/CROSS BORDER INITIATIVES

It is unanimously accepted that if Mauritius wants to emerge as a full-fledged agri-business hub, the country needs to devise a forward-looking strategy within agriculture, tap all opportunities in the region and elsewhere, and build itself as a powerful regional and international agro-processing centre. Such a strategy has to be in tune with ambitious endeavours in other sectors including finance, trade and information technology aiming at transforming the country into a business and knowledge centre of excellence.

Moreover, with the trade liberalisation process in full swing and the elimination of tariff barriers in the context of trade protocols binding the COMESA, SADC and IOC regional groupings of which Mauritius is a member, the local agribusiness sector, specifically the agro-industrial sub-sector, is becoming increasingly exposed to severe competition from bigger and more powerful overseas producers. There is therefore an urgency to gear the sector towards achieving long-term competitiveness and to take full advantage of the emerging opportunities which globalisation also entails, besides opening the door to harsher competition. The new strategic orientation has necessarily to take into account the renewed opportunities provided by the Cotonou Agreement and the export possibilities for agricultural produce offered by the United States of America through the Africa Growth and Opportunity Act (AGOA). The AGOA, which aims at fostering trade links between the USA and Africa, will definitely accelerate the process of regional cooperation and broaden the industrial base in the region.

However, owing to the numerous inherent constraints faced by Mauritius as regards agricultural production, it is clear that the country is not in a position to meet the above-mentioned challenges and seize new opportunities by itself. Mauritius alone does not have the required production capacity. Taking this into account, it is widely felt within the agricultural non-sugar sector that Mauritius should move away from an inward looking strategy and adopt instead a more outward looking approach focused on broader regional and international markets.

Regional Opportunities

It is unanimously recognised that within the new strategy, Mauritius has to take advantage of the region as a production base and to utilise the production capabilities in neighbouring countries to develop locally a strong export-oriented agro-processing industry. In so doing, domestic industries in the agro-industrial sector will be in a position to better face competition and at the same time exploit new export avenues.

Opportunities in agriculture do exist in certain neighbouring countries including Madagascar and Mozambique. These countries have abundant unexploited land resources and offer very cheap labour. Their climatic cycles are quite interesting and many crops can be cultivated year-round. Also crops, such as potatoes, that cannot be grown in Mauritius in specific periods can be cultivated during these same periods in these countries, thus ensuring a regular supply. The possibility of producing within the region a number of other primary products, such as maize, onion and garlic with guaranteed access to the local market needs to be seriously considered.
Future Objectives

Two major constraints in exploring regional opportunities are, however, political instability and poor sanitary and phytosanitary conditions. There is, therefore, a need to realistically assess the investment potential as regards agriculture in the region as a whole, set up a public-private sector task-force to look into existing opportunities in all its aspects and make recommendations accordingly, elaborate a framework within which investments will take place and encourage such investments including joint ventures with appropriate incentives. More importantly, there is a necessity for Mauritius to discuss and sign bilateral trade agreements such as Investment Promotion and Protection Agreements with countries where Mauritian operators will be investing.

As far as sanitary and phytosanitary norms are concerned, it is felt that establishing and vigorously enforcing international norms in Mauritius and in countries where Mauritian operators will be investing, are essential prerequisites for achieving success in regional and international trade endeavours.

Recommendations

- set up a public/private sector task force to revigorate regionalisation endeavours and advise Government on necessary actions;
- identify means of financing evaluation studies on the feasibility of using the region as production base;
- sensitisise and help countries of the region where Mauritian entrepreneurs will be investing in establishing and enforcing international sanitary and phytosanitary norms. (Concerted actions within the SADC, COMESA, IOC, IOR frameworks are likely to pay dividends in this respect);
- review the Regional Development Scheme to provide for additional incentives in the agricultural sector and look into the possibility of decreasing the minimum amount of investment required for its eligibility;
- review the Industrial Expansion Act of 1993, which provides for a series of incentives for agro-industrial development, to cater for regional initiatives;
- consider establishing air links where necessary to support the regionalisation process;
- allocate resources to the Marketing Intelligence Unit to provide information and act as an interface between Governmental institutions and investors as regards investment policies, regional and international import statistics, legislative and fiscal issues, amongst others;
- set up a desk in all Mauritian Embassies in order to improve the collecting and synthesising of information on investment opportunities as well as to disseminate information to potential joint-venture partners; and,
- investigate into the possibility of setting up an Export Credit Guarantee Scheme to safeguard exporters against trade related risks such as insolvency of foreign buyers and delayed payments.
<table>
<thead>
<tr>
<th>Projects</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>1.0 Modernisation and Competitiveness of Agriculture</strong></td>
<td></td>
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<tr>
<td><strong>1.1 Promoting modern production technologies</strong></td>
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<tr>
<td>Microprojects (part financing)</td>
<td>2008-2015</td>
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<tr>
<td>Diversification (workshops)</td>
<td>2008-2013</td>
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<tr>
<td>Model Clustering (part financing)</td>
<td>2008-2015</td>
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<tr>
<td><strong>1.2 Promoting value addition to agricultural produce</strong></td>
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<tr>
<td>Microprojects (part financing)</td>
<td>2008-2015</td>
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<tr>
<td><strong>1.3 Enhancing and monitoring the quality of produce</strong></td>
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<tr>
<td>Capacity building of farmers: production norms, GAP, IPM rational use of pesticides,</td>
<td>2008-2015</td>
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<tr>
<td>Post harvest management (crates)</td>
<td>2008-2010</td>
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<tr>
<td><strong>1.4 Improving marketing</strong></td>
<td></td>
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<tr>
<td>MIS: Training courses</td>
<td>2008-2012</td>
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<tr>
<td><strong>2.0 Sustainable land management</strong></td>
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<tr>
<td><strong>2.1 Water management</strong></td>
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<tr>
<td>Efficient irrigation system (microprojects)</td>
<td>2008-2015</td>
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<tr>
<td>Capacity building of farmers in water management</td>
<td>2008-2015</td>
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<tr>
<td><strong>3.0 Agricultural Research, technology dissemination and adoption</strong></td>
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<tr>
<td><strong>3.1 Strengthening Extension</strong></td>
<td></td>
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<tr>
<td>Model farms/ plots</td>
<td>2008-2010</td>
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<tr>
<td>Upgrading training facilities and communication</td>
<td>2008-2010</td>
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<tr>
<td>Research, Farmer and Extension linkage (workshops, Planters' liaison meetings)</td>
<td>2008-2015</td>
</tr>
<tr>
<td><strong>4.0 Reducing factors of risk in food supply</strong></td>
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<tr>
<td><strong>4.1 Calamity preparedness</strong></td>
<td></td>
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<tr>
<td>Developing mitigating impact strategies (protected cultivation)</td>
<td>2008-2011</td>
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<tr>
<td><strong>4.2 Cross Border Initiative</strong></td>
<td></td>
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<tr>
<td><strong>5.0 Rural and peri- urban alleviation</strong></td>
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<tr>
<td><strong>5.1 Support to vulnerable group</strong></td>
<td></td>
</tr>
<tr>
<td>Additional income through small scale activities (village projects)</td>
<td>2008-2012</td>
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<tr>
<td><strong>5.3 Farmer Welfare and Theft Reduction measure</strong></td>
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</table>
INSTITUTIONAL FRAMEWORK

In line with the general policy of the plan to efficiently re-structure the whole agricultural set-up, it is felt that the institutional framework within which services are provided also urgently needs to be revisited.

