

COUNTRY REPORT ON THE STATE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

REPUBLIC OF FIJI



CURRENT STATUS OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

In the Republic of Fiji

Country Report

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Note by FAO

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PREAMBLE



This is the second report as Fiji's contribution to the process of monitoring the implementation of the Global Plan of Action (GPA) and to the preparation of State of the World's Plant Genetic Resources for Food and Agriculture. The Pacific Agricultural Plant Genetic Resources Network (PAPGREN) of the Secretariat of the Pacific Community (SPC) as the agency overseeing the implementation process in the Pacific Region hired a consultant from Fiji with funding assistance from the Food and Agriculture Organization (FAO). The consultants prepared reports on GPA implementation in Fiji based on the agreed FAO reporting format and set of indicators. In this case Mr. Savenaca Cuquma of the Research Division of the Ministry of Primary Industries, a National PGR Focal Point carried out this work. To assist in this work, SPC provided the necessary logistics like travel funds and appropriate software from the FAO project. After a briefing at SPC in Fiji, the consultant entered the focal point data (including common tables), conducted survey among national PGR stakeholders.

Stakeholders were informed to supply the relevant information on all PGRFAs held in their collections. A visit was carried out to this site by the consultants including meeting and discussions with stakeholders. Mr. Poasa Nauluvula, Principal Research Officer – Agronomy and Mr. Mesake Nacola, acting Principal Research Officer – Horticulture also provided relevant inputs in the compilation of this report.

BRIEF INTRODUCTION OF FIJI

FIGURE 1
Map of Fiji



1. Location

Fiji lies in the heart of the Pacific Ocean midway between the Equator and the South Pole and between longitudes 174°East and 178°West of Greenwich and latitudes 12° S and 22° south. Fiji's Exclusive Economic Zone contains approximately 330 islands of which about a - third are inhabited. It covers about 1.3 million square kilometers of the South Pacific Ocean. Fiji's total land area is 18 333 square kilometers. There are two major islands - Viti Levu that is 10 429 square kilometers and Vanua Levu 5 556 square kilometers. Other main islands are Taveuni (470 sq km), Kadavu (411 sq km), Gau (140 sq km) and Koro (104 sq km). 87.9% of land is owned by indigenous Fijians while 3.9% is State land. Freehold land comprises 7.9% and Rotuman land is 0.3%. The capital is Suva and it is one of the two cities in Fiji. The other city is Lautoka and both are located on the island of Viti Levu.

2. Population

Fiji is a multi-cultural and multi-racial country. The nation's population as at 2002 was about 826 281. Fijians comprise 53.4 per cent of the total population, Indians 39.7 percent, with the balance made up of Rotumans, Chinese, Part-Europeans, Europeans and other Pacific Islanders. Fiji's population grew at an annual average of 1.3 per cent between 2000-2002. Of this 826 281, about 53 per cent live in rural areas. Whilst indigenous Fijians are usually classed as Melanesians, they are actually a mixture of both Polynesian and Melanesian elements. Fiji Indians are mostly descendants of Indian labourers brought by the British to work in the sugar plantations during Fiji's Indenture period, which ended in 1916. The official language is English with Fijian and Hindi being used widely. Fijian dialects differ between regions

3. Climate

Fiji enjoys a tropical South Sea maritime climate without great extremes of heat or cold. The islands lie in area which 'is occasionally traversed by tropical cyclones, and mostly confined between the months of November to 'April every year. Temperatures average 22°C for the cooler months [May to October] while November to April temperatures are higher with heavy down pours.

4. Economy

Fiji's economy, endowed with forest, mineral, and fish resources, is one of the most developed of the Pacific island economies, though still with a large subsistence sector. Sugar exports, remittances from Fijians working abroad, and a growing tourist industry - with 400 000 to 500 000 tourists annually - are the major sources of foreign exchange. Fiji's sugar has special access to European Union markets, but will be harmed by the EU's decision to cut sugar subsidies. Sugar processing makes up one-third of industrial activity but is not efficient. Fiji's tourism industry was damaged by the December 2006 coup and is facing an uncertain recovery time.

Fiji is no longer an agriculture-based economy. The distribution of economic power in the country comparing the size of the major sectors shows that the primary resource based sector-which encompasses agriculture, forestry, fishing and mining - has declined in its share of GDP since 1986 from 25 to 18 percent. It has been surpassed by the wholesale retail trade, restaurants & hotels sector, which now accounts for 19 per cent of GDP and is growing. This retail sector incorporates the flow on effects of tourism.

