PACIFIC REGIONAL CONSULTATION

STRENGTHENING CONSERVATION AND SUSTAINABLE USE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE IN THE PACIFIC ISLAND COUNTRIES

Suva, Fiji, 7-10 December 2010

REPORT

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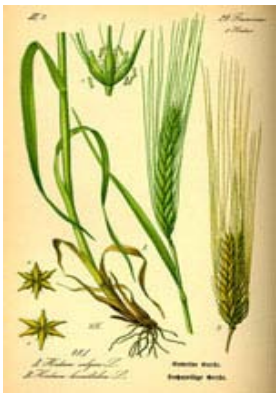
PART I:

EXECUTIVE SUMMARY

1.1 The international context

At the international level, a number of global instruments provide mechanisms to facilitate addressing today's challenges. Two of which are the International Treaty on Plant Genetic Resources for Food and Agriculture (IT-PGRFA, in force since 2004) and its supporting component, the *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture* (*Global Plan of Action*), which was adopted by the Pacific Island Countries along with other members of the Commission on Genetic Resources for Food and Agriculture (CGRFA) in 1996 through the Leipzig Declaration. The fundamental purpose of the IT-PGRFA is to enable conservation and sustainable use of plant PGRFA and allow for the equitable sharing of benefits arising from that use. The *Global Plan of Action* provides a coherent framework for member countries for the conservation and sustainable utilization of PGRFA. As a strategic framework, the *Global Plan of Action* needs to be periodically reviewed and updated to ensure that it continues to best serve country needs also in the light of new challenges.



At its Twelfth Regular Session, the CGRFA endorsed the *Second Report on Plant Genetic Resources for Food and Agriculture* (SoWPGR-2)[1] and agreed to update *the Global Plan of Action* in accordance with the Strategic Plan 2010-2017 for the implementation of the Multi-Year Programme of Work. It requested the Food and Agriculture Organization of the United Nations (FAO) to prepare the updated *Global Plan of Action* based primarily on the gaps and needs identified in the SoWPGR-2, taking into account further contributions from Governments, as well as inputs received from regional meetings and consultations. The updated *Global Plan of Action* will be considered at its Thirteenth Regular Session in 2011.

1.2 Objectives of the Pacific Regional Consultation

The Pacific Regional Consultation on Strengthening Conservation and Sustainable Use of PGRFA in the Pacific Island Countries was held in Suva, Fiji on 7-10 December 2010. The meeting was organized by FAO in collaboration with the Secretariat of the Pacific Community (SPC) with the financial support of the Government of Australia. It was attended by 28 participants from 14 Pacific Island countries and representatives from national, regional and international organizations, including the CGRFA, the IT-PGRFA, the Global Crop Diversity Trust (GCDT), and Bioversity International. The agenda of the Consultation and the list of participants are given respectively in Annex 1 and Annex 2.

[1] *Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture*, FAO, Rome, 2010 http://www.fao.org/docrep/013/i1500e/i1500e00.htm

The main objective of the Consultation was to assess and analyze the status and trends of policy and technical issues related to the conservation and sustainable use of genetic resources for food and agriculture, with a particular focus on updating the *Global Plan of Action* as well as the networking and strengthening collaborations for addressing regional priorities as relevant to Pacific Island Countries. Participants had the opportunity to discuss the:

1. status, trends and networking with regard to the conservation and sustainable use of genetic resources in the Pacific region including in light of the global challenges of climate change and food security;
2. information sharing and reporting mechanisms for genetic resources in the Pacific region;
3. partnerships, alliances, networks in the area plant genetic resources as well as strategies and plans for national plant breeding capacity, funding opportunities, and trade opportunities in the Pacific region;
4. roles of the CGRFA, the IT-PGRFA, and the GCDT in the Pacific region, particularly with regard to the challenges and expected outputs of the global instruments for the region;
5. updating of the *Global Plan of Action* in the light of the priorities, gaps and needs of the Pacific region.

1.3 Introduction to the status of PGRFA in the Pacific region

The Pacific region is home to a tremendous range of diversity of PGRFA with much of the population in rural areas depending on the available diversity for food security. Traditional food production and preparation techniques play an important role in maintaining community resilience to shocks such as those resulting from globalization and climate change. Pacific Islands depend on local staples, such as root and tubers for food and nutritional security. The aroids, banana/plantain, breadfruit, coconut, sweet potato and yams were all rated priority crops in the rationalization process conducted for the elaboration of a "Regional Strategy for the *ex situ* conservation and utilization of crop diversity in the Pacific Islands region" submitted to the GCDT. Root and tuber crops are of significant importance in the region, for food and nutritional security, for income generation and for cultural identity. The region is a primary centre of diversity for Taro (*Colocasia esculenta*). Papua New Guinea is a secondary centre of diversity for sweet potato, and also the primary centre of diversity for banana, being home to ten wild bananas. Unique to the Pacific are the Iholena and Maoli-Popo'ulu bananas, which together form the Pacific plantains. The fe'i bananas are also important in the Pacific, particularly in French Polynesia. This group of bananas has recently been receiving global attention for their high beta-carotene content. The primary centre of diversity for breadfruit (*Artocarpus* spp) is also the Pacific, with genetic diversity being the greatest within cultivars from Melanesia and Micronesia.

Pacific Island Countries face many challenges, including small populations and economies; weak institutional capacity in both the public and private sector; remoteness from

international markets; susceptibility to natural disasters and climate change; fragility of land and marine ecosystems; limited fresh water supply; high costs of transportation; limited diversification in production and exports; dependence on international markets; export concentration; and income volatility and vulnerability to exogenous economic shocks such as cost of fossil fuels. These constraints and challenges do not provide an environment in which it is relatively easy to conserve PGRFA in a sustainable manner.

The Country Reports prepared by the Pacific Islands Countries[2] for the SoWPGR-2 have highlighted many gaps and needs, such as on-farm management, crop improvement and seed systems and their insufficient integration to adequately address present and future challenges of climate change and food security. Meeting the demand to enhance local food production within an environment where climate change increasingly challenges agricultural production systems will only be possible when there is access to PGRFA together with appropriate policies and adequate capacities to use that diversity.

[2] Country Reports for *The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture* 2010 - http://www.fao.org/agriculture/crops/core-themes/theme/seeds-pgr/sow/sow2/country-reports/en/

PART II

PROCEEDINGS OF THE SESSIONS: KEY ISSUES FOR PACIFIC ISLAND COUNTRIES

2.1 Inaugural session

The consultation opened with remarks from Mr. Dan Leskien, Senior Liaison Officer, Secretariat of the CGRFA, followed by brief addresses from Mr. Mason Smith, Permanent Secretary for Agriculture, Ministry of Primary Industry, Fiji; H.E Judith Robinson, Acting High Commissioner for Australia in Fiji; and Mr Ken Cokanasiga, Officer-in-Charge, Land Resources Division, SPC. Mr. Cokanasiga outlined some of the work carried out on plant genetic resources in the Pacific, including initiatives through SPC, such as the Centre for Pacific Crops and Trees (CePaCT) and the Pacific Agricultural Plant Genetic Resource Network (PAPGREN), highlighting the role that diversity plays in ensuring sustainable food production and the benefits of adopting a regional approach considering the limited capacity of some of SPC member countries. Mr. Smith highlighted the importance of PGRFA in Fiji gives and urged cooperation with regards to PGRFA to assist countries in adapting to changes in their environment.

2.2 Session I: Conservation and sustainable use of genetic resources – status, trends and networking

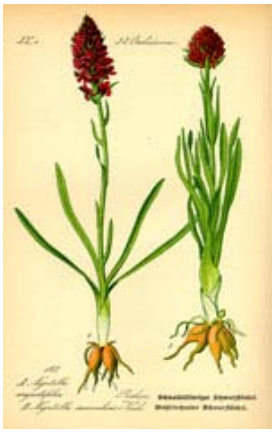
2.2.1. Status of conservation and sustainable use of genetic resources in the Pacific Island Countries

A series of presentations were made by selected speakers to provide a snap shot of country status of conservation and use of genetic resources at the national level.