With a view to ensuring productivity within the agricultural sector, it is essential that the support institutions fulfil their respective roles in an efficient manner. To this effect, it is imperative to ensure:

- adherence to the initial objectives and mandate of each institution;
- prevention of duplication of activities;
- proper and close monitoring of activities & projects;
- efficient delivery of services & research findings to the ultimate beneficiaries; and,
- proactive endeavours, with a demand-driven and target-oriented approach.

Service Providers

Agricultural services

The Agricultural Services of the Ministry, situated at Reduit comprises the following divisions:

1. National Plant Protection Office
2. Horticulture
3. Entomology
4. Agronomy
5. Agricultural Chemistry
6. Food Technology Laboratory
7. Agricultural Engineering / Remote Sensing Unit
8. Land Use
9. Animal Production
10. Veterinary Services/Animal Health laboratory
11. Agricultural Information
12. Agricultural Development

These divisions operate in close collaboration towards the enhancement of food production and security in a sustainable manner and, to this effect, provide the following main services to the agricultural community:

(i) advice on land use and agricultural projects;
(ii) plant protection services, pest and disease control; and,
(iii) veterinary care and livestock services.
Over the years, the Agricultural Services have diverged away from their initial research and extension orientation, increasingly assuming the role of a facilitator in dispensing the following services:

(i) Provision of essential inputs;
(ii) Improvement and safeguard of plant and animal health;
(iii) Land resource management;
(iv) Agricultural development and support programmes;
(v) Provision of regulatory framework; and,
(vi) Market research/Intelligence to a certain extent.

**Agricultural Research & Extension Unit (AREU)**

The research and extension mandate within agriculture including livestock, formerly falling under the purview of the Agricultural Services, was entrusted to the AREU since its inception in July 1995 from the Directorate of Agricultural Research and Extension (DARE) following the relocation of the latter’s activities to the Food and Agricultural Research Council (FARC).

It was created to facilitate Government's goals of improving the productivity of the farming community and diversifying production. In addition to the above two organisations, there exist twelve other institutions falling under the aegis of the Ministry, five of which play key roles within the non-sugar agricultural sector.

**Food and Agricultural Research Council (FARC)**

The FARC was set up in 1985 with the mandate of coordination and harmonisation of research in non-sugar crops, livestock and food production. It has the AREU operating under its aegis which is responsible for the extension and research services.

**Agricultural Marketing Board (AMB)**

The AMB was set up in 1963. It regulates and supplies potatoes, onions, spices, garlic and fresh milk on the local market. The main objectives of the AMB are to encourage local production through a guaranteed price, to market the controlled products, to ensure their regular supply and to regulate their prices on the local market.

**Irrigation Authority (IA)**

The IA was set up in 1979 with the mandate of studying the development of irrigation and of implementing and managing schemes for irrigation.

**Mauritius Meat Authority (MMA)**

The MMA was set up in 1974 to:

(i) establish and manage abattoirs;
(ii) purchase and import livestock for slaughter;
(iii) market meat and by products;
(iv) control and regulate the sale of meat; and,
(v) fix the price of meat and meat products on the local market.
Tobacco Board
The Tobacco Board was set up in 1932 under the Tobacco Production & Marketing Ordinance of 1930. Its main function is to control the production and marketing of tobacco in Mauritius by acting as a regulator of leaf production through a quota system and its subsequent marketing through its central warehouse where all leaf produced locally are purchased, processed, stored and sold to the manufacturer(s).

SPWF
SPWF is involved in registration of Small planters by providing them a Planter’s Card. Other services offered are Death Grant Scheme, Crop Insurance Scheme and “Meteo Agricole” is also offered to the planter’s community.

Tea Board

FSC

Forestry Services

National Parks and Conservation Service

MSIRI

Contacts with Municipal/District Council
The potential entrepreneur should contact the Planning Department to confirm about the need of a permit for the operation of the business and also the annual trade fee payable for the business.

Ministry of Cooperatives

National Federation of Young Farmers

National Women Entrepreneur Council

Registrar of Businesses
Local entrepreneurs should register their business at The Registrar of Businesses. Upon registration, the entrepreneur obtains a Business Registration Card with his business Number that allows legal operation of the business.

SEHDA
SEHDA is involved in Business Counseling, Business Facilitation, Business profiles, Business Information and it provides assistance in project write up and also issues at Business Certificate that is recognized by DBM for loan applicants.

DBM
The Development Bank of Mauritius provides loan to registered entrepreneurs at specific rates and is involved in Equity Participation & Venture capital for SME.
**Empowerment Programme**
Empowerment Programme provides Venture Capital for Start up & SMEs and Credit Guarantee for projects exceeding Rs 300 000.

**Enterprise Mauritius**
Assist in export of local produce, identification of constraints that prevent export, help to improve productivity and quality, help to meet market norms and assist entrepreneurs in product marketing.
REFORMING THE INSTITUTIONS

Although from their respective mandates, each institution appears to have clear-cut individual objectives, certain overlapping of activities has been observed. Therefore, the objective of the proposed restructuring process is to ensure a proper distribution of tasks between the interrelated institutions operating under the aegis of the Ministry with a view to avoiding duplication of activities and ensuring a better and more productive utilisation of resources.

A similar process recently carried out within the sugar sector with a view to meeting the objectives of the Sugar Sector Strategic Plan has proved to be very useful in addressing some of the most pressing problems of the sector. The aim is now to extend this process to the non-sugar sector. Such an exercise, with the aim of rendering individual institutions more efficient in their respective tasks and services, would enable better coordination and monitoring and would thus ensure that the objectives of the plan are met within the scheduled timeframe.