5. Agriculture

Agriculture remains a major sector of the economy, accounting for 43 per cent of Fiji's foreign exchange earnings. It provides 50 per cent of the country's total employment and contributes 19 per cent to Fiji's Gross Domestic Product (GDP). Fiji has a total land area of 1.8 million hectares. Only 16 per cent is suitable for farming and are found mainly along coastal plains, river deltas and valleys of the two main islands of Viti Levu and Vanua Levu. The rest can be found in the smaller out lying islands of the group. Of the arable land, 24 per cent are under sugar cane, 23 per cent coconut and the remaining 53 per cent under other crops. The indigenous people own about 83 per cent of the land in Fiji. And through the Landlord and Tenants Act (ALTA), the Indian farmers have had the privilege to farm on arable Fijian land through long-term leases.



OVERVIEW OF THE GPA MONITORING PROCESS

These three processes were followed:

1. Familiarization of the process and the software provided plus the entering of data in the common table and the Focal Point information.
2. Contact stakeholders followed by field visit to PGRFA collections to collect information and interview stakeholders.
3. Inputting data for Koronivia Research Station, Agronomy Section (Germplasm and Seed Testing Center stakeholder program (database).

1.1 Phase 1

The initial stage of the process involves the familiarization of the software and the reporting format. The first attempt was made to install the software in Windows Vista failed and it gave an error message. The second attempt was made with the assistance of SPC PGR Officer was successful and the programme operated with ease. A password was created and data entry commenced in the common tables.

Phase 1 is summarized below:

TABLE 1

Showing activities in Phase 1 of the process

Common table	Number of entries	Comments
Organizations	50	These include main PGR stakeholders from government, statutory bodies and regional organization in Fiji.
Contact persons	47	Government, statutory bodies, private sector, farmers
Projects	30	Only main projects are selected.
Taxons		No entry was made since all the taxa in <i>ex-situ</i> collections are present.
Cultivars		No entry made because there is currently no breeding program exists.
Information system	2	One exists for sugarcane collection, but it is old and operates in DOS. No standard information system exists.
Areas	24	These are mainly areas where PGRFA exists and some are administrative regions/ division of the country.
Agreement	10	These are mainly major international treaties and convention related to PGRFA and some local agreements with regional institutions.

1.2 Phase 2

The major activities carried out here was the collection of information of all PGRFA *ex situ* maintained within the Ministry of Primary Industries in Fiji. Officers managing these collection supplied data on the current status of existing PGRFAs. This was followed by a field visit and interview/discussion with these officers. Stations visited were as follows with stakeholders interviewed:



TABLE 2
Details of stakeholders interviewed

Officers interviewed	Position	Location
Silika Vurebe	Researcher – Agronomy	Koronivia Research Station
Osea Nateba	Researcher - Agronomy	Koronivia Research Station
Penaia Mua	Officer – in – Charge	Dobuilevu Research Station
Marika Radua	Officer – in – Charge	Seaqaqa Research Station/Wainigata Research
Jai Narayan	Officer – in – charge	Naduruloulou Research Station
Shalend Prasad	Research Officer	Legalega Research Station
Naresh Prasad	Researcher – Horticulture	Sigatoka Research Station
Amena Banuve	Senior Research Officer – Vegetables	Sigatoka Research Station
Jai Gawander	CEO	Sugar Research Institute of Fiji
Saimone Johnson	Senior Scientific Officer	Sugar Research Institute
Aremorgam Pillay	Researcher – fruits	Legalega Research Station

** Copies of GPA CDs will be sent to these respective officers

1.3 Phase 3

This phase consists of inputting data into the CD that summarizes the current status of PGRFA maintained in *ex situ* collections in Fiji. Some additions were made to the common table while some old data has been removed and replaced by new ones.

HIGHLIGHT OF THE FINDINGS



2.1 *In situ* Conservation and Development

2.1.1 GPA Activity Area 1: Surveying and Inventorying

There is no country wide survey carried out to determine the conservation of traditional crops/landraces and the on - going genetic erosion of plant genetic resources. A survey was carried out as reported earlier in 2004. Farmers still maintain some of the landraces, but this seems to be slowly eroding due to the increasing cultivation of improved varieties e.g. taro. This is evident in local markets that traditional varieties are rarely seen by vendors, but mostly hybrid taro is sold. There is need to put in place a strategy with the support of regional organization to carry out a country survey on traditional genetic resources and also the protection of traditional knowledge. This is compounded by the increasing urban migration of people from these areas. The Eastern and Northern division of Fiji are priority areas needed for survey due to population pressure, rising sea level, climate change and logging activities.

2.1.2 GPA Activity Area 2: Support on-farm management and improvement

There were some activities reported here on some farmers supporting on - farm approach. Four famers in Vanua Levu carried out on - farm conservation of mangoes and some farmers in Ovalau, Naitasiri and Wainibuka areas practiced on - farm conservation of duruka (*Saccharum edule*). Some reported activities on breadfruit were carried out in Natewa in the Cakaudrove province of Vanua Levu.

