SAINT LUCIA:

COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES

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Note by FAO

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CHAPTER 1
Introduction to St. Lucia and Its Agricultural Sector

Location

The island of St. Lucia lies between 14°05' and 13°07' N latitude and between 60°53' and 61°05' W longitude. It is located within the group of islands known as the Windward Islands of the Lesser Antilles in the West Indies. It is the second largest island of the group with an area of 616 square kilometres (km), with the maximum length and width of 43 km and 21 km, respectively.

Its closest neighbouring islands are Martinique, 32 km to the north and St. Vincent, 40 km to the south. Barbados lies 177 km to the southeast.

Topography

St. Lucia is of volcanic origin. It has a mountainous topography dominated by a central backbone running almost the length of the island. Numerous offshoot spur ridges with steep sides extend from the main ridge to both sides of the coasts. Some valleys between these spurs are broad and occupied by large banana plantations. The most well-known valleys are Cul-de-suc, Roseau and Mabouya. These valleys together with the area around the town of Vieux-Fort in the South, accounts for most of the flat lands of the country.

The high terrains occur in the southwestern part of the country, with Mount Gimie being the highest peak at 958 meters. The two famous old volcanic cones: Gros Piton and Petit Piton rise out of the sea in the southwestern coast with the elevations of 798 m and 750 m, respectively. The coastlines, particularly the east coast, are deeply indented by near-vertical cliffs. Narrow sand beaches occur at various points along the coasts.

Climate

The islands climate is referred to as 'tropical-marine', with relatively uniform high temperature throughout the year. The dry season is roughly from January to April and a rainy season from May to August, with an Indian Summer in September to October. The hottest period is May to October, and

the coolest, December to March. The mean annual temperature is about 26° C. In Castries (the capital which is situated in the north), temperatures range from 15° C on a cool night to 31° C in the shade on a hot day. Annual rainfall varies from 1,524 - 1,778 mm in the north to 2,540 -3,683 mm in the interior of the south.

Population

The population of St. Lucia is estimated to be 140,000 with an average growth rate of 1.5% per annum.

Agriculture is the dominant sector of the St. Lucia's economy. However, only 25% of the working population are employed by the agricultural sector.

Agriculture in St. Lucia

Major cultivated crops in St. Lucia are bananas, coconuts, cocoa, citrus, mangoes, and root crops such as cassava sweet potato and yams. It is estimated that there is about 12,000 hectares are agricultural land in St. Lucia. The main farming system however, revolves around bananas. The area of about 6,000 hectares (50% of the agricultural land) is under banana production, whereas coconuts occupy 5,018 hectares (42%) of the agricultural land. Other less important crops (fruit crops, root crops, and vegetables) occupy less than 8% of the agricultural land of the country.

Bananas, the main crop, accounts for 96% of the total agricultural exports and about 60% of total domestic production.

Forest environment

There are 21,692 hectares of the natural vegetation types in St. Lucia, with 7,487 hectares contained within the Government Forest Reserve. St. Lucia forest is home to a wide diversity of flora and fauna, possessing several endemic species (including the rare St. Lucia Parrot:- *Amazonia versicolor*).

The natural vegetation types of St. Lucia is classified into seven broad categories:

1. Elfin Woodland
2. Montane Thicket
3. Lower Montane Rainforest
4. Rainforest
5. Secondary Forest
6. Savanna and Grazing Land
7. Dry Scrub Woodland

Although forestry has been playing a minor role in the island's economy, the Government is acutely aware of the importance of the forest conservation for the protection of water supplies, as well as biotic and non-biotic resources for the St. Lucian people and visitors alike.

CHAPTER 2
Indigenous Plant Genetic Resources

Forest genetic resources

In the 1940's, the first survey of the St. Lucia's forests was conducted by Dr. S. J. Beard, a conservator of forests from Trinidad, as part of the study of the forests in the Lesser Antilles. He estimated the area of natural forests to be 26,063 hectares, and identified a total of 151 tree species of which 35 were endemic. His report has provided the initial basis for conservation of St. Lucia's forests and guided the forest management over the years.

Further studies have been conducted since then by overseas specialists and/or officers of the Forestry Department, Ministry of Agriculture, Lands, Fisheries and Forestry. These studies include the surveys on principle timber species (Appendix 1), non-timber native tree species (Appendix 2), ferns and fern allies (Appendix 3), and the endangered species in St. Lucia (Appendix 4).

Between 1977 and 1989, the country lost a total of 4,168 hectares of rain forest due to agricultural and urban development, primarily on private lands. Today, 20,073 hectares of natural forests are left of which an area of 7,487 hectares is protected as the Government Forest Reserve. The extent of loss in natural biodiversity over time remains to be determined.

Other wild species and wild relatives of crop plants

There exist many indigenous species which are well known for their medicinal value. List of medicinal herbs and plants in St. Lucia is given in Appendix 5. In spite of the knowledge of some native plants with medicinal properties, the use of these plants by local people is becoming scarce due to the increased adoption of pharmaceutical drugs and medicines.

Among the best known domesticated crops in St. Lucia are yams, dasheen, tannia, sweet potatoes, pineapples, peppers, ginger and cocoa. Virtually, all cultivated crops have their wild relatives. In St. Lucia, a number of wild relatives to the crops grow as weeds or in the forest, e.g. *Capsicum frutescens* a wild relative of *C. annuum* (seasoning pepper) grows a long the roadside; and a large number of Bromeliads, relatives of pineapples grow in the forest, and even on the telephone cables. Genera such as *Alpinia, Anthurium, Cassia, Ficus* and *Zingiber* are found abundantly in the forest. Extensive taxonomic identification of these wild species is required.

Landraces and old cultivars

It is believed that St. Lucia's first settlers were the Amerindians who came from South America many hundreds years ago. There were the Arawaks, from Guyana who brought with them some crops such as corn, beans, peppers and yams; and grew them for their own use. Then came the Caribs who cultivated no crops but fished and hunted.

Agriculture in St. Lucia began with the arrival of the French in the middle of the 17th century. Large areas of lands were cleared to plant crops like cotton and tobacco to be sold overseas. Sugarcane was later introduced and soon became the most important crop during the French colonialism. By the end of the 19th century, the sugar market began to drop. The planters turned to crops like cocoa, coffee, and other new crops such as citrus, nutmeg, coconuts (copra) and bananas.