Thus with a view to ensuring productivity within the agricultural sector, it is essential that the support institutions fulfil their respective roles in an efficient manner. To this effect, it is imperative to ensure:

(i) adherence to the initial objectives and mandate of each institution;
(ii) prevention of duplication of activities;
(iii) proper and close monitoring of activities & projects;
(iv) efficient delivery of services & research findings to the ultimate beneficiaries; and,
(v) proactive endeavours, with a demand-driven and target-oriented approach.
IMPLEMENTING THE PROGRAMME

The vision requires partners to have action plans, key performance indicators, service delivery standards, monitoring and evaluation systems and time frames in order to realise the non-sugar strategic plan. It also requires Government to do things differently—with urgency and in partnership with farmers, agribusiness, NGOs, and other stakeholders.

It is evident from the strategic programme proposed that the action plan to enhance participation, competitiveness and environmental integrity in the agricultural sector requires concerted efforts to ensure the following:

- A High Powered Committee
- Goal orientation among all these entities, to ensure that all are focused on achieving universal benefits, rather than merely sectional interests
- Capacity building at all levels, and in the many dimensions, ranging across the spectrum from advanced scientific knowledge to greater participation in project implementation at grass root level
- Sound planning of the implementation process to ensure that projects are started and completed at the right time, and to oversee coordination between the various entities and projects
- A proper sequencing of implementation actions with the necessary support actions (capacity building, institution building, planning, etc.)
- Monitoring of progress to ensure the proper management of the implementation process. This requires special attention to the provision of information and to management information systems as well as installing a monitoring and evaluation system.

An action plan cannot be detailed without the full participation of those mandated with the responsibility for its implementation. The strategic plan makes provision for a proposed protocol of community-public-private partnerships and calls for joint implementation.

The primary functions of this committee will be to:

- Define in detail all the strategic initiatives identified. These will include the specific action steps that are envisaged, the identification of those responsible for their implementation, the identification of other entities that need to become involved, the identification of other resources (financial and other) and the specification of timetables for implementation
- Create a management structure with the task to support the entities charged with responsibility for the implementation of each of these programmes, whether the entity is in the public, private or voluntary sector. This support will be of such a nature as not to interfere with the prerogatives of the responsible institution
- Create a reporting framework based on a plan for the monitoring and evaluation of the programmes and projects that make up the strategic plan. The permanent joint committee should report the results of these actions to the principal stakeholders on a regular basis.
PROCESSES

A permanent joint committee will be responsible at national level for the monitoring of progress and will oversee the programme of implementation. Working groups or task teams will be the key to the implementation process and will report to the permanent joint committee. The strategic partners have to determine how resources (human and financial) from each partner are committed and managed in the process of implementing the various projects and strategies.

The first and most important step is to communicate this strategy as widely as possible. The idea is that this document should be read widely and that information on the implementation programme should be shared regularly with all role-players. The process of delivering the non sugar sector strategic plan has thus begun.
EXPECTED OUTPUTS OF THE PROGRAMME

1. The domestic demand for vegetables met on a continuous basis and to achieve at least 70% sufficiency in certain key commodities.
2. Milk and meat production stabilised to reach 10% sufficiency by 2015
3. Food import bill reduced
4. Increased agro-processing activities with constant supply of primary materials
5. Increased access to land
6. Increased mechanisation and use of technology
7. Increased production of tropical and exotic fruits
8. Availability of planting materials on a regular basis
9. Improved post harvesting practices
10. Adoption of a commercial and competitive approach towards farming
11. Improved food safety practices
12. Export market for selected fruits, vegetables and ornamentals developed
13. Improved communication and marketing
14. Improved extension service delivery
15. Efficient integrated pest management in place
16. Increased service provision in the agricultural sector
Land released for Agricultural diversification

In line with Government land reform policy aimed at democratizing the economy and promoting access to agricultural land, the Ministry of Agro-Industry and Fisheries is currently implementing two distinct courses of actions namely (a) release of land under the 500-arpent scheme project and (b) release of land under the Ex-tea belt. Furthermore, the MSIRI has identified some 12,341 ha of sugarcane lands as ‘difficult areas’. These consist mainly of mountain slope lands where a 36% reduction in the preferential sugar price will adversely affect sugarcane production. Some potential areas for agricultural diversification purposes on these lands have been identified.

The 500-Arpent Scheme

Under this scheme, 500 Arpents of sugarcane lands have been earmarked for release to the farming community for undertaking of non-sugar agricultural activities. The land consists of 100 arpents from the Mauritius Sugar Producers Association (MSPA), 100 arpents from the SIT Land Holdings Limited and 300 arpents from the Rose Belle Sugar Estate.

The land under the scheme will be leased to potential entrepreneurs and is meant for the development of agro-based enterprises and businesses with emphasis on innovative ideas and technologies. Both the Crop as well the Livestock sectors is concerned. Land earmarked for crop production has already been allocated, while amenities, such as water supply and electricity are being put in place at the site earmarked for livestock.

### Priority areas/ sectors identified for diversification

<table>
<thead>
<tr>
<th>Target</th>
<th>Proposed crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export market</td>
<td>Litchi, Pineapple, Palm cabbage</td>
</tr>
<tr>
<td>Import substitution</td>
<td>Potato, onion, maize, Soyabean, pulses</td>
</tr>
<tr>
<td>and Industrial treatment</td>
<td>Oil crops</td>
</tr>
<tr>
<td>Domestic market</td>
<td>Palm cabbage, Mushroom, Fine herbs, Vegetable seed production</td>
</tr>
<tr>
<td>(supermarkets/</td>
<td></td>
</tr>
<tr>
<td>hotels)</td>
<td></td>
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<tr>
<td>Potential for agro</td>
<td>Tomato, chilli, pineapple, banana, Medicinal plants,</td>
</tr>
<tr>
<td>processing</td>
<td>Aromatic plants</td>
</tr>
<tr>
<td>Livestock development</td>
<td>Village laitier, Multiplier Farm, Goat and Sheep</td>
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<tr>
<td></td>
<td>production</td>
</tr>
</tbody>
</table>

The allocated plot size under the scheme range from a minimum of 0.5 arpent to a maximum of 1.00 arpent except for the livestock sector, which require an additional amount for certain projects. The initial period of lease is set at 8 years; certain restrictions have been imposed whereby hydroponics and certain long-term crops like litchi, palm and aloe vera will not be allowed.

The lands earmarked by the MSPA belong to 17 sugar estates and are scattered over the island. Those of the SIT are found at Beau Climat in La Flora. For the Rose Belle SE, the lands are located at Banane (200A), Beemanique (30A) and St Hubert (70A). All the lands of
the 500 arpent scheme have been surveyed and a schematic map (pertaining to each site) are provided in annex.