2.1.3 GPA Activity Area 3: Assisting farmers in disaster situation

There is a national plan in place since Fiji is prone to national disasters e.g. hurricanes and flooding. The Disaster Management Committee (DISMAC) is activated during these times and work closely with Agriculture ministry in rehabilitating affected farmers.

2.1.4 GPA Activity Area 4: Promoting *in situ* conservation of wild crop relatives and wild plants for food production

There is a strategy in place in the Ministry of Agriculture to promote underutilized and wild varieties e.g. fruits, nuts and vegetables for 2009.

2.2 *Ex situ* conservation

2.2.1 GPA Activity Area 5: Sustaining existing collections

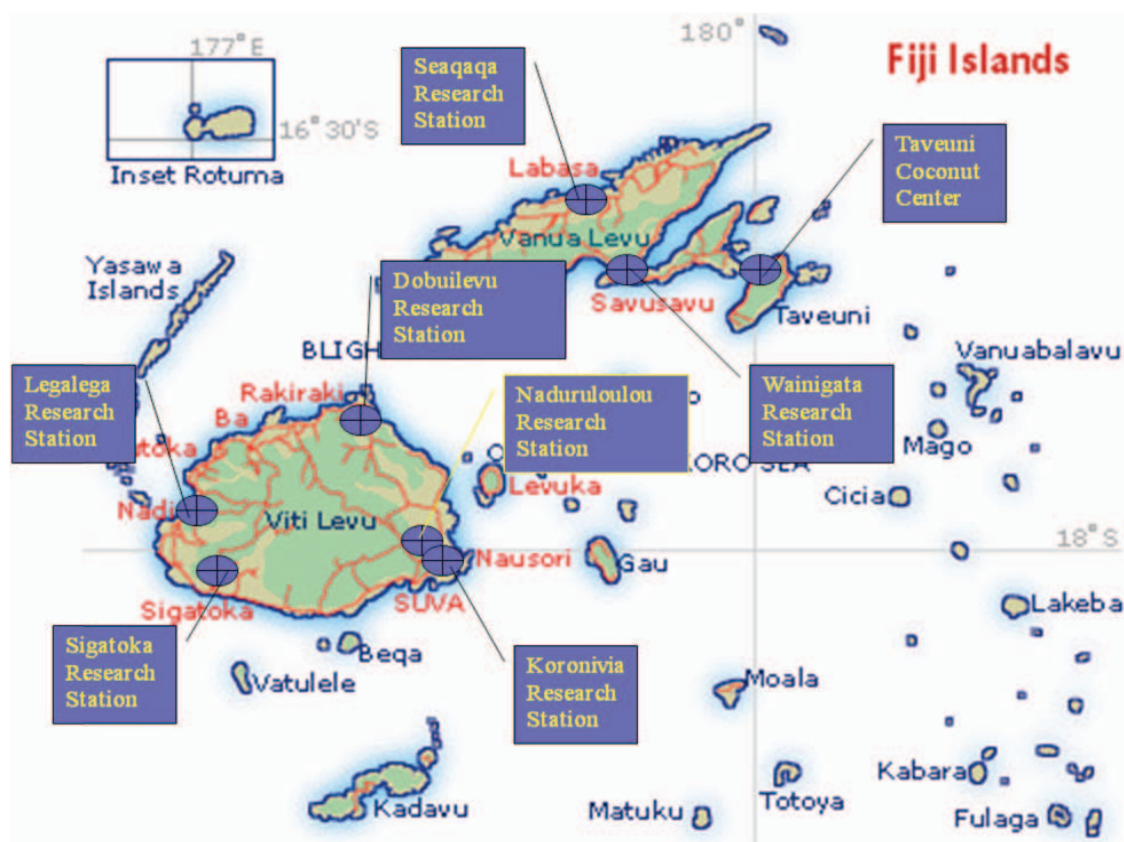
Ex situ conservation is carried out by the Research Division of the Ministry of Primary Industries in Fiji. This is mainly in the form of field gene bank, tissue culture and cool storage facilities. These collections are maintained at eight (8) research station located at different ecological zones in the country mainly in the two main islands of Viti Levu and Vanua Levu.

- Koronivia Research Station (*root crops, ginger, rice, tissue culture, cool storage, vegetables*)
- Naduruloulou Research Station (*kava, duruka, tree crops, fruits, spices, indigenous and exotic fruits and trees, vegetative propagation*)

- Dobrelevu Research Station (*root crops, fruits, ginger*)
- Legalega Research Station (*pulses, fruits, indigenous and exotic fruits, breadfruit, noni, vegetative propagation*)
- Seaqaqa Research Station (*fruits, root crops, ginger, indigenous and exotic fruits and trees*)
- Sigatoka Research Station (*vegetables, tropical fruits, cereals, wild vegetables and fruits, banana, breadfruit*)
- Taveuni Coconut Center (*coconuts, root crops*)
- Wainigata Research Station (*tree crops, coconuts*)

These are further illustrated in the map below.