Banana has become the island's main export crop. Cocoa and coconuts are still of importance in the agricultural industry, while other crops such as cotton and sugarcane receive very little attention these days.

Since many domesticated crops were introduced by the early settlers and have been growing naturally for as long as we can remember, the cultivated species are generally considered as farmer varieties while the least familiar types are considered as "wild" However, a large number of these wild varieties/species have not been systematically identified.

Mangrove and aquatic resources

Mangrove species: the three main types of mangroves found in St. Lucia are:

1. the Red Mangrove (*Rhizophora* mangle),
2. the Black Mangrove (*Avicennia nitida*), and
3. the White Mangrove (*Languncularia racemosa*)

There are about 14 areas in St. Lucia where these mangrove species including associate species such as buttonwood, littoral woodland and swamp species can be found.

Aquatic species: little has been published on the marine algal flora of St. Lucia. Based on the studies conducted in the nearby islands, it is assumed that there are over 100 species of marine algae found in the seas surrounding St. Lucia. Most study of agrophytes of St. Lucia was done on the genus *Gracitaria* (Family *Gracilarlaceae*) in which five species have been identified. They are:

Gracilaria domingensis
G. crassissima
G. cervicornis
G. debilis
G. terete (or GT)

CHAPTER 3
National Conservation Activities

Current national conservation policy centres around the conservation of soil, water and biological resources. The Forest Reserve and coastal mangroves are, at the moment, the only areas with some measure of protection under the laws of the country.

Cultivated crop species such as fruit trees, roots and tubers are distributed island wide on various farms and 'gardens' of about 18,000 farmers through the cooperation of the Propagation Unit, Ministry of Agriculture, Lands, Fisheries, and Forestry (MOA); and various regional institutions such as the Caribbean Agricultural Research and Development Institute (CARDI), and the Windward Islands Banana Growers Association (WINBAN). External cooperative agencies such as the Agricultural technical Mission of the Republic of China (Taiwanese Mission), and the French Mission for Cooperation also hold small collections of new/improved varieties of cultivated crops mainly fruit trees and vegetables.

Recently, a tissue culture laboratory has been established to enhance the Ministry of Agriculture's capacity to meet the demands in reforming the agricultural sector towards a diversified agricultural economy. Besides the micropropagation of some economically important cut-flowers and ornamentals, the Tissue Culture Unit is also responsible for *in vitro* germplasm collections of selected crop species.

3.1 NATIONAL CONSERVATION ACTIVITIES

In situ conservation

The Forestry Departmentof the MOA, is responsible for the management of the island's Forest Reserve which is around 7,487 hectares in area or about 11% of the total land area. The maintenance of the Forest reserve and its associated genetic resources is based on the principle of conservation of soil and water, and the preservation of plant and animal diversities. Whether there be wild related species of existing crops that could be exploited from an agricultural perspective is largely a matter of speculation.

The Forestry department is also responsible for the management of all mangroves on the island, which are protected as Marine Reserves.

As for cultivated crops, the Propagation unit of the Ministry of Agriculture had a collection of yams in the fields for propagation and distribution purposes. Unfortunately, the collection was lost due to the tropical storm "Debbie" in September, 1994. The Caribbean Agricultural Research and Development Institute (CARDI) also maintains, at its field station, a germplasm bank of 4 yam varieties which is continuously multiplied and distributed to farmers.

Ex situ conservation

The nurseries and seed storage facilities of the Forestry Department are presently accommodating the collections of exotic and indigenous trees as well as some fruit crops and bee-keeping species. A small medicinal-herb garden has been recently established under the management of the Forestry Department as a collection to promote the awareness of their value. The St. Lucia National Trust, a private foundation, has a small collection of some native flora. This collection was started in an effort to explore the medicinal properties of plants. As the specimen are collected, they are studied, identified, and catalogued for storage. The St. Lucia National Trust is in the process of transferring this collection to the Forestry Department which has a more suitable facilities for upgrading and expanding the collection.

In vitro collection

Germplasm Collection Programme by the Tissue Culture unit, MOA, was started in late 1994. Target species are root crops and ferns (*Pteridophytes*). At present, activities are mainly involved with culture initiation and protocol development for the minimal growth techniques. To date, the collections include three varieties of yams (Belep, Oriental DV and Plimebite), two varieties of Tannia (Rabess and St. Lucia), six species of ferns (3 natives and 3 exotic). A special, shade tolerant, cultivar of Vetiver grass is also maintained in the collection.

CHAPTER 4
In-Country Uses of Plant Genetic Resources

Saint Lucia is rich in flora biota varying from wild species in the forests and mangroves to cultivated plants in the fields. This chapter examines the uses of plant genetic resources (PGR) in the country, and identify the possible means to improve plant genetic resource utilization.

4.1 USES OF PLANT GENETIC RESOURCES IN ST. LUCIA

4.1.1 Uses of Cultivated Species

Large-scale commercial crops in St. Lucia are banana, coconut, and cocoa. Bananas bring in major income from the export markets. Recently, the uncertainty on the European Markets for Windward Island bananas has caused an intensification of the National Programme on Crop Diversification. Various fruit crops and vegetables have been introduced with the assistance of non-government organizations such as the Agricultural Technical Mission of the Republic of China (Taiwanese Mission), the French Mission for Co-operation, and CARDI. Introduced varieties are tested for their adaptability before being released to the farmers. Fresh produce is sold in the local markets, restaurants and hotels. Some fruit crops and vegetables are exported to the neighbouring islands such as Antigua and Barbados; and to as far as the United Kingdom (UK), the United States of America (USA), and Canada.

4.1.2 Uses of Wild Indigenous Species

Wild and indigenous plants such as spices and herbs are used mainly for domestic consumption. Most of them can be found in the wild or private gardens. A few companies in St. Lucia produce spices such as black pepper, cinnamon, nutmegs; and also vanilla essence. However, most of the raw materials comes from overseas sources since there are insufficient supplies in the country. The products are sold to local supermarkets, souvenir shops, and overseas.

About 100 species of herbs and shrubs with medicinal properties have been identified. Many of them are used to treat a wide range of ailments including the common cold, diabetes, gas, high blood pressure, jaundice, rheumatism, menstrual pain , venereal diseases and chicken pox. Some species are used as shampoo, soap, for dentrifice purposes, and pesticides. List of medicinal plants and possible usage is presented in Appendix 5. Many of these species are maintained in the Medicinal Garden, Forestry Department at Union Station as a collection and for germplasm exchange with local users.