The lands released by the SIT at Beau Climat will have individual plot size of 1 arpent approximately. The agro-climatic conditions prevailing in the region have been characterized and major improvements required in soil conditions have been assessed. An overall description of each of the sites at Beau Climat and Rose Belle are given below while the table in annex, provide some basic information on the MSPA lands.

**Lands from Beau Climat**

*Soil Conditions and climate*

Soil in this area is classified as Latosolic Brown Forest (Land Resources and Agricultural suitability Map of Mauritius, FAO/MSIRI, 1973). It is characterized as follows: dark brown silty clay loam structure; shallow (25-45cm deep) and gravelly along the solum, overlying parent rock; well drained. The soil is acidic (pH 4.5 – 5.5). Organic matter content is generally high (5-12%). Major part of the land is moderately sloping, while the rest is either flat or sloping.

The area receives a mean annual rainfall of around 3500mm. Evapotranspiration has been estimated at around 1450 mm annually. Consequently there is no period of moisture deficit during normal years. However, a deficit period can be encountered, periodically during the months of October to December.

*Land Suitability*

Based on the agroclimatic characteristics of the region, soil type and information obtained from surrounding diversified areas, this land can be said to be highly suitable for mixed cropping fruit, flowers and some selected other crops. However, appropriate varieties need to be chosen to suit the agro-climatic conditions.

It should be noted that certain crops, especially fruit species, like mandarins, are long cycle crops that takes several years before becoming into optimal bearing capacity.

*Mixed cropping*

Suitable crops that can be grown successfully include creepers (cucumber, pumpkin, calabash etc.), crucifers (cabbage, cauliflower, and broccoli), carrot, bean, squash and chilli. Onion and potato are other potential crops but would require good land preparation, especially removal of gravels and stones, and careful disease control during adverse climate.

Spices like coriander, shallots and cardamom cultivation are good possibilities.

Tomato and salad tomato can be grown during the summer months. A list of suitable crops, their potential yield and planting season is given in annex. However, off-season production can be undertaken, using suitable varieties, to take advantage of the cooler temperatures of this region during summer months.
**Fruits**

As far as fruit production is concerned, banana is the most suitable. Citrus, especially mandarin, passion fruit and guavas can be grown. Strawberry can ideally be produced under protected cultivation using low tunnels.

Based on the results obtained from the cultivation of Pineapple under plastic mulch on the high grounds this fruit has been found to be suitable.

**Flowers**

The following flower species can be grown: Anthurium, Gladiolus, Lilium, Rose, Alphinia, Heliconia, Bird of paradise and Gerbera. The production of orchids and foliage plants (ferns and other decorative plants) also holds good potential in these regions, especially under protected culture.

**Protected culture**

Use of greenhouses (mainly plastic tunnels) for the production of selected crops also offers good opportunity, as it overcomes some of the limitations of adverse climate. However, the remoteness of the area and the absence of electricity and water supply at present limit its utilization.

Simple structures that offer protection against rainfall, like plastic tunnels, can be used effectively for the production of fine herbs such as coriander, thyme, spring onion, parsley and mint.

**Other crops**

Palm, Aloe Vera and ‘Noni’ cultivation can also be carried out if suitable outlets can be secured for the products derived from these activities.

Main crops that could be cultivated in this region are given below:

<table>
<thead>
<tr>
<th>Mixed Cropping</th>
<th>Fruits</th>
<th>Flowers</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bean</td>
<td>Banana</td>
<td>Anthurium</td>
<td>Spices (Cardamon etc..)</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Citrus (Mandarin, Lemon etc)</td>
<td>Gladiolus</td>
<td>Palm Cabbage</td>
</tr>
<tr>
<td>Creepers (Cucumber, pumpkin, calabash etc..)</td>
<td>Passion fruit</td>
<td>Lilium</td>
<td>Fine herbs (coriander, thyme, spring onion etc...)</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Guavas</td>
<td>Rose</td>
<td>Aloe Vera</td>
</tr>
<tr>
<td>Carrot</td>
<td>Strawberry (Protected culture)</td>
<td>Alpinia</td>
<td>Noni</td>
</tr>
<tr>
<td>Onion</td>
<td>Pineapple (under Plastic mulch)</td>
<td>Heliconia</td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td></td>
<td>Birds of paradise</td>
<td></td>
</tr>
<tr>
<td>Tomato (mainly salad)</td>
<td></td>
<td>Gerbera</td>
<td></td>
</tr>
<tr>
<td>Potato (Stone free areas)</td>
<td></td>
<td>Orchid/Foliage</td>
<td></td>
</tr>
</tbody>
</table>
Lands from the Rose Belle Sugar Estate

The lands released by the Rose-Belle Sugar Estate are located at Banane (200A), Beemanique (30A) and St Hubert (70A). The agro-climatic conditions prevailing in the region have been characterized. Their potential suitability for crop production has also been worked out. The main findings and recommendations are indicated as follows:

Soil conditions

Soil in all the 3 sites is classified as Humic Ferruginous Latosol. The main characteristics are as follows: Deep sandy clay loam on compact silty clay subsoil. Frequent ironstone nodules in the topsoil. There is also appreciable amount of stones in the solum. Soil fertility is moderate, with pH around 4.5-5.5. The soil has good physical characteristics and can easily be improved through liming and addition of organic materials.

Climate and topography

This area is found near the village of Bananes, in the Super Humid Zone, with rainfall in the range 2500 – 3500 mm. No data is presently available on temperature regime for this specific site but the mean daily temperature is expected to be found in the range 14 C to 27 C. The land is flat to gently sloping.

Agricultural Suitability

Crop production activities can favorably be undertaken such as the follows:

- **Mixed cropping:** crucifers, creepers, potato, carrot, beans, onion, chili, tomato, leafy vegetables, etc.
- **Fruits:** banana, pineapple, strawberry, passion fruit etc
- **Spices:** coriander, shallot, thym, etc. preferably under low cost protected structures
- **Ornamentals:** anthurium, gladiolus, lilium, gerbera, heliconia, etc.
- Seed and seedling production activities

Fine defrocking would probably be required in some parts. The area being exposed to windy conditions would require the setting up of effective windbreak to protect the plantations.

This area is very accessible as it is found along the Banane-Cluny main road.

The Ex-Tea Belt

The Public tea sector was established during the 1960’s with the objective to diversify and broaden our sugar-based economy and at the same time to provide opportunities for job creation in view of alleviating the unemployment crisis, which prevailed during that period. In the late eighties the sector was faced with tremendous economic difficulties on account of high production cost and low returns especially in relation to the relatively medium quality tea that was manufactured locally. In 1995, the country benefited from an additional sugar quota of 85 000t on our export market. Government took the decision to diversify the Public Tea sector, mainly to sugarcane cultivation, which was already initiated in August 1994. The project covered an area of about 2 482 ha and involved some 2 520 small tea-holders.