FIGURE 2
Map of Fiji showing location of Ex situ Gene Bank



The table below shows the current status of PGRFAs of each species maintained in the above gene banks, whether characterization has been carried out with priorities.

TABLE 3
Root and tuber crops

Crops	No. of accessions	Conservation	Characterization	Priorities
Taro (upland)	94	Koronivia, Dobrelevu, Tissue culture, cryopreservation at SPC.	Morphological, Molecular	Need to rescue the traditional varieties and evaluate the TLB varieties from quarantine.
Taro (wetland)	3	Koronivia	None	Develop a package of practice and release.
Yams	66	Koronivia, Dobrelevu & Seaqaqa, SPC tissue culture	Partial (70%)	Need to rescue some of the collections,
Sweet potato	36	Koronivia, Dobrelevu, Seaqaqa	Morphological	Main rehabilitation crops after natural disasters.
Cassava	24	Koronivia, Dobrelevu	Morphological	Ethanol production, need to rescue 3 lost varieties.
Xanthosoma	2	Koronivia, Seaqaqa, Dobrelevu	None	Collection is needed, tissue culture

TABLE 4
Indigenous Fruits

Crops	No. of accessions	Conservation	Characterization	Priorities
Dawa (Pormentia pinnata)	2	Naduruloulou, Legalega, Seaqaqa	None	Priority for 2009 for evaluation for local markets and hotel industries.
Nuts (vutu, ivi, tavola)	3	Naduruloulou, Legalega, Seaqaqa	None	As above
Tarawau	2	Naduruloulou, Legalega, Seaqaqa	None	Priority for 2009
Kavika	5	Naduruloulou, Legalega, Seaqaqa	None	None
Wi	2	Naduruloulou, Seaqaqa, Legalega	None	Low

TABLE 5
Exotic fruits

Crops	No. of accessions	Conservation	Characterization	Priorities
Avocado pear	3	Sigatoka, Naduruloulou, Seaqaqa, Legalega	None	Low
Carambola	2	Sigatoka, Naduruloulou, Seaqaqa, Legalega	None	None
Star apple	1	Naduruloulou, Seaqaqa, Legalega	None	None
Mangosteen	2	Naduruloulou, Seaqaqa, Legalega	None	None
Nuts	5	Naduruloulou, Seaqaqa, Legalega	None	Priority for 2009
Guava	4	Naduruloulou, Sigatoka, Seaqaqa, Legalega	None	Low
Jackfruit	5	Sigatoka, Naduruloulou, Seaqaqa, Legalega	None	Demand for local market, characterization
Sour sop	2	Seaqaqa, Sigatoka, Naduruloulou	None	None
Sapodilla	1	Naduruloulou, Legalega, Seaqaqa	None	None
Bullocks heart	1	Legalega, Seaqaqa	None	None
Custard apple	1	Legalega, Naduruloulou, Seaqaqa	None	None
Rose apple	1	Sigatoka, Legalega	None	None
Rambutan	2	Naduruloulou, Legalega	None	Low
Durian	1	Legalega, Naduruloulou	None	None
African pride	1	Naduruloulou, Sigatoka	None	None
Langsat	2	Naduruloulou, Sigatoka, Legalega	None	None
Citrus	32	Sigatoka, Naduruloulou, Seaqaqa	None	Characterization
Mango	68	Legalega, Seaqaqa	Morphological	Export promotion and local hotels
Pineapple	5	Sigatoka, Seaqaqa	Morphological	Export promotion and hotels, characterization
Papaya	2	Sigatoka, Legalega	Morphological	Export promotion and local hotels
Noni	2	Sigatoka, Naduruloulou, Seaqaqa	None	Some work carried out on anti non – communicable disease properties by USP
Passionfruit	5	Naduruloulou, Sigatoka, Legalega	None	None

TABLE 6
Vegetables and pulses

Crops	No. of accessions	Conservation	Characterization	Priorities
Cowpea	207	Legalega	None	Export promotion, characterization
Pigeon pea	180	Legalega	None	Alternative source of income for sugar cane farmers
Mung	62	Legalega	None	Medium
Urd	5	Legalega	None	Medium
Peanut	58	Legalega	None	Medium
Soyabean	53	Legalega	None	Medium
Chick pea	6	Legalega	None	Medium
Wheat	49	Legalega	None	To be evaluated as an Import substitution crop
Cucumber	5	Sigatoka	None	Medium