Several species of native orchids (epiphytic and terrestrial) are protected in their habitats. There are 119 species of ferns and their allies in St. Lucia (see Appendix 3). Among these, one species is endemic and about 20 species have been recently identified as having economic potential. Works on propagation and promotion of the economically important species are underway.

4.1.3 Uses of Aquatic and Mangrove Species

Aquatic resources: five kinds of seaweeds or seamoss (see Chapter 3), all from the Family *Gracilariaceae*, are cultivated and utilized. The seaweeds are harvested from the sea or from the cultivated fields. The algae is then sun dried, stored, packaged, then sold to local supermarkets or exported to Trinidad. Most of the seamoss is used for making beverage, punch, soup, porridge and fudge.

The commercial seamoss cultivation in St. Lucia involves vegetative propagation on floating lines, which is simple to install and inexpensive. The yields after 12 weeks are approximately 2.5 kg of fresh weight per one meter of the rope.

Seamoss is commonly sold in three forms:

1. bleached and dried seamoss, packaged and sold either as retail or bulk;
2. bottled beverage with other ingredients, and
3. bottled or canned concentrate.

Gracilaria terete or GT is most commonly cultivated as it has a fast growth rate and relatively high yield. Although its gel strength is low, GT is used for the preparations of the first and the second marketing forms which do not require gelling. *G. debilis* and G. *crassissma* are more difficult to cultivate due to being slow growing and extremely fragile. However, with higher gel strengths than GT, which make them suitable for the preparation of bottled or canned concentrate, these two species are often harvested from the wild stocks.

Other uses of marine algae in St. Lucia include uses as organic fertilizer, mulch, and compost for crop productions. The species used for these purposes are not identified. The harvest of approximately 50-60 tons per annum, in the form of cast weeds, has been reported.

Mangrove resources: Mangrove areas are extremely important as they provide a sanctuary to avifauna, some of which are endemic to St. Lucia. In the past, many of the mangrove areas were used for land reclamation and charcoal production. Realizing the great importance of the mangrove and its associate resources, the Government has classified all mangroves as marine reserves. Thus they are protected under the laws of St. Lucia, and selective cutting of mangrove species is practised. Nevertheless, deforestation for charcoal production still occurs, leading to the degradation of the mangrove areas.

4.1.4. Uses of Forest Genetic Resources

According to the Forest Management Plan, St. Lucian Forests are divided into three categories:

1. Forest to be completely protected (*in situ* conservation)
2. Forest where some trees can be cut down under certain regulations
3. Forest where trees can be planted and harvested (timber production)

Undisturbed natural forests remain confined to the Government Forest Reserve, constituting a total of 7,487 hectares which cover about 11% of the island. The Reserve is largely within the mountainous interior of the island. Some dry scrub woodlands remain on private lands on the eastern and western coastal strip.

Some 243 hectares of exotic tree species have been established within the forest plantations and currently provide some of the timber required by the local market (Table 1). These plantations are managed sustainably, with harvesting carried out on a selective basis.

Table 1: Forest trees (exotic species) which are cultivated within the forest plantations

Botanical name (Family)	Common Name	Uses
Hibiscus elatus (*Malvaceae*)	Blue Mahoe	timber
Tectona grandis (*Verbenaceae*)	Teak	timber
Swietenia macrophylla	*Hondurus Mahogany*	timber
Pinus caribaea (*Pinaceae*)	Caribbean Pine	timber, fence posts

Leucaena leucocephala (*Leguminosae*)	Leucaena	fuel wood, animal fodder

Source: Forestry Department.

Local tree species such as Bois d' Amande (*Hieronyma caribaea*), Bois Pain Marron (*Talauma dodecapetala*), and White Cedar (*Tabebuia pallida*) are also harvested from the Government Forest Reserve but with tight limitations based on different criteria such as diameter, presence of regeneration, rarity of the species, terrain and proximity to drinking water intakes (see Appendix I for listing of the common timber trees of St. Lucia).

There are other tree species which are valuable in terms of the provision of non-timber forest products (see Appendix 3). These include Gommier (*Dacryodes excelsa*) for its flammable resin, L'encens (*Protium attenuatum*) for its insecticidal property and use in religious ceremonies. Few native forest species are known to be edible, for example: Balata (*Manilkara bidentata*) for its seeds, Bois Tan (*Byrsonima sp.*), Cypre (*Cordia allidora*), and Gwi-Gwi Palm (*Aiphanes luciae*) for their fruits.

4.2 PLANT GENETIC RESOURCES COLLECTIONS AND SEED DISTRIBUTION

National collections

Name	Programme	Crop	Type of Collection	Distribution
Forestry	Timber production, Conservation, and Reforestation	•exotic/indigenous trees	*ex situ* (nurseries/seed storage) *in situ* (Reserve, wilding)	own uses and sell to farmers
	Crop Diversification	•fruit trees and bee-keeping species	*ex situ* (nurseries)	"
Propagation Unit	Crop Diversification	•fruit trees (various species/varieties) •flowers/ornamental (various species/varieties) •root crops (yams)	*ex situ* (nurseries) *ex situ* (nurseries) *in situ* (fields)	sell to farmers/ customers " lost during Sept., 1994, due to tropical storm

Name	Programme	Crop	Type of Collection	Distribution
Tissue Culture Unit	Germplasm Collection	•root crops (3 varieties of yams, 2 varieties of tannia) •grass (Vetiver, shade tolerant line) •ferns (3 native species, 3 exotic)	*in vitro* *in vitro* *in vitro*	- - -

Notes: About 99% of planting material for distribution is produced on farm. The rest is obtained from other agencies, e.g. CARDI and the Taiwanese Mission.

Non-government collections

Name	Programme	Crop	Type of Collection	Distribution
WINBAN (Windward Islands Banana Growers Assoc.)	Banana Production	bananas	*in situ* (fields)	sell to farmers
CARDI	Technical Assistance	fruits, vegetables, roots (improved varieties from overseas, field tested before releasing	*in situ* (fields), and *ex situ* (seed storage)	to farmers, free of charge and sell to regional islands
French Mission	Technical Assistance	vegetables, ornamental (improved varieties from overseas)	*ex situ* (nurseries/seed storage)	to farmers, free of charge
Taiwanese Mission	Technical Assistance	fruits, vegetables, cut flowers (improved varieties from Asia and USA)	*in situ* (fields), and *ex situ* (nurseries/seed storage)	contribute to farmers, Propagation Unit and Overseas Institutes such as CARDI, IICA

Private/farmers' collections

A recent survey on PGR collections for all categories of farmers, revealed that most farmers collected their cultivated species in the fields and by seed storage. Small scale farmers sometimes buy seeds/planting material from government establishments and/or large estates.