Also, some initiatives were undertaken by the Ministry to allocate some additional lands to foodcrop and fruit production owing to the increasing demand for fresh vegetables and fruits. From 1989 to 1992 some 180 ha of tea land were leased to small farmers for these
activities, which turned out to be quite successful both economically and socially. As regards sugarcane cultivation on the tea lands, the activity has proved to be hardly sustainable especially in the longer terms. Some of the causes put forward to explain the poor performance of the sugarcane crop on these lands relate to the adverse agro-climatic conditions which characterize this Super Humid Zone, the rising cost of production and the fear for drastic sugar price reduction guaranteed until recently by the EU. To date, many plots of land are left in an abandoned state, while other farmers have made official request to divert away from sugarcane cultivation.

The ex-tea lands which are less productive in sugar production will eventually not be able to sustain the activity in view of the gradual phasing out of the preferential tariff obtained under the Sugar Protocol. The MSIRI has identified some 2085 ha of these lands as ‘difficult areas’. However, these lands also present numerous opportunities for diversification into foodcrops, fruits and livestock production, with particular consideration to certain specific development projects such as palm production, flower & ornamental cultivation, hydroponics, herbs and spices as well as medicinal plant production. However, the projects must be implemented in a coherent and integrated manner that would make them economically viable as well as socially acceptable. The driving force for the success of this diversification project will reside in the future expected increase in national economic and tourist arrival target set at 2 million in the near future.

The background information of this specific region of the island is described below, followed by a development plan proposed for key activities that could be undertaken within this zone.

Area description

The ex-tea lands are located within a well-defined area of the Uplands mainly around villages of Belle Rive, Midlands, Vuillemin, La Pipe and Nouvelle France. With its high precipitation rate and characteristic acid soils, tea was a cash crop that was adapted the regions. The ex-tea lands occupy an area of around 6 000 arpents. The area is divided into 28 sections carrying specific names. Most of the time these sections are contiguous and separated partly by rivers and corridors of natural forest or other natural features like mountains. Plaine Sophie (near Mares Aux Vacoas) is the only region that is found apart but the whole area has already been leased to small farmers for vegetable and fruit cultivation.

The prevailing climatic conditions are almost similar over the entire region. However soil conditions vary to some extent and they are among the most important criteria used in formulating this alternative agricultural development plan.
All the sections comprising the ex tea lands and their acreage.

<table>
<thead>
<tr>
<th>Locality</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devoyenne</td>
<td>47.1</td>
</tr>
<tr>
<td>Ferrette</td>
<td>17.1</td>
</tr>
<tr>
<td>Dioré</td>
<td>14.1</td>
</tr>
<tr>
<td>Butte Chaumont</td>
<td>13.2</td>
</tr>
<tr>
<td>Canneliere</td>
<td>26.2</td>
</tr>
<tr>
<td>Grand Merlo</td>
<td>79</td>
</tr>
<tr>
<td>Grande Chartreuse</td>
<td>71.6</td>
</tr>
<tr>
<td>Gilibert</td>
<td>29</td>
</tr>
<tr>
<td>Malherbes</td>
<td>42.2</td>
</tr>
<tr>
<td>Rivière du Bois</td>
<td>182.2</td>
</tr>
<tr>
<td>Midlands</td>
<td>206.0</td>
</tr>
<tr>
<td>Betty</td>
<td>46.6</td>
</tr>
<tr>
<td>Dubreuil</td>
<td>286.4</td>
</tr>
<tr>
<td>Herbreau</td>
<td>153.7</td>
</tr>
<tr>
<td>Total</td>
<td>2577.5</td>
</tr>
</tbody>
</table>

Limitations and major improvements needed

These lands have inherent limitations in terms of adverse climatic conditions - high precipitation and low evapo-transpiration, and poor soil conditions – low fertility, acidic and prone to leaching.

Consequently the following measures are recommended for good crop performance.

- Liming of the soil to increase its pH and improve nutrient availability especially of phosphorus, potassium and calcium. Liming materials such as cement (5t/ha) or lime (4t/ha) may be used.
- Improvement of the soil fertility by incorporating organic materials, such as manure and compost at the rate of 40/ha for the first two years, which can be reduced to 20- 30t/ha in the subsequent years.
- Laying out of efficient drainage and waterway system to evacuate excess water during high rainfall periods.
- Removal of surface rocks so as to broaden the range of crops that can be potentially cultivated.
- Adoption of soil conservation measures on slopy lands in order to minimize soil erosion.

Specific problems of this region

A number of reasons have been put forward by the planters for abandoning cultivation or requesting a change of plots, of which the main ones are damage caused by monkey and marshy plots. This is not surprising as many of these plots adjoins forest areas and/or are found in depressions with high water table and/or are susceptible to accumulation of water during rainy periods. To alleviate the monkey problem a campaign is currently ongoing whereby traps to capture monkeys are being placed by two companies in the most sensitive areas. Therefore the problem is expected to diminish in the future.
As for the marshy plots two situations have been encountered. On one hand, the most common ones, the land can be drained easily with the setting up of appropriate infield and outfield drains and thereafter cultivated normally. In the other cases a high water table is present. In such cases the land can be drained to some extent and then the choice of crops is critical. In the first instances colocasia can be grown. Thereafter, especially during dry spells, creepers can be cultivated (chouchou, cucurbits, pumpkin etc). Other crops need to be grown on raised beds. Except for colocasia, other root crops should be avoided (potato, carrot, onions etc).

A few plots at Devoyenne have a gley type soil which is difficult to drain, because they are found in small depressions, with unfavourable soil physical properties (clayey). These plots should preferably be put under conservation forests.

**Alternatives to sugar cane**

The land presently under sugar cane can be put to other agricultural uses on the basis of their capability rating. There are considerable variation in soil conditions with respect to soil depth, rockiness, texture and overall soil fertility status. An assessment of the agricultural suitability indicate that this zone provides good opportunities for agricultural diversification programmes, namely mixed cropping, fruits, livestock or fodder production and forestry. Hydroponics systems can also be set up in places where electricity an water supply can be secured.
Localities identified for the setting up of the respective agricultural development.