2.2.1.1 Country presentations

Vanuatu

Ms Marie Melteras, Chief Executive Officer, Vanuatu Agricultural Research & Technical Centre (VARTC), gave a presentation on the activities in PGRFA in Vanuatu and noted that the extent of diversity in Vanuatu is similar to that found throughout Melanesia. Ms Melteras described the activities of VARTC which carries out all of the work on PGRFA in Vanuatu and is involved in collecting, characterization, selection of elite cultivars and breeding and holds a major *ex situ* collections in the island of Santo. VARTC is involved in crossing local varieties with exotic varieties imported from CePaCT and farmers are trained to handle seedlings of crops, such as sweet potato and yam. This approach improves the genetic base of these crops thereby reducing vulnerability to pest and disease attack. A Root Crops Agro-biodiversity project (2005-2010), implemented by VARTC, surveyed all cultivated varieties of taro, yam, sweet potato and banana. It showed that farmers do adopt the introduced material thereby broadening the narrow genetic bases of some species, and importantly, no local varieties were lost. Significant geographic distribution of clones of the introduced varieties also took place via spontaneous, informal distribution to farmers' relatives. It also showed the interest that farmers have for "new" varieties and also the effectiveness of informal distribution and contrasts with the more conventional approach where the research station remains the source of the material for farmer access.



At present VARTC have been active in collecting a number of crops, namely banana (154 accessions), *Abelmoschus manihot*, known as island cabbage, bele or aibika (225 accessions) and breadfruit (221 accessions). These collections have been established at VARTC and will be characterized at a later date. The collaboration between VARTC and the Centre International de Recherche Agronomique pour le Développement (CIRAD) in molecular characterization are being strengthened and expanded.

Cook Islands

Mr Tiria Rere, FAO National Correspondent, Cook Islands Ministry of Agriculture, and Mr William Wigmore, Director of Research, Cook Islands Ministry of Agriculture, gave a presentation on the status of PGRFA conservation and use in Cook Islands. The Cook Islands, along with Samoa, have limited crop diversity and are one of the first countries to ratify the IT-PGRFA in December 2004. The presentation emphasized the importance of crop improvement, so that diversity accessed through the Multilateral System of the IT-PGRFA could be adapted for local needs. Samoa has demonstrated the importance of breeding, having now bred taro varieties, resistant to taro leaf blight (TLB) finally enabling the country to export taro to New Zealand. More capacity building in plant breeding is a priority especially for the larger island countries, which within the regional framework would benefit the smaller island countries. They noted that countries such as the Cook Islands would benefit from training in participatory approaches to plant breeding. Utilization of PGRFA can be promoted through improving the links between the public and private sector focusing attention on expanding value-adding of products to promote local foods. There was still a need for more awareness on the importance of PGR for both the public and policymakers. Little attention having been given to agricultural studies in schools in general, countries should consider introducing agricultural studies at both the primary and secondary school levels.

Kiribati

Mr Tianeti Ioane Beena, FAO National Correspondent, Kiribati Ministry of Environment, Lands and Agricultural Development, and Mr Kinaai Kairo, Director of Agriculture, Kiribati Ministry of Environment, Lands and Agricultural Development, gave a presentation on the main challenges facing Kiribati with regard to genetic resources for food and agriculture. As a Pacific atolls it has numerous challenges to address with regards to agriculture. The major physical limitations, as far as food production is concerned, are inadequate rainfall in some years and in many places, and soil fertility limitations and a relatively narrow plant and animal genetic base. The isolation of many of the atolls also means that these countries have to bear a high cost of agricultural inputs.

Threats to existing animal and plant genetic resources come from sea-level rise, seawater intrusion, drought, and competition for access to land due to population growth and urban drift. Kiribati is an island nation composed of 32 atolls and one raised coral island, located in the central tropical Pacific Ocean. Mindful of its limited diversity, Kiribati ratified the IT-PGRFA in 2005. A Centre for Excellence in Atoll Agriculture is located in Kiribati, which aim is to identify crops and animals that are suitable for atoll conditions. The CePaCT also supplies crop diversity to Kiribati for evaluation. CePaCT implemented a project funded by FAO in

which 30 varieties of bananas were distributed to 10 islands. The adoption of some of these varieties has been encouraging, and the project has made a worthwhile contribution to food security. The information generated by this project has enabled banana varieties to be recommended to other atoll/low-lying islands. Capacity is a limiting factor also on the atolls, and as such capacity supplementation should be an essential component of any project for the atolls.

2.2.1.2 Regional activities in genetic resources

Dr Mary Taylor, Genetic Resources Coordinator/CePaCT Manager, SPC, presented the regional activities in conservation and use of genetic resources in the Pacific region. The Regional Germplasm Centre (RGC), now the Centre for Pacific Crops and Trees (CePaCT), was the immediate response from SPC to the 1996 Ministerial recommendation that countries need to put in place policies to conserve, protect and utilize plant genetic resources at the national and regional levels. The RGC was officially opened in Suva, Fiji in September 1998. SPC also developed the Framework for Plant Genetic Resources Conservation, Management and Use in the Pacific, which was presented to the Directors of Agriculture in May 2001, who recommended that a Pacific Agricultural Plant Genetic Resource Network (PAPGREN) be established. PAPGREN was launched in September 2001, with funding from New Zealand. The overall objectives of PAPGREN were to strengthen national PGR programmes and collaboration among them, so as to use scarce resources more effectively. The regional strategy for the conservation and use of PGRFA was further developed through PAPGREN and activities in many of the countries are funded both through national and regional funds.

The effectiveness of the network and regional cooperation is illustrated by the formal placing of the Annex 1 crops held in trust for the region by the CePaCT into the Multilateral System of the IT-PGRFA in 2009. This highlighted that the region as a whole recognized the importance of sharing diversity and the need to be part of the global system of PGRFA. To date, five countries are members of the International Treaty (Cook Islands, Fiji, Kiribati, Palau, and Samoa) and New Caledonia and French Polynesia through France (though each country had to conduct internal consultations for national endorsement). Other countries such as Vanuatu and Papua New Guinea are well advanced in their internal consultations.

Countries of the Pacific region work closely together in the conservation and use of PGRFA, each country operating where it has the capacity to do so, and where there is limited capacity, the regional mechanism is supportive. The taro collection at CePACT exceeds 840 accessions and collections of other aroids, Pacific bananas and breadfruit are expanding. Recently relocation to new premises means that the genebank now includes a virus indexing facility whereas before virus indexing was carried out in a shared facility. In recognition of the diversity found within the taro and yam genepool in the Pacific, the CePaCT receives a long-term grant from the GCDT. Through CePaCT the region can easily access PGRFA from outside the region, in particular from the International Agriculture Research Centres (IARCs). This linkage has become increasingly valuable with the challenge posed by climate change and the urgent need to evaluate crop varieties that are more suited to unfavourable environments.

Despite the progress made in PGRFA in the Pacific, Dr Taylor noted that there is still much to be done. Capacity building is an urgent need, especially in areas such as crop improvement. Attachments between countries are a good option and have been successful in the past, for

example, between Samoa and Papua New Guinea. Documentation is still lacking and there is an urgent need to capture information before it is lost. The focus with crop conservation to date has been on *ex situ* conservation with little attention on any other methodology; similarly little attention has been given to seed-propagated crops whose importance is likely to increase with the challenge of climate change. More effort is required at the policy level; very few countries have any policy which relates to PGRFA conservation and use.

Working Groups

Two Working Groups were formed to discuss how best to improve conservation and the sustainable use of agro-biodiversity for food security. Having stressed the importance of sustainable use of agro-biodiversity and traditional farming for the region, especially with regard to subsistence agriculture, the groups identified the following challenges:

- There is limited understanding of the definition of agro-biodiversity and a lack of how the various components work together to achieve a well-managed system;
- More efforts are required to raise awareness and to integrate all aspects of agro-biodiversity at the project level;
- Policy-makers should adopt a more holistic approach of agro-biodiversity, especially in relation to climate change;
- Strengthening capacities in plant breeding is essential, in particular participatory plant breeding;
- Sustainable use of agro-biodiversity and use of local foods for nutritional and food security should be promoted;
- Educating all age groups about the need to make good food choices, especially with the current mass marketing of processed food, would be key to a successful promotion;
- The cultural importance of traditional crops in the region, including yams and taro, should be enhanced in light of food sovereignty.