Crops	No. of accessions	Conservation	Characterization	Priorities
English cabbage	21	Sigatoka	None	Diamond back moth control, local markets
Water melon	21	Sigatoka	None	Medium
Cauliflower	14	Sigatoka	None	Low
Squash	6	Sigatoka	None	None
Capsicum	23	Sigatoka	None	Low
Chilies	35	Sigatoka	Morphological	BQA export crop, supply of seeds to farmers
Tomatoes	50	Sigatoka	Morphological	Need to evaluate varieties for local hotel industries
Eggplant	24	Sigatoka	None	BQA export crop, seeds
Lettuce	20	Sigatoka	None	Need to evaluate varieties for local hotels
Long bean	6	Sigatoka	None	Low
Cucumber	3	Sigatoka	None	Low
Onion	3	Sigatoka	None	Import substitution
Chinese cabbage	5	Sigatoka	None	Low
Okra	2	Sigatoka	None	Medium
Gourds	10	Sigatoka	None	None
Raddish	4	Sigatoka	None	None
Carrot	9	Sigatoka	None	Medium

TABLE 7
Banana and plantain

Crops	No. of accessions	Conservation	Characterization	Priorities
PHIA banana	8	Koronivia, Sigatoka, Legalega	Morphological, nutritional properties	Need to identify high yielding varieties & carotenoid rich varieties and promote.
Local varieties	3	Koronivia, Sigatoka	None	"
Plantain	9	Sigatoka, Legalega, Koronivia	None	"

TABLE 8.0
Coconut, Breadfruit, *Saccharum* spp & Wild varieties

Crops	No. of accessions	Conservation	Characterization	Priorities
Coconuts	14	<i>In situ</i> , Taveuni, Wainigata, <i>in vitro</i>	Morphological, molecular	High, value addition
Breadfruit local varieties	22	SPC tissue culture, Legalega, Sigatoka, Seaqaqa & Natewa (marcotting)	None	Export crop, need to carry out characterization since descriptors are available. Identify varieties rich in carotenes and promote its health benefits.
Duruka or Pitpit	8	Naduruloulou	Morphological, Molecular, Nutritional (50%)	Need to rescue the collection, conserve through tissue culture, export crop.
Sugar cane	4 500	Sugar Research Institute of Fiji (SRIF)	None	There is an urgent need to characterize the collection in Fiji.
Ota or edible fern	4	Sigatoka	None	Need to characterize and carry out nutritional studies. High demand in local markets. Need to collect other cultivars

TABLE 9
Beverages and spices crops

Crops	No. of accessions	Conservation	Characterization	Priorities
Ginger	8	Koronivia, Seaqaqa, Dobuilevu, tissue culture	Morphological, biochemical	Supply of planting materials to farmers, dry ginger production
Vanilla	3	Naduruloulou	None	Need to evaluate varieties, high value crop
Cardamom	1	Naduruloulou	None	Low
Cinnamon	1	Naduruloulou	None	Low
Black pepper	7	Naduruloulou	None	Low
Curry leaf	1	Naduruloulou	None	Low
Nutmeg	1	Naduruloulou, Legalega	None	Low
Coffee	1	Naduruloulou, Seaqaqa	None	None
Tea	1	Naduruloulou	None	None
Cocoa	115	Naduruloulou, Wainigata	None	Low
Kava	12	Naduruloulou	Morphological, DNA, Biochemical	Pharmaceutical properties

2.2.2 GPA Activity Area 6: Regenerating threatened *ex situ* collections

There is a need to regenerate the traditional varieties of taro in Fiji. There is a situation in Taveuni where farmers are planting only the export variety and landraces are slowly eroding. SPC in collaboration with the Ministry of Agriculture in Fiji established a collection of traditional cultivars in this area to introduce these varieties back to the farmers. For *ex situ* collection at Koronivia re – collection is needed for traditional taro varieties. Duruka varieties needed to be rescue since old records indicate the presence of 14 accessions. Cool storage facilities needed to be upgraded and well maintained to store seeds of tropical fruits and needs to be duplicated at Koronivia Research Station seed germplasm.

2.2.3 GPA Activity Area 7: Supporting planned and targeted collecting

Collection is an on – going activities for *ex situ* collection in Fiji, this is possible through annual data collected on germplasm collection. Recent studies have indicated the increase in non – communicable disease in Fiji and the Pacific, so there is a need to collect wild varieties with anti – non communicable disease properties such as “fei” bananas, breadfruit, noni to name a few.

There is no national plan in place to assess the genetic erosion of PGRFAs but this is carried out through *ex situ* collection monitoring. Some of the recent collecting missions carried out are as follows:

- Breadfruit collections in Natewa district (22 accessions marcotted)
- Xanthosoma to establish a collection
- Duruka from Naitasiri
- Traditional fruits and wild vegetables

The Ministry of Primary Industries in Fiji with its Land Use Division has the facilities for GIS, which can be used to map out diversity and indicate hot spots for future collecting missions.