<table>
<thead>
<tr>
<th>Productive Forestry</th>
<th>Locality</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devoyenne</td>
<td>47.1</td>
<td></td>
</tr>
<tr>
<td>Ferrette</td>
<td>17.1</td>
<td></td>
</tr>
<tr>
<td>Dioré</td>
<td>14.1</td>
<td></td>
</tr>
<tr>
<td>Butte Chaumont</td>
<td>13.2</td>
<td></td>
</tr>
<tr>
<td>Canneliere</td>
<td>26.2</td>
<td></td>
</tr>
<tr>
<td>Grand Merlo</td>
<td>79.0</td>
<td></td>
</tr>
<tr>
<td>Grande Chartreuse</td>
<td>71.6</td>
<td></td>
</tr>
<tr>
<td>Gilibert</td>
<td>29.0</td>
<td></td>
</tr>
<tr>
<td>Malherbes</td>
<td>42.2</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>339.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Livestock/Fodder</th>
<th>Locality</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rivière du Bois</td>
<td>182.2</td>
<td></td>
</tr>
<tr>
<td>Midlands</td>
<td>206.0</td>
<td></td>
</tr>
<tr>
<td>Betty</td>
<td>46.6</td>
<td></td>
</tr>
<tr>
<td>Dubreuil</td>
<td>286.4</td>
<td></td>
</tr>
<tr>
<td>Herbreau</td>
<td>153.4</td>
<td></td>
</tr>
<tr>
<td>Gourdel</td>
<td>78.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>952.6</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mixed Cropping/Fruits/ornamentals</th>
<th>Locality</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bee Manique</td>
<td>93.3</td>
<td></td>
</tr>
<tr>
<td>Nouvelle France</td>
<td>47.0</td>
<td></td>
</tr>
<tr>
<td>La Pipe</td>
<td>160.3</td>
<td></td>
</tr>
<tr>
<td>Petit Melo</td>
<td>38.4</td>
<td></td>
</tr>
<tr>
<td>Vulelmin</td>
<td>215.2</td>
<td></td>
</tr>
<tr>
<td>Montilles</td>
<td>60.8</td>
<td></td>
</tr>
<tr>
<td>Piton</td>
<td>203.6</td>
<td></td>
</tr>
<tr>
<td>Five Ways</td>
<td>83.5</td>
<td></td>
</tr>
<tr>
<td>Merven</td>
<td>81.5</td>
<td></td>
</tr>
<tr>
<td>Verdun</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td>Dick</td>
<td>47.4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1090.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conservation Forestry</th>
<th>Locality</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arnot</td>
<td>45.6</td>
<td></td>
</tr>
<tr>
<td>Raffray</td>
<td>149.0</td>
<td></td>
</tr>
<tr>
<td>Grand Chartreuse</td>
<td>71.6</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>266.2</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Mixed cropping*

Except for a few plots with specific problems mentioned above in this report most are suitable for mixed cropping. Crops that can be grown successfully include creepers.
(cucumber, pumpkin, calabash, chouchou etc), crucifers (cabbage and cauliflower) carrot, beans, squash, onion, chilly (cari). Potato is a potential crop but very careful disease control is required especially during adverse climatic conditions. Spices, such as coriander, shallots and especially cardamom, cultivation are good possibility.

Tomato and salad tomato can be grown during the summer months. A list of suitable crops, their potential yield and planting season is shown in annex. It should be noted that these areas are also suited for the production carefully selected off-season vegetable crops mainly due to the relatively low temperatures and humid conditions that prevail during the summer months especially at high altitudes.

In general, it is expected that the crop yield will be low for the first 2 years of cultivation, until the soil has been properly worked out to reach the optimum fertility level. A list of suitable crops, their potential yield and planting season is given in annex 2 and 3.

Fruits
As far as fruit production is concerned, banana is the most suitable. Citrus, especially mandarine, passion fruit and guavas can be grown. Strawberry can ideally be produced under protected cultivation using low tunnels.

There is a growing demand for ‘Goyave de chine’ in the processing industry. If a market is secured, then ‘Goyave de chine’ can be grown on a commercial basis, as it is currently done in Reunion Island

Based on the results obtained from the cultivation of Pineapple under plastic mulch this crop is found to be suitable.

Ornamentals
The following flower species can be grown Anthurium, Gladiolus, Lilium, Rose, Alphinia, Heliconia, Bird of Paradise and Gerbera. The production of orchids and foliage plants (ferns and other decorative plants) also holds good potential in these regions, especially under protected culture.

Protected culture
Use of greenhouses (mainly plastic tunnels) for the production of selected crops also offers good opportunity, as it overcomes some of the limitations of adverse climate. However, the absence of electricity and water supply at present limits its utilisation.

Palm cultivation
Another good potential utilization of these lands is for palm production, to be used either for fresh consumption or as pickle and other transformed products. However to be economic around 2 arpent of land will be required for a planter. Currently the variety Pejibye as well as Royal Palm has been found promising in these areas.

Livestock/Fodder production
The ex tea lands can also be used for livestock production. An area of 950 ha can be used for this activity, mainly for the production of animals on place or as fodder production units for supply to other enterprises, such as “Village Laitieres”.

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Livestock activities can be carried out provided appropriate infrastructure (water and electricity) be made available. Cattle can be reared in closed system and appropriate measures for the control of stomoxys flies should be taken as high incidence of such nuisance will affect productivity. Although goat thrives best in dry and warm zones goat keeping can be carried out in these regions by providing good housing conditions and adoption of good management practices. Poultry farming also can be envisaged in confined system.

Appropriate waste disposal system to minimise impact of solid and liquid waste on the environment will have to be devised as per the requirements for Preliminary Environment Report.

The areas mentioned are suitable for the establishment of fodder plantations of the following species: Elephant grass, Setaria grass, Rhodes grass, Herbe d'Argent and Herbe bourrique. However, Elephant grass, Setaria and Herbe D'Argent are known to have good yields under the prevailing conditions and can ensure supply of fodder throughout the year with appropriate management practices. As planting materials are not readily available for cultivation of large areas the establishment of nurseries should be envisaged.

Under good management practices fodder yield of 100 t/ha on average can be obtained. Therefore over the whole area earmarked some 90 000 t of fodder can be expected throughout the year, at the rat of 4 to 5 cuts/year. These can sustain a cattle population of around 5 000 heads.

**Forestry/ Agro-forestry**

Some of the more marginal lands can best be used as productive forestry either solely or combined with fodder production. Some 340 ha have been identified for this purpose. Apart from making the best use of these lands forestry would also provide invaluable ecological services in this area where two of the most important reservoirs of the island are found.

Up to date only pine trees have been successfully grown in super-humid areas as the species are well adapted to the climatic and acid soil conditions in these regions. Most known tree species are tropical in origin and require warmer climates e.g. Bois noir, giant acacia, *Sesbania* sp., etc.