2.2.2 The role of the international instruments in the conservation and use of genetic resources for food and agriculture

Commission on Genetic Resources for Food and Agriculture

Mr Dan Leskien presented the role and activities of the CGRFA[3]. The CGRFA was established in 1983 to deal with issues related to plant genetic resources. In 1995, the FAO Conference broadened the CGRFA's mandate to cover all components of biodiversity of relevance to food and agriculture. The CGRFA provides the only permanent forum for governments to discuss and negotiate matters specifically relevant to biological diversity for food and agriculture. It aims to reach international consensus on policies for the sustainable use and conservation of genetic resources for food and agriculture and the fair and equitable sharing of benefits derived from their use. Since its establishment, the CGRFA has overseen global assessments of the state of the world's plant and animal genetic resources for food and agriculture and negotiated major international instruments, including the IT-PGRFA.

The International Treaty on Plant Genetic Resources for Food and Agriculture

Mr Daniele Manzella, Legal Officer, on behalf of the Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture[4], described the objective and scope of the IT-PGRFA. The Treaty came into force on 29 June 2004. Its objectives are the conservation and sustainable use of PGRFA and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity (CBD), for sustainable agriculture and food security. The IT-PGRFA aims at:

- strengthening global efforts to promote conservation and sustainable use of PGRFA, including through policy and legal measures;
- recognizing the enormous contribution of farmers to the diversity of crops that feed the world;
- establishing a global system to provide farmers, plant breeders and scientists with access to plant genetic material;
- ensuring that recipients share benefits they derive from the use of this genetic material.

Through the IT-PGRFA, countries have agreed to establish an efficient, effective and transparent multilateral system to facilitate access to PGRFA, and to share the benefits in a fair and equitable way. The Multilateral System of Access and Benefit-sharing (MLS) applies to 64 major crops and forages, which constitute 80 percent of food produced from plants. The IT-PGRFA has set out the parameters of facilitated access and equitable benefit-sharing and the Governing Body has translated those parameters into standard contractual terms and conditions, namely through the "Standard Material Transfer Agreement" (SMTA). Resources may be obtained from the MLS through the SMTA for conservation and utilization in research, breeding and training. The monetary benefits that are generated though such facilitated access flow into the Benefit-sharing Fund, which is entirely under the control of the Governing Body. The Fund finances high impact projects for farmers in developing countries, taking into account the priority activity areas in the rolling *Global Plan of Action*. The IT-PGRFA also triggers several forms of non-monetary benefit-sharing, such as exchange of information and access to, and transfer of technology.

[3] FAO Commission on Genetic Resources for Food and Agriculture - http://www.fao.org/nr/cgrfa/cgrfa-home/en/

[4] International Treaty on Plant Genetic Resources for Food and Agriculture - http://www.planttreaty.org/

The Global Crop Diversity Trust

Ms Melissa Wood, Director of Operations, Global Crop Diversity Trust[5], described the mission and activities of the GCDT as a public-private partnership for fund raising to ensure the conservation and availability of crop diversity for food security worldwide, in line with the IT-PGRFA and the *Global Plan of Action.* She said secure funding was required by many of the world's 1500 genebanks to save important collections of crop diversity. Chronic shortage of funding can lead to loss of diversity, and GCDT's response is to raise an endowment, the interest from which could guarantee the effective conservation - and vitally, the ready availability to those who wish to use it - of the biological basis of all agriculture. The endowment will ensure that the conservation of this most critical resource is placed forever on a firm foundation.

The closing discussions of this session outlined some of the key expectations of the region with regards implementation of international instruments. These are:

- capacity building, especially for the smaller islands, and including the provision of information to the global instruments for formulating reports;
- raising awareness of the importance and role and linkages of these instruments; and
- support for implementation of the IT-PGRFA, including increasing the number of contracting countries and providing the Secretariat of the IT-PGRFA with the information on the PGRFA placed in the MLS.

2.3 Session II: Information sharing and reporting mechanisms for genetic resources for food and agriculture in the region

Information sharing is a necessity for sound decision making and increasingly everything in made available online. Staff from CGRFA, IT-PGRFA, FAO and GDCT in this session gave a series of presentations the role, purpose and functions of the various web portals and online tools for PGR-related activities. During this session, a series of small working groups, were formed to discuss and understand the knowledge resources available through various web portals on PGRFA and related aspects. Since there are a range of tools and resources available online, this session proved very valuable in alerting the participants as to the breadth of information and reporting mechanisms available in the following websites of the instruments and organizations:

- CGRFA: www.fao.org/nr/cgrfa

- IT-PGRFA: www.planttreaty.org

- Global Crop Diversity Trust: www.croptrust.org

- GPA Facilitating Mechanism: www.globalplanofaction.org

[5] Global Crop Diversity Trust - http://www.croptrust.org/main/

-World Information and Early Warning System on PGRFA:
http://apps3.fao.org/wiews/wiews/jsp

- GIPB: http://km.fao.org/gipb

- World Information Sharing Mechanism, WISH-GPA: www.pgrfa.org

- Crop Genebank Knowledge Base: www.cropgenebank.sgrp.cgiar.org/

- Roots for Life: www.rootsforlife.org

- Plant Production and Protection Division - Seed and Plant Genetic Resources:
www.fao.org/agriculture/crops/core-theme/seeds-pgr/en/

- GENESYS: www.genesys-pgr.org

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE	The International Treaty ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE
Facilitating Mechanism for the implementation of the Global Plan of Action	WISH·GPA
GLOBAL CROP DIVERSITY TRUST A FOUNDATION FOR FOOD SECURITY	GIPB
AGP Seeds and Plant Genetic Resources	SAVE AND GROW

2.4 Session III: Partnerships and Alliances - Opportunities for the Pacific Island Region

2.4.1 Global Partnership Initiative for Plant Breeding Capacity Building

Dr Chikelu Mba, Agricultural Officer, FAO, gave a presentation on the goals and activities of the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB), including the strategies being developed within its framework. The GIPB is a multi-party initiative of knowledge institutions around the world that have a track record in supporting agricultural research and development, working in partnership with country programmes committed to developing stronger and effective plant breeding capacity. As a partnership of stakeholders from the public, private and civil society sectors, the initiative is aimed at catalyzing and supporting national, regional and global action among relevant international organizations, foundations, universities and research institutes, corporate and business sector, civil society associations, and national and regional bodies. The mission of GIPB is to enhance the capacity of developing countries to improve crops for food security and sustainable development through better plant breeding and delivery systems. The longer-term vision of success of the GIPB is the improvement in crop performance and food security based on the establishment of enhanced sustainable national plant breeding capacity.

Dr Mba also highlighted that an overarching strategy should bring together a national programme on PGRFA that links conservation to use in crop improvement and dissemination of planting materials use; involves a high-level coordinating body; and helps to build capacity.

2.4.2 Participatory plant breeding in Samoa

Mr Tolo Iosefa, Manager, Taro Improvement Project, University of the South Pacific, described the activities on participatory plant breeding in taro in Samoa. Taro was a major export of Samoa throughout the 1980s, and in 1993 the market was valued at approximately US$4 million accounting for just over half of the total value of Samoa's exports. However, in 1993 an epidemic of TLB, caused by the fungus *Phytophthora colocasiae*, destroyed both the export and domestic market. As all the taro varieties in Samoa were susceptible to the fungus, resistant taro varieties, liked by the consumers, had to be found. A participatory breeding programme (Taro Improvement Programme) was established which involved farmers at an early stage of the selection. Varieties were imported from overseas, namely Palau and the Philippines to provide the resistance required.

The platform for this breeding program was provided by TaroGen, a project for *Taro Genetic Resources: Conservation and Utilization*, established in the late 1990s to reduce the vulnerability of taro production to disease outbreaks, by conserving Pacific taro diversity and importing diversity from other regions. It took five cycles of crosses and selection for the breeding program to incorporate agronomically useful levels of resistance or tolerance to TLB into varieties that are acceptable to farmers and consumers. Five varieties generated by the Taro Improvement Programme (TIP) have now completed evaluation by farmers and some consumer acceptability testing and have been approved by the government for export development. More resistant materials from Cycles 6 and 7 are now being evaluated by farmers but require assessment for consumer acceptability before they can be commercialized for the domestic and export markets.

The key to the success of the programme is the active participation by farmers. Participatory plant breeding makes taro improvement research more relevant to user-needs, compared to conventional breeding. The partnership led to faster selection, release and spread of improved varieties. It also encouraged farmers to conserve and maintain their own genetic resources. Farmers have equal access to exotic varieties and breeding lines, and they gain control over germplasm. New challenges are coming from the impacts of climate change, nutritional needs and value-adding potential, but the partnerships established in the fight against taro leaf blight continue to work together to meet these new challenges.