Non-government sectors and foreign agencies do not necessarily provide sufficient supply to farmers since its not their main objective. Local farmer cooperatives do store and make available vegetable seeds and other planting material to their members. Contributions from the French Mission form qualitatively important sources of planting material. The seedlings are usually sold to members at subsidized prices.

4.3 CROP IMPROVEMENT PROGRAMME

Crop improvement can be achieved by two means: selection and breeding. At present, the practice in St. Lucia is field selection. Extension officers, non-government sectors, and farmers have been involved in selecting for superior characteristics from cultivated varieties; and best adaptability to the St. Lucian conditions from the newly introduced ones.

Plant breeding is scarcely practised. Only a few orchid gardeners know how to, and keep it as a hobby more than a task. There are no national plant breeding programmes at the moment.

Some of the constraints are:

- Lack of human resources (professionals/plant breeders)
- Lack of financial resources

Conventional breeding is labour intensive and time consuming. Having a tissue culture facility available in the country can play a major role. At present the St. Lucian tissue culture laboratory can serve two purposes in crop production programmes.

As for germplasm collections, it can: i) serve as a genebank for selected species; ii) rapidly propagate valuable planting material for farmers when there is an urgent demand (e.g., after a natural disaster, disease outbreaks); iii) provide speedy and safe exchange of germplasms across international boundaries (reduce the risk of disease introduction and the need for quarantine).

As for improvement of plant quality, it can: i) produce specific pathogen-free material; ii) vegetatively propagate specific clones uniformly and in large numbers; iii) select for beneficial mutants/variants by *in vitro* selection techniques.

If funding and human resources are available, there should not be any limitation / discrimination for small developing countries to have some level of biotechnology.

4.3.1 Activities Specifically Relating to Bananas

The St. Lucia's Banana Industry through Windward Islands Banana Growers Association (WINBAN) currently has a project aimed at improving banana germplasm. This "Banana Variety Project" includes the introduction and field evaluation of material developed or selected by a number of banana research institutes worldwide. No actual breeding or selection activity is conducted in the Windward Islands. However, the Industry does have a "financial stake" in the banana breeding activities at the Honduran Foundation for Agricultural Research (FHIA). The main goals of worldwide banana breeding and evaluation activities are to have plants resistant or tolerant to major pests and diseases such as nematodes, banana borer, yellow and black sigatoga (*Mycosphaerella musicola*, and *M. fijiensis*, respectively), Moko (*Pseudomonas solanacearum*), and Fusarium Race 4 (*Fusarium oxysporum*). So far selection from naturally occurring populations has been more successful than production of man-made hybrids.

WINBAN has in its collection a number of varieties/hybrids produced by the former Caribbean Banana Breeding Programme, based in Jamaica; and four varieties from the International Network for the Improvement of Banana and Plantain (INIBAP), six varieties from FHIA, four varieties (including Grande Naine) from Israel, and one variety from the Canary Islands. These varieties have been subjected to field evaluation for their agronomic characteristics and quality. A few varieties have been in the final stage of evaluation by farmers.

The collection of these plants have been held at the WINBAN Research Station at Roseau, St. Lucia. Although the sites of the collection was affected by flooding during the tropical storm "Debbie" in September, 1994, all varieties survived. The primary concern is the availability of funding for maintenance of the collection which does not always attract support since it does not contribute to revenue while funds are scarce.

4.4 IMPROVING PGR UTILIZATION

Plant genetic resources should be conserved and utilized on a sustainable basis. Creating awareness of the value of biodiversity to local people is also important. Agroforestry, combining traditional farming systems with preservation of forest will get local people more involved in the protection of forestry resources.

Wild relatives of cultivated species, indigenous varieties and weeds have evolved within their own environment and are therefore likely to be tolerant of the harsher conditions such as drought, pests and diseases. They should be characterized, evaluated and conserved. Farmers should be provided with the information on biocontrol of pests and diseases. This approach is not only environmental friendly but also help conserving wild species/weeds which may be valuable to the country in future.

Closer collaboration with regional/international institutions (universities, research institutes, funding agencies, genebanks, etc.) is required. St. Lucia welcomes any means of assistantship in the areas of plant genetic resource, characterization, evaluation and management. There is an urgent need for training of human resources. Assistance from international funding agencies is needed in the form of scholarships for local personnel. Technical expertise from overseas may be helpful while St. Lucia is still lacking trained human resources.

CHAPTER 5
National Goals, Policies, Programmes and Legislation

National policies and programmes

There is a general acceptance of the critical importance of biodiversity in the balanced and sustained development of St. Lucia. The Government has a serious concern on the protection of natural resources and environment.

Presently, the Forest Reserve and Coastal Mangroves are protected under the laws of the country. A governments project known as the Mabouya Valley Development Project was founded in 1989. The goals of the project are to facilitate rural settlement of small farmers on sustainable agricultural development basis; and to ensure the protection of natural resources including lands and forests. To-date, the project has been a success. The project has been instrumental in eliminating slash and burn practice and has helped 121 farmers' families with permanent settlement. Recently, government has vested a portion of a large estate in the care of the National Trust for the purposes of conservation (National Park) and sustainable development.

Training

Shortage of human resources is one of St. Lucia's major constraints. The country's priority for training programmes of local personnel (with equal opportunity for both men and women) includes a wide range of disciplines, but national funding is limited.

Training in the areas of plant biotechnology, including genetic resource management are occasionally offered by regional institutions/universities with the financial aid of external organizations such as the Food and Agriculture Organization of the United Nations (FAO). These training programmes often require the persons with at least a Bachelors Degree to attend the courses. Most of the qualified personnel, especially with post-graduated degrees, are heavily involved with administration and eventually leave the technical posts. Under these circumstances, optimal use is not made of available training opportunities.