Forest trees can be combined with fodder species that are tolerant to shade. Herbe bourrique is predominantly found to grow in our forest areas. Elephant grass, setaria grass and herbe d'Argent can be established with modified spacing for the forest tree plantations. Planting of Calliandra in combination with grasses mentioned is also envisaged.

**Conservation forestry**

As mentioned previously two of the most important freshwater reservoirs of the island, namely Piton du Milieu and the Midlands Dam are found amidst these lands, most of which are found within the catchments area. It is proposed that some of the lands are put back to conservation forestry, especially those found in the immediate vicinity of the reservoirs. Sections identified for this purpose include Arnot, Raffray and part of Grande Chartreuse and amount to some 270 ha. The gain to be obtained over the long run in terms of ecological services would surely outmatch the immediate gain that can be derived if they are put to agriculture.
**Difficult areas under sugar cane**

According to the MSIRI (MSIRI Occasional Report No..32, September 2006) the difficult areas for sugar cane refer to land that cannot be mechanized on account of severe physical and edaphic constraints. Some 12 341 ha of such lands has been identified and where abandonment of sugar cane cultivation will give rise to environmental, economic and social problems. These lands were categorized into three categories, a brief of which are given below.

**Category A:** Land moderately to marginally suitable for sugar cane and located on the seaward slopes of 3 mountain ranges: the Moka – Long Mountain range, the Grand Port range and the Black River- Savanne range. (4642 ha) (3433 small scale planters ≤ 42 ha)

**Category B:** Inlands slopes of the same Mountain ranges as Categories A and one on the flanks of an isolated mountain along the Eastern to Southern edges of the Central Plateau.

**Category C:** Flat to moderately sloping land. (6 334 ha including some 2 085 ha occupied by small holders of the ex-tea land).

The map of these categories of land prepared by the MSIRI is annexed for reference. Although there is a strong pleas for these lands to be supported and kept under sugar cane for environmental and social reasons, it is believed that a substantial part of these lands will be shifted towards other land uses, among which are diversification into other crops. Since these are ecologically sensitive areas, prone for degradation, the choice of alternative crops is a very crucial one. Some potential crops identified as alternative to sugar cane lands are presented below.

<table>
<thead>
<tr>
<th>Land category</th>
<th>Horticultural crops</th>
<th>Fruits and others</th>
<th>Ornamentals</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Pejibye</td>
<td>Pineapple</td>
<td>Tropical Exotic flowers</td>
</tr>
<tr>
<td></td>
<td>Palm (local species)</td>
<td>Litchi</td>
<td>Foliage</td>
</tr>
<tr>
<td></td>
<td>Aloe vera</td>
<td>Avocado</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vetiver grass</td>
<td>Passion Fruit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Banana</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mango</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Papaya</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Pejibye</td>
<td>Banana</td>
<td>Tropical Exotic flowers</td>
</tr>
<tr>
<td></td>
<td>Palm (local species)</td>
<td>Pineapple</td>
<td>Foliage</td>
</tr>
<tr>
<td></td>
<td>Aloe vera</td>
<td>Passion fruit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vetiver grass</td>
<td>Strawberry(under protected culture)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Mixed cropping</td>
<td>Pineapple</td>
<td>Tropical Exotic flowers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passion fruit</td>
<td>Foliage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strawberry(under protected culture)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Banana</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Litchi/Mango/Papaya (North Eastern area)</td>
<td></td>
</tr>
</tbody>
</table>
Since these are sensitive areas it will be imperative that any diversification be conducted following good land and soil management practices to minimize land degradation that could have serious onsite and offsite effects. There are also a range of agro-climatic diversity within each category that can lend themselves to specific diversification purpose and these need to assess on a site specific basis. The economic success of these enterprises will depend to a large extent on the strength of the forward linkages with the overall economic development of the country.
## Annex

### Lands leased under the 500 A Scheme

<table>
<thead>
<tr>
<th>Sugar Estate</th>
<th>Location</th>
<th>Area(^*) earmarked (A)</th>
<th>No. of Lots leased</th>
<th>Activities earmarked</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MSPA Lands</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Bel-Ombre S.E</td>
<td>Bel Ombre</td>
<td>2.60</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2 Britannia S.E</td>
<td>Britannia</td>
<td>2.40</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3 Constance S.E</td>
<td>Hermitage</td>
<td>5.81</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>4 Mon Desert Alma S.E</td>
<td>La Laura</td>
<td>7.62</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>5 Harel Frères</td>
<td>Plaine des Papayes</td>
<td>5.00</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>6 Cie de Beau -Vallon Ltd</td>
<td>Ville Noir</td>
<td>6.66</td>
<td>17</td>
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</tr>
<tr>
<td>7 Deep River Beau Champs</td>
<td>La Nourice</td>
<td>11.00</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>8 Medine S.E</td>
<td>Tamarin Fall/ Berlin</td>
<td>13.30</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>9 Mon Trésor S.E</td>
<td>Plaine Magnien</td>
<td>4.74</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10 Savannah S.E</td>
<td>Mare Tabac</td>
<td>6.00</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>11 Fuel S.E</td>
<td>Camp Sonah</td>
<td>13.98</td>
<td>28</td>
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</tr>
<tr>
<td>12 Mon Loisir S.E</td>
<td>Mon Loisir</td>
<td>5.64</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>13 Mount S.E</td>
<td>Barlow/Petite Julie</td>
<td>4.20</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>14 Bel-Air S.E</td>
<td>Batimarais</td>
<td>2.41</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15 St Aubin S.E</td>
<td>Bois Cherie</td>
<td>2.00</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>16 Union S.E</td>
<td>Exil</td>
<td>2.50</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>17 St Felix S.E</td>
<td>Chemin Grenier</td>
<td>1.41</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>SIT</strong></td>
<td>La Flora</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td><strong>Rose Belle S.E</strong></td>
<td>Banane</td>
<td>200</td>
<td>200</td>
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</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Livestock</strong></td>
</tr>
<tr>
<td></td>
<td>St Hubert</td>
<td>~80</td>
<td>~47</td>
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<tr>
<td></td>
<td>Cluny</td>
<td>~30</td>
<td>~30</td>
<td><strong>Hydroponics</strong></td>
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**Suitability zone for following crops:**

<table>
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<tr>
<th>Crops</th>
<th>Sub humid 1200mm</th>
<th>Humid 1200 – 2400mm</th>
<th>Super humid &gt;2400mm</th>
<th>&gt;3200mm</th>
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<tbody>
<tr>
<td>Chilly</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Bean Pulse</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Pitaya</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>(up to 1800mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palm cabbage</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Onion</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Tomato*</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Potato*</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Pineapple</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Litchi</td>
<td>√</td>
<td>√</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Banana</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Ornamental</td>
<td>√</td>
<td>√</td>
<td>√</td>
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</table>