2.4.3 Opportunities and challenges in use of PGRFA for trade: the case of New Zealand

Mr Bill Griffin, Breeding and Genomics Portfolio Manager, the New Zealand Institute for Plant and Food Research, gave a presentation on the opportunities and challenges in use of PGRFA for trade in New Zealand. New Zealand has a total reliance on imported PGR for major agricultural, horticultural and forestry – all strong primary industry sectors dependent on effective research and development. The NZ Institute for Plant and Food Research is a science company owned by the New Zealand Government providing research and development that adds value to fruit, vegetable, crop and food products. There is less emphasis upon a commercial bottom-line and a greater emphasis upon public – private contracting and research and development. Recent public funding for a ten-year period has been provided for kiwifruit, berry summer fruit, arable and vegetable crops, however significant crops are missing, for example, hops and pipfruit.

Within the breeding and genomic portfolio the aim is “new cultivar development from smart breeding of elite germplasm”. Opportunities exist for new product development to address international consumer trends; to ensure adaptation to climate change; and to have resistance to key pests and diseases. The challenges that the industry must address are evident from two recent biosecurity incursions, with significant cost implications. Support networks are essential for success and these involve government agencies, research and development providers and the private sector. Strong partnerships are needed at all levels both within the Pacific region and globally. The New Zealand market creates an opportunity for crop products from the Pacific but market access is a demanding process. There are opportunities for niche products but quality, quantity and in particular continuity of supply must be guaranteed.

2.4.4 Regional partnerships and networks for agro-biodiversity in Asia-Pacific

Mr Leocadio Sebastian, Regional Director, Bioversity International, Regional Office for Asia, the Pacific and Oceania, described the regional partnerships and networking for agro-biodiversity in the Asia-Pacific region. Networking has been an effective strategy in strengthening collaboration in PGRFA conservation and use within Asia, the Pacific and Oceania, however the challenge is how to make the networks more self-sustaining. PAPGREN was supported with donor funds (New Zealand Aid Programme, NZAID, and the

Australian Centre for International Agricultural Research, ACIAR, in the first phase, and NZAID in the second phase), but this funding ceased in 2010. Activities are still being implemented through the network, some funded by the GCDT and others funded through climate change funds, for example, from the Australian government through the International Climate Change Adaptation Initiative (ICCAI). Networks need to better articulate the benefits resulting from regular face-to-face interaction.

To improve partnerships and networks for agro-biodiversity, new alliances are needed among scientists working in plant and animal genetic resource-related fields at the national, regional and global levels. Better integration of work programmes into national plans and regional and global frameworks will help to avoid gaps and overlaps, and will add value through synergy.
Across the Asia-Pacific region, research and development priorities are similar, such as studies to enhance the use of genetic resources; pre-breeding and participatory breeding work and information systems and tools for data exchange. Networks should not just exist within a region but span regions to support south-south collaboration. South-south collaboration would bring benefits in technology, capacity building and germplasm exchange. Stronger partnerships with civil society, the private sector, farmers and other stakeholders are also important to ensure sustainability.

2.4.5 Funding opportunities under the Benefit-Sharing Fund of the IT-PGRFA

Mr Daniele Manzella, on behalf of the Secretariat of the IT-PGRFA, described the funding opportunities that exist under the Benefit-Sharing Fund of the IT-PGRFA. Mr Manzella highlighted that the main recipients of resources under the Fund are local farming communities of developing countries which maintain and increase crop biodiversity. The Fund has a mobilization target of US$116 million by December 2014.

The Bureau of the IT-PGRFA announces a call for proposals every two years. The first call (2008-2009), resulted in 11 pilot projects funded. Governmental and non-governmental organizations were invited to submit, through the National Focal Points of the respective Contracting Party project proposals to address one or more of the following priorities: (a) information exchange, technology transfer and capacity building; (b) management and conservation of plant genetic resources on-farm and (c) the sustainable use of plant genetic resources.

The thematic focus of the second call for in 2010 was “to help ensure sustainable food security by assisting farmers to adapt to climate change through a targeted set of high impact activities on the conservation and sustainable use of PGRFA”. The Call for Proposals was closed by September 2010 and, as a result of the first screening, 136 pre-proposals were selected and invited to develop full project proposals for assessment and evaluation by a panel of experts. Approval for funding is exclusively based on technical merit.

2.4.6 Partnerships in the region under the GCDT

Ms Melissa Wood gave detailed information on the significant support given by the GCDT to PGRFA conservation and use in the Pacific. This support includes a long-term grant for the aroid and yam collections at the CePaCT, which acknowledges the importance particularly of the taro collection. In addition, through a grant for crop regeneration, nine countries are

being supported to regenerate their collections of taro, giant swamp taro, sweet potato, yam, breadfruit, coconut, giant taro (*Alocasia macrrorhizos*) and cocoyam (*Xanthosoma sagittifolium*). The GCDT also provides support to implement strategies for those crops identified as a priority in the Pacific regional strategy, for example, banana. The development of a cryopreservation protocol applicable to giant swamp taro, giant taro and cocoyam is funded by the GCDT. Funds have also been provided to evaluate the Pacific taro core for drought and salinity tolerance in collaboration with the National Agriculture Research Institute (NARI), Papua New Guinea.

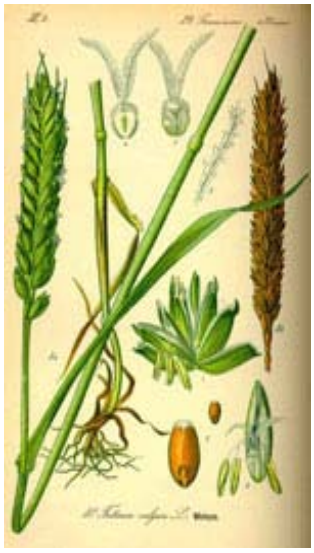
A major new initiative (to be announced later in December 2010) will enable the Trust to work with national agricultural research institutes, Royal Botanic Gardens Kew and the Consultative Group on International Agricultural Research (CGIAR) to systematically find, gather, catalogue and conserve the wild relatives of our most important food crops, and to put this diversity into the crop breeding pipeline. This project will greatly support work help protect global food supplies against the imminent threat of climate change on agricultural adaptation for climate change, and strengthen future food security. Norway is providing US$50 million towards this important contribution to food security. Fund Disbursement guidelines for the Trust are on: http://www.croptrust.org/main/governance.php?itemid=79

PART III

UPDATING THE *GLOBAL PLAN OF ACTION FOR THE CONSERVATION AND SUSTAINABLE UTILIZATION OF PGRFA*

3.1 Proceedings of the sessions on the updating the *Global Plan of Action*

1. The CGRFA, at its Twelfth Regular Session, in October 2009, agreed to update the *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture* (*Global Plan of Action*), in accordance with its Strategic Plan 2010-2017 for the implementation of the Multi-Year Programme of Work. It requested FAO to prepare the updated *Global Plan of Action* based primarily on the SoWPGR-2 and, in particular, on the identified gaps and needs; taking into account further contributions from Governments and inputs received from regional meetings and consultations. The CGRFA decided that the updated *Global Plan of Action* will be considered at the its Thirteenth Regular Session in 2011.



2. The Pacific consultation on the updating of the *Global Plan of Action* was held in Suva, Fiji on 9-10 December 2010 as part of the broader regional consultation on Strengthening Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture in the Pacific Island Countries. A regional synthesis of gaps and needs in the sector of PGRFA in the Pacific Island Countries was prepared to facilitate the discussions and is given in Annex 3.

3. Introductory presentations were delivered by Mr. Diulgheroff, FAO, on the *Global Plan of Action* and its updating process, as well as on relevant changes highlighted in the SoWPGR-2 and challenges for the new *Global Plan of Action*; by Ms. Mary Taylor, SPC, on the regional status of PGRFA's conservation and use; and by Ms Pick, FAO, who described the expected outputs and the dynamics of the working groups ahead. Country representatives were divided in five working groups; each group had the opportunity to review and make contributions over the introductory parts and the main four thematic groups of the *Global Plan of Action*, namely, *In Situ* Conservation and Development; *Ex Situ* Conservation; Utilization of Plant Genetic Resources; and Institutions and Capacity Building.