2.2.4 GPA Activity Area 8: Expanding *ex situ* conservation

There is a tissue culture laboratory at Koronivia Research Station; it was established with the support of SPC. Some PGRFAs are maintained including kava, wetland taro, upland taro, ginger, TLB taro. There are plans in place to build a new laboratory from the existing old building. Some funding was provided by the Fiji government to establish the building foundation. A fully functional laboratory needs a hardening nursery to evaluate the plantlets before distribution to clients.

The core collection of Pacific taro are maintained at SPC (CePaCT), including the Fiji collections. Five Taro Leaf Blight (TLB) resistant cultivars are currently evaluated at the Post Entry Quarantine and will be added into the taro collection in 2009.



Some wild varieties have been collected and domesticated and are kept at *ex situ* collections e.g. edible fern, duruka, indigenous fruits and nuts.

Cool storage facilities need to be upgraded on few stations to safeguard the seeds of tropical fruits and vegetables.

2.3 Uses of Plant Genetic Resources

2.3.1 GPA Activity Area 9: Expanding characterization and evaluation and the number of core collections

Characterization is one of the major drawbacks on Fiji's *ex situ* collection given the diversity of PGRFAs maintained at 8 research stations. This is very important in maintaining large amounts of collections; duplicates can be removed and allows us to manage working collections that can reduce operational costs. Most of these PGRFAs have been characterized using morphological, agronomical traits, biotic and abiotic factors.

Morphological and molecular approaches have been undertaken by some crops with the support of regional and international institutions.

TABLE 10

Some major characterization carried out

Crops	Characterization type	Remarks
Kava	Biochemical, DNA	50%
Coconuts	Morphological, DNA, Molecular	60%
Mangoes	Sugar content, fiber content, shelf life	
Ginger	Morphological, biochemical	60%
Yams	Morphological	SPYN network
Traditional vegetables	Morphological	Nutritional needed
Traditional fruits	Nutritional quality	
Duruka	Morphological, DNA, Molecular (micro – satellites), Nutritional	50% and continuing – Fiji, USP and SPC
Cassava	Morphological	40%
Taro	Morphological, DNA, Molecular	100% Pacific core collection at SPC including Fiji varieties

The main constraints in Fiji is the lack of trained personnel in this field and there has been some assistance by the SPC to train local staff in the field of morphological, DNA and molecular characterization. A future plan is to establish a molecular laboratory at Koronivia Research Station to characterize important PGRFAs rather than relying on taking samples to overseas laboratories.

2.3.2 GPA Activity Area 10: Increasing genetic enhancement and base broadening

The Sugar Research Institute of Fiji (SRIF) is the only institution undertaking breeding program and has released two high yielding varieties in 2000 and 2006. Fiji was supposed to undertake a breeding program on taro in 2008 to breed Taro Leaf Blight varieties introduced from Samoa through SPC with local varieties. But unfortunately the plant breeder left for Doctorate studies in Australia. These varieties are maintained in tissue culture and there is still a prospect of breeding program in future.

Fiji accessed some cassava, yams varieties from CTA and IITA in 2007, kept in tissue culture and will be evaluate to increase Fiji genetic base on these crops. With the support of Center of Pacific Crops and Trees (CePaCT) Material Transfer Agreement (MTA) enable the country to access to some PGRFAs from abroad.



2.3.3 GPA Activity Area 11: Promoting sustainable agriculture through diversification of production and broader diversity in crops

There was a program initiated in 2006 called The Alternative Livelihood Programme (ALP) to diversify other cash crops on sugarcane areas because of the decrease in sugar price and the expiring of the sugar preferential price from the EU markets. This program has been shelved and replaced by the Rural and Outer Island Project (ROI), Import Substitution Program (ISP), Export Promotion Program (EP) and the Sigatoka Valley Development Program (SVDP). These are 4 major projects currently managed by the Ministry of Primary Industries in Fiji that promotes sustainable agriculture and PGRFAs play a vital role in broadening diversity.

2.3.4 GPA Activity Area 12: Promoting the development and commercialization of underutilized crops and species

There are plans in place within the Ministry of Primary Industries to explore the value of underutilized fruits, nuts and vegetables. Most of these PGRFAs have medicinal, nutritional value important for food security and health benefits. An edible fern or Ota have been collected and domesticated, which of high demand in local market and mostly people of all races in Fiji eats this edible fern.

Duruka of the *Saccharum* spp complex have been promoted and now being exported abroad. There are opportunities exists in local fruits and nuts. Noni (*Morinda citrifolia*) regarded as underutilized though it is not a PGRFA plant are included in the *ex situ* collection. The University of the South Pacific are carrying out some research work on its anti – non communicable diseases.