National legislation

The Government of St. Lucia realizes the importance of natural resources and focuses on the development of agricultural diversification based on sustainable resource management. National Plant Quarantine Regulations have been effective in the prevention of pests and diseases of economic crops, especially bananas.

Recently, the newly established Government's Tissue Culture Unit has played a supporting role in plant quarantine by assisting the Crop Protection Unit with plant quarantine regulation procedures for importation of *in vitro* plant materials. Tissue Culture Unit provides assistance in ensuring that the imported *in vitro* materials are free from specific pathogens by keeping them under observation and random testing on selective media for a certain period of time before releasing the materials to the importers. Sooner or later, the Government's Tissue Culture Lab will have to play a major role in plant quarantine activities to facilitate the international transfer of *in vitro* materials and yet prevent the entry of any potential pests and diseases. These activities will lead to the new import/export regulations of plant materials which will enhance the agricultural growth and development on a basis that is safe for the national plant genetic resources.

CHAPTER 6
International Collaboration

St. Lucia's efforts in the areas of regional and international collaboration in plant genetic resources management, though gaining strength, is at the early stage of development. The areas of collaboration include infrastructure development and maintenance, technical support, training, and germplasm introduction.

Financial assistance for the development and implementation of projects related to the conservation of natural resources, and sustainable development is obtained from international aid agencies such as the Canadian International Development Agency (CIDA), the European Development Fund, and the Food and Agriculture of United Nations (FAO). The country has also benefitted from the FAO supporting programme on Improved Seed Production: CARICOM Countries and Surinam Programme; and. Germplasm Database Programme for the Caribbeans.

The Organization of the American States (OAS) provides training, equipment and scientific publications for the development of Tissue Culture and Biotechnology Programme. The Inter-American Institute for Cooperation on Agriculture (IICA) provide technical support in the areas of plant genetic resources and related matters. The University of the West Indies (UWI) is a major institute for training of national personnel in some areas of plant genetic resource management.

The French Mission for Cooperation and the Agricultural Technical Mission of the Republic of China have provided technical assistance in agricultural development in St. Lucia. The involvement of both Missions in the areas of floriculture and vegetable productions has introduced new/improved varieties to the country. The recent collaboration between the Government of St. Lucia and the Royal Project Foundation of Thailand has opened the door for the introduction of more exotic plant species and exchange of germplasm between the two countries.

The Caribbean Agricultural Research and Development Institute (CARDI) is a principal co-operant that puts the country in touch with a number of international institutions whose activities deal with plant genetic resources.

These institutions include Centro Internacional de Agricultura Tropical (CIAT), International Crops Research Institute for the Semiarid Tropics (ICRISAT), International Institute of Tropical Agriculture (IITA), the Honduran Foundation for Agricultural Research (FHIA) University of Florida, University of Reading, University of Guyana, and a number of other organizations.

CHAPTER 7
National and Regional Needs and Opportunities

- Among the top priorities of St. Lucia's needs relating to plant genetic resources conservation and utilization, is to develop its own human resource capacity. Assistance from overseas will be needed as a start in some areas which lack trained personnel, e.g. systematic botany, plant breeding, and germplasm maintenance. Since any programmes involving the conservation and. improvement of genetic resources require long-term commitment, having local professionals is obviously beneficial for the sustainability of those programmes.
- An extensive survey is required to determine which genetic resources should be collected and evaluated. Special attention should be given to endangered species, endemic species and wild relatives of cultivated crops with economic importance.
- Ideally, plant diversity should be preserved in their natural habitats (*in situ* conservation). Activities involving Forest/Marine Reserves, Agroforestry and Ecotourism should be strengthened to ensure the security of the indigenous species.
- To guarantee the safety of the genetic resources, a national seed gene bank for long-term preservation is recommended. Species to be preserved as well as sources of financial support and man-power remain to be determined.
- Creating awareness of the value of landraces and wild species to local people, school children, etc. Information on this subject should be provided to the public by means of mass media and exhibition. Field collections by farmers and private sector should be encouraged/supported.
- Strengthen the area of *in vitro* preservation. However, with limited human and financial resources, the Government's Tissue Culture Laboratory should concentrate on a few species only. The criteria for selection of crops should be based on the similarity in terms of their requirements for culturing and maintenance. Linkage between laboratories in the region should also be established to avoid duplication of work and facilitate the exchange of germplasm and information between countries.
- Enhance knowledge and activities relating to land and water management, reduction of the use of chemical pesticides, and prevention of air, soil, and water pollution.

- Develop legislation concerning intellectual property rights for the country.

The following regional initiatives were proposed for the consideration of the CARICOM Standing Committee of Ministers responsible for Agriculture (SCMA) at their 18th meeting in June, 1995:

- Development of cooperative programmes for the systematic inventory of the region's biodiversity.
- Sharing knowledge and expertise regionally in order to support national efforts.
- Development of common methodologies and harmonization of legislation, in addition to basic national regulations such as standards.
- On-going human resource development and capacity-building in the prioritised and specific areas of sustainable agricultural development aimed at achieving self-reliance.
- The development of policies and incentives to encourage private sector participation in the sustainable utilization of the Region's diverse plant genetic resources.

CHAPTER 8
Proposals For a Global Plan of Action

- Linkages between countries at regional and international levels are required for sharing of information on plant genetic resources. This may include international funding and technical supports to establish a computerized network for the, countries and headquarters.
- Ideally, plant genetic resources should be conserved in seed gene banks or *in vitro* storage. However, infrastructure, technology and trained personnel needed to maintain modem gene banks is very costly, and perhaps not feasible for small developing nations. International effort for collection and preservation of plant genetic resources may be required, while developing countries are allowed to benefit from the utilization of the genetic material being taken.
- There is a need to strengthen the linkages between developing countries and research institutions/universities in developed nations where biotechnology revolution is occurring. Technical assistance from universities in more developed nations and from international research institutes is required. Assistance in the form of graduate training of local personnel; helping with the establishment of the infrastructure, such as research laboratories, experiment stations, etc., would be most beneficial.