Introductory parts and implementation and financing of the *Global Plan Of Action*

4. The Pacific group suggested the Leipzig Declaration become an Annex to the updated *Global Plan of Action*. An additional short section is proposed to describe the progress made in the implementation of the *Global Plan of Action*.

5. A new Declaration is proposed to reflect new challenges such as the impacts of climate change (including the special vulnerabilities for small island states); food and nutritional security needs; population growth; the changing policy environment including the Millennium Development Goals (MDGs) and other instruments; development and access to markets; under-utilized crops and wild species; transfer of new technologies; genetic erosion and habitat loss, and the need for capacity-building. The proposed new Declaration could be considered for adoption by the governing bodies of the IT-PGRFA (March 2011) and CGRFA (July 2011) before being recommended by the CRGFA to the FAO Council.

6. The Introduction should explain the role of the *Global Plan of Action* and the reason it was updated. Para 1 needs a message of urgency that is focused on small island states at risk from climate change. The Pacific group suggested using the language of the IT-PGRFA where appropriate, such as in Para 2, for the 'International Undertaking on PGR'.

7. The Rationale section should be sharpened for more impact. The title could omit the word 'specifically', or, be reduced to 'Rationale'. Para 1 should be amended to include new global issues and the role of the *Global Plan of Action* in the implementation of the IT-PGRFA.

8. Para 7(b) should highlight the lack of technologies and human resources in developing countries. The last sentence in 7(c) needs to be more specific while 7(d) should mention the IT-PGRFA and the CBD when it refers to 'sharing of benefits'. Para 7(f) could shift higher up and include a reference to progress made since 1996. New funding sources e.g. GCDT and the Benefit-Sharing Fund of the IT-PGRFA should be referred to in 7(g).

9. A new section is proposed to explain the updating of the *Global Plan of Action*; the urgency to address new challenges and the contribution of PGRFA to solutions.

10. Para 8 should refer to the SoWPGR-2and the updating of the *Global Plan of Action*, while the first mention of strategy should be pluralized to 'strategies'. The bullets in Para 9 will need updating in line with the priority activity areas (PAAs) of the updated *Global Plan of Action*. The 1st bullet point to add the issue of climate change; 2nd bullet point to highlight PGRFA for 'nutrition and food', and the 3rd bullet point on benefit sharing should be in line with the IT-PGRFA's provisions on this subject.

11. The Strategies section (Para 10) needs to refer to the IT-PGRFA and GCDT and also explain the updating of the *Global Plan of Action*. The reference to substantial international cooperation in this paragraph should be strengthened. In general, the bullet points should refer to new global issues, e.g. climate change, and note the progress made since 1996.

12. Para 10(a) should refer specifically to the loss of materials due to the lack of funding. Para 10(b) and 10(d) can be merged while also adding 'crop improvement', and highlighting the need for participatory plant breeding and capacity building for plant breeding. Add "Establishing and' to 'strengthening the selection efforts …' The wording for 'on-farm and in nature' need to be clarified. The sixth line should add 'research' to the linkages.

13. An additional section is proposed on building awareness.

14. Priority Activity Areas (PAA) 12 and 14 can be merged. All PAA's should be updated with key achievements since 1996. Some suggested changing 12(a) 'Assessment' to

'Background'; and, in 12(b), changing 'Long-term' and 'Intermediate' (Objectives), to 'General' and 'Specific' respectively.

15. The Policy/Strategy section should include 'regional' and not only national and international, as the Pacific often takes a regional approach to issues of common concern.

16. The Capacity section to include 'infrastructure' along with the current reference to human and institutional capacities. This section to be strengthened to highlight the urgency for building capacity and the value of using partnerships.

17. The text on Implementation and Financing of the *Global Plan of Action* should be updated as necessary (e.g. text refers to an upcoming World Food Summit in 1996) and also include new financing mechanisms such as the GCDT and Benefit-Sharing fund in the IT-PGRFA. There is a need to highlight the importance of securing funds for implementation of the *Global Plan of Action* and provide more details on the arrangements for implementation, such as monitoring and review.

18. Para 8 in this section should emphasise the commitments by members in terms of funding and policy support for national programmes. The consultation also suggested to consider the establishment of an endowment fund to address priorities of the *Global Plan of Action* and plant genetic resources that are not currently covered by the GCDT and the Benefit-Sharing Fund of the IT-PGRFA.

19. A general comment was to ensure that the Introductory parts refer not only to crops but also to crop wild relatives (CWR).

***In situ* conservation and development**

20. General comments from the Pacific group were that the 'regional' dimension should be added when national and international action is mentioned. Long-term and Intermediate Objectives could be simplified to Goals and Objectives, respectively. The text should also be specific on what is meant by "seeds", whether or not it refers to planting material in general, thereby including vegetative propagules.

PAA 1. Surveying and inventorying plant genetic resources for food and agriculture

21. The title for PAA 1 should be strengthened by including 'monitoring' and 'knowledge on PGRFA'.

22. As per the Long-term objectives, Para 15 should mention 'crop wild relatives' after the reference to 'populations of plants'. The words 'monitoring or documentation' could be added so that Para 15 is more than an inventory. It was also suggested that the words 'especially those that are of anticipated use' after 'agriculture' be deleted. In Para 16 the words 'and monitoring' should be added after 'sustainable use'.

23. The Intermediate objective in Para 17 should be strengthened by adding words to improve existing methods and develop new ones where needed. Other suggestions are to mention traditional knowledge, monitoring and the importance of implementation.

24. Under Capacity, the gap from the SoWPGR-2 inserted in Para 22 should add 'and ethnobotany' after the reference to crop wild relatives. The Pacific consultation also felt that the need for training in the use of descriptor lists for PGR should also be mentioned.

PAA 2. Supporting on-farm management and improvement of PGRFA

25. The title for PAA 2 should reflect the range of traditional food production systems from home gardens to forest farming.

26. The 5th Long-term objectives "To foster the future emergence of public or private seed companies and cooperative enterprises as an outgrowth of successful on-farm selection and breeding." in Para 32 could be reworded to read 'To foster successful traditional and innovative selection and breeding particularly in the light of climate change'.

27. Under Intermediate objectives, in the 4th sentence of Para 33, a distinction is made between on-farm and garden programmes which may require clarification. In the same objective/sentence the reference to systems of knowledge could replace the word 'local' with 'traditional'. The reference to women in the final sentence should be clarified, or, reworded to replace 'women' with 'gender and age' or 'different farmers'. Another suggestion is to reword the final sentence to read 'Understanding production and resource management in rural households should be gender sensitive'. The importance of participatory approaches in the Pacific needs to be reflected in the updated *Global Plan of Action*.

28. Under Policy/strategy in Para 37, the 8th and 9th bullet points (identified gaps from SoWPGR-2) dealing with participatory plant breeding can be merged. The Pacific group felt that it was important to understand the role of consumers within food systems and this should be written into the text. The final bullet point in Para 43 should be expanded to include help with marketing.

PAA 3. Assisting farmers in disaster situations to restore agricultural systems

29. The title of PAA 3 could be made more proactive such that 'Assisting in advance of disaster situations to restore agricultural systems'.

30. In Long-term objectives, Para 51, it was suggested that farmers and rural peoples could be replaced with 'communities'. The objective could also benefit by including 'diversifying agricultural systems'. The Pacific group felt that the word 'seed' under Intermediate objectives, in Para 52 should be replaced with the words 'planting materials', which is broader. The updated *Global Plan of Action* needs to be sensitive to the potentially restricted understanding of the term "seeds". In Para 53 the reference to 'establish' should be followed by the words ' improve and maintain' in order to reflect continuity of the process.

31. Under Policy/strategy after Para 55, in the 1st bullet point of the insertions from SoWPGR-2 gaps and needs, the reference to genetic erosion could be replaced by 'agro-biodiversity or genetic diversity loss'. In the 3rd bullet point, the sentence could be changed to read 'There is a need for comprehensive collections of landraces, farmers' varieties and CWR before they are lost as a result of changing climates'.

32. Other sectors could be added to the agriculture and the environment sectors in the reported need of the SoWPGR-2 after Para 62 e.g. forestry, education and public works.