2.3.5 GPA Activity Area 13: Supporting seed production and distribution

For the seed sector, there are no major activities carried out except by the supply of seed and planting materials from the research stations upon farmer's request. At Sigatoka Research Station supply of seeds and planting for Bilateral Quarantine Agreement (BQA) to New Zealand is carried out. Under the agreement, research has to produce and supply seed and planting materials e.g. papaya, chillies, eggplant, mango.

At Koronivia Research Station a taro commercial block has been operating for the last 3 years to produce planting materials of exported variety and supply to farmer at a subsidies price.

2.3.6 GPA Activity Area 14: Developing new markets for local varieties and diversity rich products

The four major programs undertaken by the Ministry of Primary Industries has its own components of exploring new markets for local products. In addition to this, the Fiji government has established the Agro Marketing Authority (AMA) to buy produce from the farmers and also develop new markets for Fiji's local products.

2.4 Institution and Capacity Building

2.4.1 GPA Activity Area 15: Building strong national programmes

As stated in the GPA national information sharing mechanism, there is a need to establish a PGR unit at Koronivia Research Station since it is the administrative/policy station for all research stations in Fiji. It is located close to the capital city and accessible to regional institutions especially SPC, Forum Secretariat and USP. It can be used to coordinate PGR activities in Fiji and where a national database to be in place. PGR National Focal Point can manage this unit and also train other staff. This will be the focal point not only to national but to regional and international institutions. Since Fiji is a member of the World Trade Organization, national legislations can be developed therefore considering options for effective sui generis plant varieties protection systems, including UPOV.

A National Consultation (NC) is pending to be carried out to bring together relevant stakeholders indicating the diversity of PGRFAs in Fiji. This can map out strategies for PGRFAs activities in future since Fiji has acceded to the International

Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). A National Steering Committee could be revived to facilitate and monitor these strategies and the secretary can be one of the National Focal Point.

However due to the change in government in Fiji and the current political climate, a National Consultation could not be carried out. But the current national programmes in place have improved the performance of the Ministry of Agriculture so far compared to previous years

2.4.2 GPA Activity Area 16: Promoting networks

The Secretariat of the Pacific Community (SPC) has assisted countries in the Pacific in 2001 whereby the Pacific Agricultural Plant Genetic Resources Network (PAPGREN) was established. It has assisted in many areas within the regional countries on sharing information on PGRFAs, bring together national focal points and interact with each other. It has removed working in isolation within the region.

In 2006 regional workshop was carried out with SPC assistance and a network of tissue culturist was formed called the Pacific Tissue Culture Network (PTCN) and Fiji is a member of this network. There are some existing and outgoing regional/international networks that Fiji is currently a member:

- Pacific Agricultural Plant Genetic Resources Network (PAPGREN)
- Pacific Tissue Culture Network (PTCN)
- Developing of a Sustainable Agriculture Program (DSAP)
- Coconut Genetic Network (COGENT)
- Taro Genetic and Utilization Network (Taro Gen)
- Banana network

Becoming members of these networks can facilitate the accessibilities of PGRFAs from abroad to broaden our genetic base of PGR in Fiji.

Networking within Fiji is strengthened by the establishment of internet services and a website for the Ministry of Primary Industries. A GOVNET system in place will enable stakeholders to closely interact and make correspondence much easier.

2.4.3 GPA Activity Area 17: Constructing comprehensive documentation systems

Documentation is an important activity in PGRFA conservation for adequate decision making process on PGR conservation and use. At present there is no standard documentation system in place and its staffs manage and maintain their own records of *ex situ* collection. There has been some improvement on some station that is accessible to electricity, Excel spreadsheets are used to store data.

A database has been created at Koronivia using Microsoft Access but this is not functional because of staff turnover, one has left and the other on study leaves. This will be activated once staff resumes duty. A standard documentation system will be in place and supplied to each officers responsible.

2.4.4 GPA Activity Area 18: Developing monitoring and early warning systems

There is no system in place to monitor the erosion of plant genetic resources both at *ex situ* and *in situ*. Assessments are largely dependant on data collected from annual germplasm monitoring.

2.4.5 GPA Activity Area 19: Expanding and improving education and training

Currently there is a staff (Mr. Savenaca Cuquma) from Fiji trained at the University of the South Pacific (USP) for the MSc program with support from SPC on PGR Conservation and Use focusing on the morphological, molecular and nutritional characterization of duruka cultivars in Fiji. Another staff Mr. Manoa Iranacola left for MSc in India on Plant Physiology.

Short courses are available to staffs with some trained on PGR documentation. The need to train officers managing *ex situ* collection is long overdue so that they can appreciate the values of PGRFAs in their collection. Some priority areas that is needed for short term (documentation, PGR conservation and use, GIS and GPS use, collecting methods and plant identifications); long term (plant breeding, characterization, plant physiology) that could enhance the utilization of PGRFAs in Fiji.