APPENDIX 1
Principle Timber Trees of St. Lucia

Family	Botanical Name	Common Name	Note
Malvaceae	*Hibiscus elatus*	Blue Mahoe	exotic
	Tectona grandis	Teak	exotic
	Swietenia macrophylla	Hondurus Mahogany	exotic
	Pinus caribaea	Caribbean Pine	exotic
	Leucaena leucocephala	*Leucaena*	exotic
Magnoliaceae	*Talauma dodecaptala*	Bois Pain Marron	indigenous
Lauraceae	*Ocotea leucoxylon*	Laurier Mabre	indigenous
Lauraceae	*Ocotea floribunda*	Laurier Ti Feuilles	indigenous
Sterculiaceae	*Sterculia caribaea*	Mahot Cochon	indigenous
Malpighiaceae	*Brysonima martinicensis*	Bois Tan Rouge	indigenous
Euphorbiaceae	*Hieronyma caribaea*	Bois d'Amande	indigenous
Euphorbiaceae	*Sapium caribaeum*	La Glu	indigenous
Rosaceae	*Xanthoxylum martinicese*	Bois De Masse	indigenous
Mimosaceae	*Pithecellobium jupunda*	Dalmarie	indigenous
Papilonaceae	*Andira inermis*	Angelin	indigenous
Papilonaceae	*Ormosia monosperma*	Dedefouden	indigenous
Simarubaceae	*Simaruba amara*	Bois Blanc	indigenous
Burseraceae	*Dacryodes excelsa*	Gommier	indigenous
Burseraceae	*Protium attenuatum*	L'Encens	indigenous
Sapotaceae	*Manilkara bidentata*	Balata	indigenous
Sapotaceae	*Oxythece pallida*	Balata Chien	indigenous
Rubiaceae	*Chimarrhis cymosa*	Bois Rivere	indigenous
Bignoniaceae	*Tabebuia pallida*	White Cedar	indigenous

Source: The Principle Timber Trees of the Windward Islands, H. Fraser, 1957.

APPENDIX 2
Common Native Forest Species in St. Lucia and Their Uses

Family	Botanical Name	Common Name	Uses
Burseraceae	*Dacryodes excelsa*	Gommier	Canoe building, flammable resin
Burseraceae	*Protium attenuatum*	L'encens	Incense from bark extract
Sapotaceae	*Pouteria multiflora*	Pain d'epice	Edible fruit
Palmae	*Euterpe globosa*	Palmiste	Thatch roofing material
Palmae	*Aiphanes luciana*	Gwi-gwi	Edible fruit
Paimae	*Coccthrinas barbadensis*	Latanier	Broom making
Faboideae	*Ormosia monosperma*	Dedefouden	Seeds for craft
Thymeleaceae	*Daphnopsis macrocarpa*	Mahoe Piman	Bark used for making rope
Sapotaceae	*Manilkara bidentata*	Balata	Edible seeds
Passifloraceae	*Passiflora sp.*	Pomme de Liene	Edible fruit, basket making
Cyatheaceae	*Cyathea arborea*	Tree Fern	Stem-props for huts, supports for rough bridges, planting medium for orchids
Leguminosae	*Haematoxylon campechianum*	Logwood	Dye
Myrtaceae	*Pimenta racemosa*	Bois Den	Leaves distilled to bay-rum
Bignoniaceae	*Crescentia cujete*	Calabash	Dry fruit used as water container/eating utensil, medicinal
Fabaceae	*Gliricidia sepium*	Glory Cedar	Animal fodder, medicinal, pesticide
Anacardiaceae	*Spondias mombin*	Hog Plum	Edible fruit
Moraceae	*Ficus aurea*	Fweje	Aerial roots for craft

Source: Forestry Department

APPENDIX 3
List of *Pteridophytes* Found in St. Lucia

The following gives a total of 119 species of ferns and fern allies (*Pteridophyta*) in St. Lucia. They are represented in a total of 41 families.

1. *Psilotum nudum*
2. *Lycopodium verticillatum*
3. *Lycopodium linifolium*
4. *Lycopodium funiforme*
5. *Lycopodium aqualupianum*
6. *Lycopodium cernuum var. cernuum*
7. *Selaginella flabellata*
8. *Selaginella substipitata*
9. *Selaginella tenella*
10. *Selaginella rotundifolia*
11. *Danaea elliptica*
12. *Danaea alata*
13. *Dicranopteris pectinata*
14. *Hymenophyllum fucoides*
15. *Hymenophyllum hirsutum*
16. *Hymenophyllum hirtellum var. gratum*
17. *Hymenophyllum lanatum*
18. *Hymenopllyllum polyanthos var. polyanthos*
19. *Trichomanes hymenophylloides*
20. *Trichomanes rigidum*
21. *Trichomanes membranaceum*
22. *Trichomanes punctatum*
23. *Trichoinanes augustifrons*
24. *Trichomanes krausii*
25. *Trichomanes pinnatum*
26. *Trichomanes trigonum var. trigonum*
27. *Trichomanes polypodioides*
28. *Trichomanes alatum*
29. *Trichomanes crispum*
30. *Trichomanes osmundoides*
31. *Cyathea imrayana*
32. *Cyathea arborea*
33. *Cyathea tenera*
34. *Cnemidaria grandifolia var. grandifolia*
35. *Dennstaedtia obtusifolias*
36. *Saccoloma inaequale*

37. *Lindsaea quadrangularis*
38. *Hypolepis repens*
39. *Anisosorus hirsutus*
40. *Pteridium aquilinum var. arachnoideum*
41. *Pteris vittata*
42. *Pteris tripartita* (endemic)
43. *Pteris arborea*
44. *Achrosticum aureum*
45. *Achrostichum danaeifolium*
46. *Blechnum serrulatum*
47. *Blechnum occidentale*
48. *Blechnum binervatum*
49. *Blechnum ryanii*
50. *Salpichloena volubilis*
51. *Pityrogramma calomelanos*
52. *Pityrogramma chrysophylla*
53. *Hemionitis palmata*
54. *Adiantopsis radiata*
55. *Adiatum obliquum*
56. *Adiatum villosum*
57. *Adiantum latifolium*
58. *Adiantum tetraphyllum*
59. *Adiantum fragile*
60. *Oleandra nodosa*
61. *Elaphoglossum herminieri*
62. *Elaphoglossum longifolium*
63. *Elaphoglossum martinicense*
64. *Elaphoglossum plumieri*
65. *Elaphoglossum apodum*
66. *Hymenodium crinitum*
67. *Lomariopsis sorbifolia*
68. *Polybotrya cervina*
69. *Nephrolepis rivularis*
70. *Nephrolepis biserrata*
71. *Nephrolepis multiflora*
72. *Tectaria plantaginea*
73. *Tectaria trifoliata*
74. *Tectaria incisa*
75. *Ctenitis subincisa*
76. *Polystichopsis muscosa*
77. *Stigmatopteris rotundata*
78. *Diplazium limbatum*
79. *Diplazium cristatum*
80. *Diplazium striatum*
81. *Thelypteris opposita*