PAA 4. Promoting *in situ* conservation of wild crop relatives and wild plants for food production

33. The title of PAA 4 could end with 'and for traditional uses'. The first sentence in Para 65 should also refer to climate change. Another suggestion is to amend Para 66 of Long-term objectives to read 'To promote conservation of genetic resources of wild crop relatives and wild plants for food production and other uses where they are grown'. The reference in Intermediate objectives, Para 68, to environmental health could be changed to 'human health and environmental sustainability'.

34. After Para 73, in the gaps and needs reported from SOW_2, some delegates questioned the relevance of the 1st and 3rd bullet points.

35. The importance of various awareness raising efforts was stressed by the group as CWR are often not recognized by local communities as potentially useful plant genetic resources.

***Ex situ* conservation**

36. The Pacific group suggested some changes to reflect a regional approach and to ensure that under-utilized species, traditional knowledge and capacity needs will be adequately covered in the updated *Global Plan of Action*. Text should refer to the IT-PGRFA where the CBD is mentioned, if appropriate. The titles Long-Term and Intermediate objectives could be changed to General objectives and Specific objectives, respectively.

PAA 5. Sustaining existing *ex situ* collections

37. The Long-term and Intermediate Objectives should be re-written to take into account the developments in the area of *ex situ* conservation since the mid-1990s. There should also be recognition of the contribution that regional programmes and institutions can make to a global system of *ex situ* conservation.

38. In small island states, diesel-based electricity is relatively expensive. The Pacific group proposed that in the Policy/Strategy section, Para 83 also highlights the need to explore cheaper and more reliable power supply options for crop collections that rely on expensive conservation methods.

PAA 6. Regenerating threatened *ex situ* accessions

39. Under Para 95, "highlighting the need for users of PGRFA to feedback information after evaluation of *ex situ* accessions" should be inserted after the 6th sentence, which reads "Lack of information...impeding rational regeneration". The need for regenerating vegetatively propagated materials and recalcitrant seeded plants should be adequately

referred to under this PAA. The Assessment part should be updated with information on progress made in the regeneration of collections including those supported by the GCDT.

40. Under Intermediate objectives last sentence of Para 97, which begins 'To complete the first …', could be deleted.

41. Under Policy/strategy in Para 101, the sentence should include a reference to the genebank standards and regeneration guidelines developed by FAO and the GCDT, respectively. A similar addition is suggested for Para 104, where characterization should be developed in line with globally accepted crop descriptor lists.

42. Under Capacity, Para 105, the words 'and other relevant stakeholders' should be added to the list in the last line. In this same section, the Pacific group felt that for the small islands a priority was for training in basic conservation skills due to high staff turnover and the limited numbers of people who might qualify for tertiary level study. A new sentence is proposed to read 'Training should also increase the number of people who are trained in basic conservation skills'.

7. Supporting planned and targeted collecting of plant genetic resources for food and agriculture

43. The Pacific group felt that more weight should be given to crop wild relatives. In the Assessment, Para 116, line 5 should add 'crop wild relatives' to the list. In Para 117, a new sentence is proposed to read 'Priority be given to collecting the remaining under-utilized species and crop wild relatives, in particular, for those ecosystems at risk of climate change and land-use changes'.

44. In Long-term objectives, Para 118, the Pacific group felt the collections should be matched by the ease of retrieval. The suggestion is to add to the end of the sentence, the phrase 'and ensure they are secure and safely conserved and made available'.

45. Under the Policy/strategy section, Para 120, it should be stressed the need for *in situ* and *ex situ* conservation strategies to be integrated and connected to access and use strategies.

8. Expanding *ex situ* conservation activities

46. The Pacific group believes that a large knowledge base exists at the local level and this needs to be reflected in the Assessment (Para 131). A new sentence is proposed to read 'The lack of using local knowledge and promotional activities is limiting access to new and under-utilised species'.

47. After Para 136, the 4th bullet point of the gaps and needs from the SoWPGR-2 should add the words 'urbanisation and adoption of developed cultivars' at the end of the first sentence. The 5th bullet point should add 'traditional knowledge' to the list in line 1. The 7th bullet point could be made more inclusive by changing the phrase in line 1 to 'educate managers, politicians and policy makers …'

48. In the Capacity section, the Pacific group felt that training in new technologies was required to strengthen *ex situ* conservation. The existing sentence in Para 139 should be changed to read 'Support should be given to training in *in vitro* orthodox seed conservation and utilization techniques, cryo-preservation and other new and appropriate technologies. Training in new information technologies and applications is also required'.

49. Para 140 in the Research/Technology section should be strengthened, and the word 'must' is suggested so that the sentence opens as 'Protocols must be developed …'. At the end of the same sentence, the proposal is to add the words 'and optimized orthodox seed storage'.

Utilization of plant genetic resources

50. The Pacific group felt the title could be simplified to 'Use of PGRFA in crop improvement'. In general, the text should highlight the role of plant breeding along with terms such as 'plant breeding', 'pre-breeding' and 'participatory plant breeding'. These are at the core of the PAAs in this section, especially PAA 10.

51. The need to mainstream the participatory approaches involving farmers, community-based interventions and local knowledge in crop improvement must be articulated, including capacity building in plant breeding.

52. Reference should be made to the novel biotechnologies in characterization, improvement and selection within IPR regimes. The text should emphasize the development of policy frameworks for PGRFA to ensure sustainability and promote best practice. Highlighting the need for strong links between breeding, conservation and seed/planting material systems will help to support optimal outcomes.

53. The impacts of climate change, vulnerable environments and nutritional needs as drivers for crop improvement should be noted. The nutritional qualities of staple crops should also be highlighted. The text should also promote ecosystem-based crop production, including organic farming, that support balanced biological systems.

54. Long-term and Intermediate Objectives could be changed to 'Goals' and 'Specific Objectives' respectively, or similar, to be in line with conventional styles.

PAA 9. Expanding the characterization, evaluation and number of core collections to facilitate use

55. The title of PAA 9 could be changed to 'Strengthening and expanding the characterization and evaluation of germplasm'. References to "Core collections" in the title should be dropped.

56. In the Assessment, Para 146, as well as throughout the PAA when it applies the term 'core-collection' appears too restrictive and could be replaced with the term 'sub-set'. In Para 147, there is a need to emphasize the use of a minimum set of descriptors complemented by molecular marker systems in germplasm characterization and the identification of sub-sets.

57. In Para 161 (a), the text should highlight the efficiencies derivable from the use of modern biotechnologies and information technology tools in both managing PGRFA and using them to develop superior crop varieties.

PAA 10. Increasing genetic enhancement and base-broadening efforts

58. The title for PAA 10 should reflect the need to increase access to the widest possible genetic variation for breeding purposes and to expand improvement activities, e.g. 'Increasing exploitable genetic variation', or, 'Increasing pre-breeding and breeding efforts'. Breeding should be discussed throughout the PAA accordingly.

59. In Para 169 (b), this should include a reference to induced mutations, facilitated by molecular biology – including reverse genetics strategies - as a means to expand the genetic base of germplasm. This change is also suggested for the Intermediate objectives in Para 171.

60. Under the Long-term objectives, the 3rd sentence in Para 170 could be changed to read 'To increase genetic variability in crop varieties through the utilization of wild relatives, local materials and/or modern varieties'.

PAA 11. Promoting sustainable agriculture through diversification of crop production and broader diversity in crops

61. Para 178 should highlight the need to develop strategies that promote the use of nutritious local foods in diversified diets. Similarly, the Long-term objective in Para 179 should highlight the need to improve crop quality attributes through breeding as a means to improve the nutritional and health status of the population. The text could also emphasize product development and value-adding as stimuli for production.

PAA 12. Promoting development and commercialization of underutilized crops and species
and
PAA 14. Developing new markets for local varieties and "diversity-rich" products

62. PAA 12 and 14 could be merged with the resulting PAA catering to boosting the production and commercialization of under-utilized crops and local varieties. This PAA should emphasize the importance of value-adding as a means to boost production and generate incomes; raise awareness of the benefits of a diversified food base, and promote under-utilized crops in enhancing the nutritional status of the population. In addition, the importance of increasing awareness and education on the benefits of a diversified food base should be promoted.

PAA 13. Supporting seed production and distribution

63. The title in PAA 13 could be changed to use the words 'planting materials' in place of, or in addition to, the word 'seeds'.
64. Under Policy/strategy, Para 203 should highlight the need to promote smallholder farmer distribution channels; build capacity; raise awareness of the need to use high quality planting materials, and promote commercial distribution. There is also a need to promote the

use of open pollinated cultivars to enable farmers to save seeds, and to facilitate seed distribution and production. The same Para should emphasize the need to facilitate access to PGRFA by streamlining plant quarantine requirements.