SPC and USP have collaborated in including PGR in the university's curriculum and this is currently revised. The Fiji College of Agriculture (FCA) is the best ideal place to include PGR in the school curriculum. For secondary schools, an agricultural science is widely taught in most schools around the country.

2.4.6 GPA Activity Area 20: Promoting public awareness

Public awareness in Fiji is carried out but this need to be vigorously intensified in order to promote PGR to the general public. Every agricultural projects/activity carried out has its component of public awareness. The annual World Food Day celebration is one of the main activities supported by government to display and promote PGRFAs in Fiji. Others include Agriculture shows, Fiji Day celebration, Crime prevention week, field days and visits, school visits to agricultural stations.

The media needs to be actively involved in promoting PGRFAs to farmers and the general public. The annual PAPGREN meeting needs to involve the media in reporting the meeting to the public. Fiji has its Sky Pacific Television in place and is accessible to Pacific Island countries. Any PGRFAs meeting or workshop held in Fiji must include the Fiji V to inform other Pacific Islands countries.

2.5 Summary of GPA Implementation in the Fiji Islands

1. From this report it can be concluded that Fiji has made some progress from the last survey conducted in 2004 with some new crops added into germplasm. Some crops have been characterized using morphological, DNA and Molecular methods. Some genetic erosion identified in *ex situ* germplasm. Genetic erosion needs to be clearly defined in this case, whether it is defined as missing from the collection or extinct from a country. If it is missing from the germplasm then it may be present at *in situ* and collection can be carried out. There is much work needed to be carried out in Fiji's PGRFAs.
2. As it can be seen in the above report that most PGRFAs activities are concentrating on *ex situ* collections. Characterization and standardized documentation are some critical areas that need attention and support from national and regional institutions. This supports effective decision making in evaluating PGRFAs in Fiji.
3. There is a need to carry out surveys to *in situ* areas and as stated that the Northern and Eastern division are critical areas for survey. This is due to natural disasters, climate change and rising sea levels that these areas are prone to. GPS and GIS system that are currently available in Fiji can be used to map out diversity hot spots.
4. Lack of training on PGR to agriculture staffs remains a major drawback, while some initiatives are in place to train local staffs. Some long term trainings are needed in the field of plant breeding, DNA and molecular characterization, plant biology and physiology. Staff turnover is another problem faced in Fiji that hinders the progress of PGR activities.
5. The contribution of PAPGREN has improved the management of Fiji *ex situ* PGRFAs at national levels compared to previous years. This has facilitated to accessibility of PGRFAs regionally and abroad.



ACHIEVEMENTS, CONSTRAINTS AND SUGGESTIONS

The activities, achievements and suggestions contained in this report will provide a significant contribution towards the enhancement of PGR program in Fiji. This will be table in the National Consultation to be carried out in Fiji for discussion with comments and possibly additional inputs from other stakeholders.

Fiji has acceded to the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) in July 2008 and we need to put in place mechanisms that will enable Fiji to carry out the obligations under the Treaty. In addition to this Fiji has ratified the Convention on Biological Diversity (CBD) in 1993.

This activity enables Fiji to organize it PGRFAs conservation strategies and able to source resources to sustain and utilize these plant genetic resources.

The increase in world population and the increase in the demand for food supply is another important factor compounded by climate change. PGRFAs will play an important role in addressing the food security, health issues, rise in sea level and loss of biodiversity.

CHAPTER 4

FUTURE PLANS

The following recommendations are needed to put in place and to enhance the capacity undertaken as part of the establishment of a National Information Sharing Mechanism (NISM) in Fiji.

1. The current National Focal Point have increased from 1 – 3 personnel, this is done to strengthen the cooperation of PGR activities and coordination within the Ministry and other stakeholders. Mr. Poasa Nauluvula, Mr. Mesake Nacola and Mr. Savenaca Cuquma are the National Focal Point for Fiji. This has included the Horticulture Section of the Research Division that maintains a large proportion of PGRFAs in Fiji.
2. Focal points will be responsible for updating the future NISM, liaise with stakeholders and also train other staff on PGR management and the use of this software to assist in inputting of data to the GPA monitoring mechanisms.
3. National focal points will liaise with the PGR officer at SPC and work closely with him on national and regional PGRFAs issues and then update the Ministry on the progress.
4. National focal points to organize the National Consultation with other relevant stakeholders in Fiji develop strategies and map out a roadmap on PGRFAs activities in Fiji.
5. Fiji stands to benefits a lot from acceding to the ITPGRFA because it will facilitate the benefit sharing and exchange of germplasm because most of the PGR we have commercialized in Fiji have their center of origin outside Fiji.