* more information in MSIRI Land Suitability Map
## Publications, Information for Farmers (Cumulative)

<table>
<thead>
<tr>
<th></th>
<th>2007/08</th>
<th>2010</th>
<th>2015</th>
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<tr>
<td>Publications</td>
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<td>Booklets</td>
<td>6</td>
<td>19</td>
<td>55</td>
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<td>Record Sheets</td>
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<td>40</td>
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<td>Farming News</td>
<td>24</td>
<td>16</td>
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<tr>
<td>Films/CD</td>
<td>2</td>
<td>8</td>
<td>18</td>
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<td>Posters</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Radio Programmes</td>
<td>30</td>
<td>60</td>
<td>240</td>
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## Cumulative Indicators for Training

<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>1. Farmers</td>
<td>No of Trainings</td>
<td>24</td>
<td>48</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>No of Trainees</td>
<td>400</td>
<td>1200</td>
<td>3200</td>
</tr>
<tr>
<td>2. VRS Retrenched workers, unemployed</td>
<td>No of Trainings</td>
<td>24</td>
<td>48</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>No of Trainees</td>
<td>400</td>
<td>1200</td>
<td>3200</td>
</tr>
<tr>
<td>3. Women &amp; Youth</td>
<td>No of Trainings</td>
<td>240</td>
<td>540</td>
<td>900</td>
</tr>
<tr>
<td></td>
<td>No of Trainees</td>
<td>5460</td>
<td>13000</td>
<td>23000</td>
</tr>
<tr>
<td>4. Vulnerable groups</td>
<td>No of Trainings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No of Trainees</td>
<td></td>
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</table>
Freight Rebate scheme

The Freight Rebate Scheme has been revised as from 30th November 2005 in order to promote export of minimal processed products. The scheme is now as follows:

- The 50% freight refund currently applicable to the export of pineapples for long haul destinations would be restricted only to peeled, sliced and packed fresh produce.
- Unprocessed pineapples would benefit from 25% freight refund.
- All other processed products, that is, those that are peeled, sliced and packed before export would also benefit from 50% freight rebate.
- All unprocessed fresh products would enjoy a 25% freight rebate with the exception of green chillies which would continue benefiting from 50% freight refund since the quantity of chillies exported are small and its harvest is labour intensive.

Floor price by the Agricultural Marketing Board on onion and potato

Boost up scheme for potato whereby financial facilities are provided for the purchase of seed provided harvest is sold to the AMB
## IMPORTATION OF VEGETABLE SEEDS FOR YEAR 2006

<table>
<thead>
<tr>
<th>VEGETABLE SEEDS</th>
<th>QTY (KG)</th>
<th>VEGETABLE SEEDS</th>
<th>QTY (KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artichaut</td>
<td>0.7</td>
<td>Pak Choi</td>
<td>238.8</td>
</tr>
<tr>
<td>Asparagus</td>
<td>70</td>
<td>Parsley</td>
<td>16.6</td>
</tr>
<tr>
<td>Asparagus bean</td>
<td>50</td>
<td>Pois de Senteur</td>
<td>0.7</td>
</tr>
<tr>
<td>Basilic</td>
<td>1.74</td>
<td>Potatoes</td>
<td>512,855</td>
</tr>
<tr>
<td>Bean</td>
<td>16,517.6</td>
<td>Pumpkin</td>
<td>114</td>
</tr>
<tr>
<td>Beetroot</td>
<td>118.4</td>
<td>Radish</td>
<td>221.8</td>
</tr>
<tr>
<td>Bittergourd</td>
<td>58.4</td>
<td>Ridge gourd</td>
<td>36</td>
</tr>
<tr>
<td>Bottlegourd</td>
<td>34</td>
<td>Snake gourd</td>
<td>20.8</td>
</tr>
<tr>
<td>Broccoli</td>
<td>2.3</td>
<td>Snow peas</td>
<td>40</td>
</tr>
<tr>
<td>Cabbage</td>
<td>347.4</td>
<td>Soybean</td>
<td>1</td>
</tr>
<tr>
<td>Carrots</td>
<td>1,235</td>
<td>Spinach</td>
<td>8.5</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>12.2</td>
<td>Sponge gourd</td>
<td>0.1</td>
</tr>
<tr>
<td>Celery</td>
<td>24</td>
<td>Spring onion</td>
<td>30.7</td>
</tr>
<tr>
<td>Chilli</td>
<td>10</td>
<td>Squash</td>
<td>141.8</td>
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<tr>
<td>Chinese Cabbage</td>
<td>37.9</td>
<td>Stachys</td>
<td>0.005</td>
</tr>
<tr>
<td>Courgette</td>
<td>37.1</td>
<td>Sweet corn</td>
<td>3.9</td>
</tr>
<tr>
<td>Cucumber</td>
<td>186.5</td>
<td>Swiss chard</td>
<td>2.5</td>
</tr>
<tr>
<td>Eggplant</td>
<td>42.9</td>
<td>Thyme</td>
<td>9.5</td>
</tr>
<tr>
<td>Euphorbia</td>
<td>0.02</td>
<td>Tomato</td>
<td>617.8</td>
</tr>
<tr>
<td>Garden cress</td>
<td>0.7</td>
<td>Turnip</td>
<td>0.7</td>
</tr>
<tr>
<td>Sweet Pepper</td>
<td>68.4</td>
<td>Watercress</td>
<td>7.8</td>
</tr>
<tr>
<td>Lady finger</td>
<td>0.02</td>
<td>Ciboulette</td>
<td>1.4</td>
</tr>
<tr>
<td>Leek</td>
<td>21.7</td>
<td>Coriander</td>
<td>12,651</td>
</tr>
<tr>
<td>Lettuce</td>
<td>85.6</td>
<td>Endives</td>
<td>4.57</td>
</tr>
<tr>
<td>Loofah</td>
<td>4.8</td>
<td>Estragon</td>
<td>0.7</td>
</tr>
<tr>
<td>Maize</td>
<td>15</td>
<td>Fenouille</td>
<td>0.7</td>
</tr>
<tr>
<td>Okra</td>
<td>35.7</td>
<td>Marjolaine</td>
<td>0.7</td>
</tr>
<tr>
<td>Onions</td>
<td>980.7</td>
<td>Roquette</td>
<td>8.5</td>
</tr>
<tr>
<td>Petsai</td>
<td>45</td>
<td>Romarin</td>
<td>0.7</td>
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</tbody>
</table>