82. *Thelypteris balbisii*
83. *Thelypteris decussata*
84. *Thelypteris clypeolutala*
85. *Thelypteris glandulosa*
86. *Thelypteris extensa*
87. *Thelypteris quarangularis*
88. *Thelypteris dentata*
89. *Thelypteris tetragona var. tetragona*
90 *Thelypteris nephrodioides*
91. *Thelypteris pennata*
92. *Thelypteris poiteana*
93. *Thelypteris reticulata*
94. *Asplenium serratum*
95. *Asplenium pumilum*
96. *Asplenium obtusifolium*
97. *Asplenium salicifolium var. salicifolium*
98. *Asplenium auritum var. rigidum*
99. *Asplenium cristatum*
100. *Asplenium cuneatum*
101. *Polypodium pectinatum*
102. *Polypodium polypodoides*
103. *Polypodium loriceum*
104. *Polypodium chnoodes*
105. *Polypodium aureum var. aureum*
106. *Polypodium piloselloides*
107. *Polypodium lycopodioides*
108. *Polypodium astrolepsis*
109. *Polypodium repens*
110. *Polypodium phyllitidis*
111. *Polypodium crassifolium*
112. *Grammitis serrulata*
113. *Grammitis suspensa*
114. *Grammitis asplenifolia*
115. *Cochlidium seminudum*
116. *Anetium citrifolium*
117. *Polytaenium feei*
118. *Polytaenium dussianum*
119. *Vittaria lineata*

Source: Flora of the Lesser Antilles - *Pteridophyta*: Leeward and Windward Islands (R. Howard, Vol.2, *Pteridophyta* by G. Proctor, Arnold Arboretum, Harvard. University, Jamaica Plain Massachusetts).

APPENDIX 4
Endangered Forest Species of St. Lucia

Family	Botanical Name	Common Name	Status
Cupressaceae	*Juniperus barbadensis*	Pencil Cedar	Endemic
Melastomataceae	*Miconia secunda*	-	Rare, Endemic
Melastomataceae	*Miconia luciana*	Bois Cendre	Rare, Endemic
Nominiaceae	*Siparuna santae luciae*	Bois Caca	Rare, Endemic
Palmae	*Aiphanes luciana*	Gwi-Gwi	Endemic
Euphorbiaceae	*Barnadia laurentii*	-	Endemic
Euphorbiaceae	*Acalpha elizabethae*	-	Endemic
Mimosaceae	*Calliandra slaneae*	Menizeye	Endemic
Clusiaceae	*Chrysochlamys caribaea*	Bois Mang	Rare, Endemic
Palmae	*Coccothrinas barbadensis*	Latanier	-
Thymeleaceae	*Daphnopsis macrocarpa*	Mahoe Piman	Rare, Endemic
Myrtaceae	*Eugenia dussii*	-	Rare, Endemic
Rubiaceae	*Exostema santa-luciae*	-	Endemic
Euphorbiaceae	*Hieronyma caribaea*	Bois d'Amande	-
Bromeliaceae	*Tillandsia fasciculata*	-	Endemic
-	*Tovomita plumieri*	Paletuvier	Endemic
Lauraceae	*Phoebe elongata*	Laurier Canelle	-

Source: Forestry Department

APPENDIX 5
Principal Medicinal Plants Used in St. Lucia

Vernacular name	Botanical name	Family
Konsoud, Wallwort	*Symphytum officinale*	*Boraginaceae*
Tjitjima, Turmeric	*Curcuma domestica*	*Zingiberaceae*
La-fl-siwo, Elder	*Sambucus simpsonii*	*Caprifoliaceae*
Kongolala	*Eclipta alba*	*Asteraceae*
Sonwe, Zonw, Fonn sen	*Blechum brownei*	
Zherbe, Sesh	*Moghania strobilifera*	
White rose, Woi,	*Roses spp.*	
Tet Neg,	*Elephantopus crispus*	*Asteraceae*
Yellow sage, Bwa-wa-tau, White sage	*Lantana camara*	*Verbenaceae*
Barbados Pride, Pride of Barbados	*Caesalpiniapulcherrina*	*Leguminosae*
Guava	*Psidium guajava*	*Myrtaceae*
Avocado, Pear	*Persea americana*	*Lauraceae*
Kaka Poul, Periwinkle	*Catharanthus roses*	*Apocynaceae*
Cemetry Vine, Coralita	*Antigonon leptopus*	*Polygonaceae*
Pomegranate	*Punica granatum*	*Punicaceae*
Oleander	*Nerium oleander*	*Apocynaceae*
Coconut	*Cocos nucifera*	*Palmae*
Shell ginger, Shellflower	*Alpinia zerumbet*	*Zingiberaceae*
Glory cedar	*Gliricidia sepium (J.)*	*Fabaceae*
Vernacular Name	*Calliandra slaneae*	*Minosacae*
Kaf zpyant, Wild coffee	*Senna occidentalis*	*Caesalpiniaceae*
Paw angole, Pigeon pea	*Cajanus cajan*	*Leguminosae*
Cotton, Ktn	*Gossypium barbadense*	*Malvaceae*
Baly wouj, Red Broom	*Sida acute*	*Malvaceae*
Awali, Pitch apple	*Clusia rosea jacq*	*Clusiaceae*
Bay Leaf, Bay tree	*Pimenta racemosa*	*Mytaceae*
Jiwof glo, Water cloves	*Ludwigia octovalvis*	*Onagraceae*
Chadon benni, Blessed thistle,	*Eryngium foetidum*	*Umelliferae*
Black Sage, Maho new	*Cordia martinicens (Jacq.)*	*Boraginaceae*