Institutions and capacity building

PAA 15. Building strong national programmes

65. For PAA 15, 'strengthening' and 'regional' should be added to the title to read 'Building and strengthening national and regional programmes'.

66. The first sentence of Para 219 should read "Many countries still lack national policies, strategies and/or action plans...."acknowledging the importance of having policies in place from which to develop strategies and action plans. The 2nd bullet point should clarify the three categories from the SoWPGR-1 that are referred to so the reader does not have to read the report. The 5th and 6th bullet points can be combined as they both refer to the NISM.

67. Many of the bullet points in Para 219 are very general and fail to show that regional differences exist (e.g. the 3rd, 11th and 12th bullet points). Other sectors, such as education and health, should be acknowledged given the increasing recognition that PGRFA can contribute to nutrition and health, and the need to alert children and youth to the benefits of PGRFA. For example, Para 220 only mentions the agriculture, environment and development sectors.

68. In Para 221 the importance of 'maintenance' and 'documentation' is omitted from the third sentence, such that the sentence should read 'The integration of conservation, maintenance, characterization, evaluation, documentation, dissemination and use will facilitate the valorization of plant genetic resources for food and agriculture.'

69. The Long-term and the Intermediate objectives need to indicate a timeframe, or, be renamed as 'General' and 'Specific'. Objectives should consider regional needs due to the role played by regional networks and programmes in strengthening national programmes.

70. Under Policy/strategy, Para 229, last sentence, highlights the need for biosecurity regulations. The need for and importance of human resource capacity in implementing biosecurity regulations must be recognized e.g. 'Human resources capacity should be considered at the same time as any establishment of regulations' to be added to the end of the paragraph. The term "broadly-comprised" in Para 230 (last sentence) should be more specific. The establishment of committees is not enough – they must also be effective. A revised sentence could read 'Establishment of effective, multi-sectoral national committees will be an important means of organizing and coordinating efforts in most countries'.

71. In Para 233, the reference to *in situ* and on farm conservation in the 1st bullet point of the gaps and needs from the SoWPGR-2 should reflect national and regional differences with regards to the need for strategies in these areas. In Para 237, some bullet points were similar and could be merged; the 6th bullet point could be changed to read 'Further research to provide information to underpin the development of appropriate policies for the conservation and use of genetic diversity, in particular, the economic valuation of PGRFA', to

emphasize the importance of determining the value of PGRFA. More emphasis is needed on the importance of building and strengthening capacity in Participatory Plant Breeding methodology in the 8th and 9th bullet points (Para 237). References to plant breeding should mention both conventional and participatory breeding.

72. In the Coordination/Administration section, after Para 238, the 8th bullet point from the gaps and needs of the SoWPGR-2 discusses international linkages but there is little mention, if any, for effective linkages between international, regional and national levels. The Pacific group proposes a separate bullet point which reads 'Effective linkages are essential between agencies and institutions at the international, regional and national levels'. The role of regional bodies (e.g. SPC) in facilitating communication at the national level be acknowledged.

PAA 16. Promoting networks for plant genetic resources for food and agriculture

73. For PAA 16, the title could be improved by adding the word 'strengthening', to read 'Promoting and strengthening networks for PGRFA'.

74. Under the Asssessment section in Para 241, the 3rd line which lists the activities that networks support and facilitate, omits the word 'documentation'. The importance of documentation needs more emphasis generally in the document and appears to have been omitted in several lists of genebank activities.

75. The 4th bullet point of the gaps and needs reported from the SoWPGR-2, after Para 242, should also mention the Pacific, where funding is also a constraint for the Pacific network PAPGREN. The Pacific group is unaware of the existence of the Pacific cassava network mentioned in the 5th bullet point.

76. As per the Intermediate objective in Para 248, reported figures (5 to 15 international crop and thematically-oriented networks) need updating. Under Policy/strategy after Para 252 the 3rd bullet point of the SoWPGR-2 gaps and needs omits 'regional' and also ignores the importance of sectors outside of agriculture and the environment. The last bullet point refers to international germplasm exchange as 'a key motivation' rather than 'one of the motivating factors behind many networks'. Given the importance of networks, a new bullet point is proposed to read 'There is a need for studies to assess the benefits and impacts of networks to support policy development and funding'.

77. Under Capacity, Para 253 should note the importance of 'coordination' skills. The 1st bullet point of the SoWPGR-2 gaps and needs after Para 253 discusses the need for new and innovative funding strategies. The need to strengthen the capacity of PGRFA staff to write successful proposals should be noted. Para 254 infers that new networks should be established in several regions including the Pacific. Prior to the establishment of any new networks, existing ones should be strengthened. The bullet point of the SoWPGR-2 gaps and needs after Para 254, i.e. the importance of south-south cooperation, especially for capacity building, should be emphasized. Linkages between networks also need to be strengthened.

PAA 17. Constructing comprehensive information systems for plant genetic resources for food and agriculture

78. For PAA 17 strengthening should be inserted, to read 'Constructing and strengthening comprehensive information systems for PGRFA'.

79. The 'regional' dimension should be mentioned in the Capacity section, Para 272, to read 'Access by national and regional programmes to basic scientific, research and bibliographic information should be facilitated'. Regional programmes are vital in supplying information to national programmes in a region as fragmented as the Pacific. In the same section, the lead sentence in Para 273 ("Genebanks … national goals") should stand alone, or, be worded to carry more emphasis. Human resources in this area are often a low priority. The word 'regional' should be added so that the sentence reads 'Genebanks should have sufficient personnel to manage information and make it easily and widely accessible to users according to national and regional goals'.

80. 'Self-teaching manuals' as mentioned in Para 274, are of key importance and as such it should be highlighted that these manuals should be in user-friendly language and, where relevant, translated into local languages. The use of the word 'manual' was queried and it was suggested that perhaps 'tools' would be a better word, thereby incorporating both hard copies and online.

PAA 18. Developing monitoring and early warning systems for loss of plant genetic resources for food and agriculture

81. For PAA 18, the sentence "loss of genetic resources in crops occurs mainly through adoption of new crops or new varieties of crops with the consequent abandonment of traditional ones without appropriate conservation measures" at the end of Para 279 is very important especially in the light of projects which focus on trade, as such this sentence could stand alone to highlight its importance. Several bullet points from the SoWPGR-2 gaps and needs after Para 280, e.g. the 2nd and 3rd, are very similar and could be synthesized in the updated *Global Plan of Action*.

82. The wording in the Long-term objective could be more concise. The Intermediate Objectives contain three points which could be separated to ensure clarity.

83. Under the Policy/strategy section in Para 284, the 4th bullet point from the gaps and needs of the SoWPGR-2, has several points under it, which vary in their focus. The 4th bullet point (*Specific research needs relating to on farm management or in situ conservation of PGRFA*) provides sufficient detail for the *Global Plan of Action*; the other sub-bullet points are not necessary.
After Para 291, the 2nd bullet point from the SoWPGR-2 gaps and needs should read 'There is a need for more efficient, strategic and integrated approaches to the management of PGRFA at the national and regional levels'; 'genetic improvement seed production and distribution' is misleading and would better read 'genetic crop improvement and plant material production and distribution'.

PAA 19. Expanding and improving education and training

84. The title of PAA 19 could be improved through 'Building and Strengthening Human

Resource Capacity'. In general, PGRFA education and training should not just occur within agriculture and biological sciences but also be included in the health, economics and environment curricula. There is insufficient emphasis on the importance of primary and secondary education to achieve this priority activity. There should be a statement to reflect this, rather than 'concerning PGRFA at all levels' as in the Policy/strategy section, Para 300.

85. The importance of developing e-learning and distance education in the various aspects of PGRFA conservation, management and use should be mentioned. The Intermediate objective in Para 297 appears to suggest this but it needs to be clearer. There is also insufficient mention of the importance of on-going training so that skills can be updated. Overall the Intermediate Objectives ignore the importance of training in PGRFA aspects at all levels. Further, Para 299 is too restrictive and should be changed into 'To encourage institutions to include PGRFA aspects in related courses and programmes in biological, agricultural and environmental sciences. The nutritional benefits of PGRFA should also be included in health courses.