Vernacular name	Botanical name	Family
Twa - tas	*Lippia alba*	*Verbenaceae*
Venvenn lache wat, Vervain	*Stachytarphata jamaicensis*	*Verbenaceae*
Patjouli	*Hyptis Mutabilis*	*Euphorbiaceae*
Bazalik	*Ocimum basilicum*	*Lamiaceae*
Mal fonbwazen, Frobwazen, Frond bazin, Basilic, Mint	*Ocimun gratissimum*	*Lamiaceae*
Dite pyi	*Capraria biflora*	*Scrophulariaceae*
Baly dou, Sweet broom	*Scoparis dulcis*	*Scrophulariaceae*
Calabash	*Crescentia cujete*	*Bignoniaceae*
Ti patat, Minne - root	*Ruellia tuberosa*	*Acanthaceae*
Chinchona, Cinchona	*Exostema sanctae - luciae*	*Rubiaceae*
Mint	*Mentha nemorosa*	*Labiatae*
Vemacular Name Lapsent, Wormwood, Tapis	*Ambrosia hispida*	*Asteraceae*
Whitehead, Matnitjen	*Parthenium hysterophorus*	*Asteraceae*
Khus Khus	*Vetiveria zizanioides*	*Poaceae*
Gwendjin, Guinea seed	*Cyperus rotundus*	*Cyperaceae*
Lalw, Aloe	*Aloe vera*	*Liliaceae*
Coco chat, Coco shot	*Trimezia martinicensis*	*Iridaceae*
Jjann doule	*Hedychium coronarium*	
Toloman	*Canna indica*	*Cannaceae*
Twenty - one - shilling	*Pfaffia iresinoides*	*Amaranthaceae*
Fy douvan, Mawi pouwi	*Petiveria alliacea*	*Phytolaccaceae*
Sensitive plant, Myhont	*Mimose pudica*	*Leguminosae*
Zb - a - zdjwi, Needle grass	*Bidens pilosa*	*Asteraceae*
Zb - a - kuws, Shining bush	*Peperomia pellucida*	*Piperaceae*
Medsinni benni, Physicnut	*Jatropha curcas*	*Euphorbiaceae*
Chapanty, gwan bwa	*Odontonema nitidum*	*Acanthaceae*
Blanjenn djabb, Wild eggplant	*Solanum torvum*	*Solanaceae*
Zeb - mouton, Latifi, Labonn - fanm	*Ageratum conyzoides*	*Asteraceae*
St. John bush	*Justicia secunda*	
Konkonm koulit, Karla, Indian cucumber	*Momodica charantia*	*Cucurbitaceae*
Zeb - a - v, Semen contra, Semen kontwa, Wormgrass	*Chenopodium ambrosioides*	*Chenopodiaceae*

Vernacular name	Botanical name	Family
Kawaktlzm, Leaf-of-life, Wonder-of-the-World	*Bryophyllm pinnatum*	*Crassuloaceas*
Bois cotelette.	*Citharexylum spimosum*	*Verbenaceae*
Hibiscus	*Hibiscus rosa - sinensis*	*Malvaceae*
Kasialata, Christmas candle	*Cassia alata*	*Caesalpiniaceae*
Dandelion, Fy- doblom	*Chaptalia nutans*	*Asteraceae*
Fonbwafen, Sweet basil	*Ocimum micranthum*	*Lamiaceae*
Sitonnl, Citronnelle	*Pectis floribunda*	*Asterceae*
Tabak dajab, Wild Tobbaco	*Pluchea spp.*	*Asteraceae*
Vemaculat Name Lang poul	*Enicostema verticllatum*	*Gentiaraceae*
Diten dijin, Diten Keyol	*Lippia micromera*	*Verenaceae*
Chapantye, Carpenter,s grass	*Justicia pectoralis Jacq.*	*Acanthaceae*
Cashew, Pomme - cajou	*Anacardium occidentale*	*Anacardiaceae*
Prickly pear, Rachette, Watjt	*Opuntia cochenillifera*	*Cactaceae*
Seed - under - Leaf, Gwen anbafy blin	*Phyllanthus amarus*	*Euphorbiaceae*
Vernacular Name - Zootie	*Laportea aeatuans (SynFleurya aestuans)*	*Urticacaeae*
Wild onion, Spider lily, Cocoa onion	*Hymenocallis tubiflora*	*Amaryllidaceae*
Wild Mint	*Hyptis atrorubens*	*Labiatae*
Milk weed, Malomen	*Euphorbia hirta*	*Euphorbiaceae*
Japana, Japanna,	*Eupatorium triplinerve*	*Compositae*
Lemon grass, Citronnelle, Sitonne	*Cymbopogon citratus*	*Gramineae*
Bird pepper, Piman gwiv	*Capsicum frutescens*	*Solanacea*
Woukou, Roukou, Roucou	*Bixa orellana*	*Bixaceae*
Tref, Tuf	*Aristolochia trilobata*	*Aristolochiaceae*
Man better man	*Achryanthes indica*	*Amaranthaceae*
Papaya	*Caria papaya*	*Caricaceae*
Foul foot, Pied poule	*Eleusine indica*	*Graminae*
Water grass, Zbgwa	*Commelina diffusa*	*Commelinaceae*
Plantain, Planten	*Plantago major*	*Plantaginaceae*
Gros pompon, Go ponpon	*Leonotis nepetifolia*	*Lamiaceae*
Crab,s eyes, Graind'sglise, Jumbie Beads	*Abrus precatorius*	*Fabaceae (Leguminosae)*

Vernacular name	Botanical name	Family
Castor oil, Gwen makwisti, Huile cawapate	*Ricinus communis*	*Euphorbiaceae*
Venvenn kawayib, Pis-a-bed	*Wedelia trilobala*	*Casteraceae*
Soursop, Couassol, Corossol, Corosolier	*Annona muricata*	*Annonaceae*
Purslane, Koupye	*Portulaca oleracea*	*Portulacaceae*
Cinnamon, Spice, Kannel	*Cinnamomum verum*	*Lavraceae*
Kafe go bouwo	*Mucuna pruriens*	*Fabaceae*
Agouma	*Solanum americanum*	*Solanaceae*
Jjanm, Ginger	*Zingiber officinale Roscol*	*Zingiberaceae*
Thick - leaf - thyme	*Coleus eromaticus (Plectranths amboinicus)*	*Lamiaceae*
Mint, Lanmant fanm	*Mentha neanorosa*	*Lamiaceae (Labiatae)*
Ti bonm, Ti baun blanc	*Croton bixoides*	*Euphorbiaceae*
Saspaway	*Yucca guatemalensis*	*Agavaceae*
Langue boeuf, Lapitte, Lang bef, Century - plant	*Agave caribaeicola*	*Agavaceae*

Source: Forestry Department

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