86. Under the section on Capacity, there is insufficient recognition of the need for practical hands-on training. Further value would be added to this section if suggestions are made as to how this could be provided, for example, staff exchanges between countries or regions.

87. Para 309 under Research/technology is unclear as to what is meant. Suggested change reads as follows 'Institutions should link to ongoing research both within educational institutions and also national programmes and other relevant agencies'. This change acknowledges the benefits that can be gained by placing students with the National Agricultural Research Systems.

88. Para 310 under Coordination/administration should include international, such that the sentence would read 'Training courses should be developed and offered in close collaboration with international, regional and national programmes'.

PAA 20. Promoting public awareness of the value of plant genetic resources for food and agriculture conservation and use

89. For PAA 20, the title could be improved through 'Promoting and strengthening public awareness of the importance of PGRFA for food and nutritional security and trade'.

90. The Assessment (Paras 312 and 313) would benefit from highlighting the relatively recent evidence concerning the nutritional benefits that can be gained from the diversity found within PGRFA.

91. Intermediate Objectives would benefit if changed to read 'To support mechanisms particularly in developing countries, for coordinated public awareness activities ~~at all levels~~ targeting all stakeholders, in particular youth'.

92. The 'Capacity' section placed the emphasis on PGRFA staff to become good communicators. However, it should also highlight the need to build capacity within the media

by strengthening linkages with the local media; encourage the local media to cover PGRFA issues on a regular basis, and involve the media in PGRFA workshops and meetings so they gain a better understanding of the subject area.

93. Para 323 should include 'the need to analyse the impact of promotional materials so that limited resources can be used for maximum impact'.

3.2 Summary of results

The discussions proved to be very fruitful as all country representatives fully participated in the identification of the trends, gaps and needs in PGRFA to be addressed in the Pacific region, and in the elaboration of recommendations for the updating of the *Global Plan of Action*. Overall, although there has been good progress made in raising awareness of the importance of PGRFA conservation and use, the integration of all activities related to PGRFA conservation and use into the national political agendas is still required. In particular, institutions and capacity building need stronger networks and national programmes. Other priorities include training and education as well as raising public awareness of the value of PGRFA for conservation and use.

PART IV

RECOMMENDATIONS AND NEXT STEPS

4.1 Recommendations

During the meeting, participants raised a number of issues with a special emphasis on climate change which represents an immediate and unprecedented threat to livelihoods and food security in Pacific island countries. Participants also provided a range of suggestions and recommendations to improve conservation, use and linkages between all relevant stakeholders (see Annex 4 for details).

The key recommendations can be summarized as follows:

- ***Strengthening capacity*** of Pacific Island countries in all areas of PGRFA conservation and use to ensure the long-term availability of adequate human resources capacity, including technical, management, legal and policy aspects;

- ***Increasing understanding and enhancing implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture***, and in particular the operational functioning of its Multilateral System of Access and Benefit-sharing in order to facilitate access to PGRFA and share the benefits arising out of their use in a fair and equitable way;

- ***Increasing the participation of farmers in conservation, crop improvement and seed supply*** in order to support work on a wider diversity of materials, to ensure that new varieties are appropriate to farmer practices and experiences, and to strengthen on-farm conservation of PGRFA and farmer seed supply systems;

- ***Improving policies and legislation for the conservation, exchange and sustainable use of PGRFA***, including in such areas as variety development and release, seed supply, farmers' rights, access and benefit-sharing, phytosanitary measures, intellectual property rights (IPRs) and bisoafety, taking into account the needs of all stakeholders and ensuring that policies and legislation are appropriate, non-conflicting and complementary;

- ***Strengthening plant breeding and seed systems management*** including participatory plant breeding to contribute to food security and improve farmers' livelihoods through the deployment of adapted crops and the development of resilient crop varieties and to increase the use of PGRFA and thus provide further tangible incentives for their conservation;

- ***Increasing collaboration with all relevant stakeholders and partners*** within and among the Pacific island countries to promote capacity building, technology transfer and sharing of information.

4.2 Next steps

Specific efforts are required to strengthen capacities, to link conservation and use of PGRFA, to improve farmers' access to a wide range of new improved varieties adapted to local conditions, and to ensure that policy-makers take on board a holistic approach of agro-biodiversity, especially in relation to climate change. To this end, participants requested that adequate technical and financial assistance be provided by Governments and donors in a sustainable manner, including for developing and implementing the *Global Plan of Action* and the IT-PGRFA through projects aimed at elaborating strategies for the sustainable management of PGRFA through the establishment or strengthening of linkages between germplasm conservation, breeding and delivery of high quality seeds and planting materials of improved crop varieties.

ANNEX 1

Strengthening Conservation and Sustainable Use of PGRFA in the Pacific Island Countries

Suva, Fiji, 7-10 December 2010

AGENDA

7 December

Time	Themes	Speakers
08:30	Registration	
09:00	Welcome and opening remarks	FAO, Australia, SPC
09:15	Introduction of participants, Objectives and Agenda	FAO
Session 1	**Conservation and sustainable use of genetic resources – Status, trends and networking**	
10:10	Status of conservation and sustainable use of genetic resources in the Pacific Island Countries	Mary Taylor, SPC & country reps
11.00	Reinvigorating conservation and sustainable use of agro-biodiversity for food security	Working Groups
14:00	Key issues in conservation and use of genetic resources for food and agriculture: The Role of the Commission of Genetic Resources for Food and Agriculture (CGRFA)	Dan Leskien, FAO CGRFA Secretariat
14:30	IT-PGRFA and the Multilateral System for Access and Benefit-Sharing: Global Challenges and Future Directions	Daniele Manzella, IT-PGRFA-Secretariat
15:00	GCDTactivities to further the development of the global system for PGR conservation	Melissa Wood, Global Crop Diversity Trust
16:00	Global Instruments -Expected Outputs for PI Countries	Working Groups

8 December

Session 2	**Information Sharing and Reporting mechanisms for GRFA in the region**	
09:00	Web portals: CGRFA, IT-PGRFA, GCDT, GPA Facilitating Mechanism, Information & reporting tools, NISMs, GENESYS.	Panel
Session 3	**Partnerships and Alliances : Opportunities for the Pacific Island region**	

11.15	Global Partnership Initiative for Plant Breeding Capacity Building – GIPB	Chikelu Mba, FAO
13:30	Towards strategies & plans for national plant breeding capacity	Chikelu Mba, FAO
13:55	Taro participatory plant breeding in Samoa: a success story	Tolo Iosefa, USP, Samoa
14:10	Opportunities and challenges in PGRFA for trade in the Pacific	Bill Griffin, NZIPFRL
14:40	Regional partnerships and networks for agro-biodiversity	Leocadio Sebastian, Bioversity International
15.30	Funding opportunities for plant genetic resources to address climate change under the Benefit Sharing Fund	Daniele Manzella, IT-PGRFA-Secretariat
15:45	Partnerships in the Region for plant genetic resources under the Global Crop Diversity Trust	Global Crop Diversity Trust

9 December

Session 4	**Updating the *Global Plan of Action for the Conservation and Sustainable Utilisation of PGRFA***	
09.00	Changes in PGRFA conservation and use: Challenges for the new GPA	Stefano Diulgheroff, FAO
09:15	Regional Summary of PGRFA Conservation and Use	Mary Taylor, SPC
10:15	Expected Inputs and Dynamics of working group discussion	Barbara Pick, FAO
Session 5	**Working Groups on the updating of the GPA (Sections I-V)**	
11:00 – 17:40	Working Group session 6A, 6B, 6C	

10 December

Session 5	**Working Groups on the updating of the GPA (Sections I-V)**	
09:00	Working Group session 6D, 6E	
Session 6	**Proposals for updating the Global Plan of Action**	
14:00	Wrap up Section I, II, III, IV, V	
17.00	Closing Remarks	

ANNEX 2

LIST OF PARTICIPANTS

AUSTRALIA

Dr Sally Norton
Curator, Senior Research Scientist
Australian Tropical Grains Germplasm Centre
Crop and Food Science, Agri-Science Queensland a service of
Department of Employment, Economic Development and Innovation,
LMB 1, Biloela QLD 4715
AUSTRALIA
Phone: +61 7 4992 9130 Mobile: 0437 430 491
Fax: +61 7 4992 3468
Email: sally.norton@deedi.qld.gov.au

COOK ISLANDS

Mr Tiria Rere
FAO National Correspondent
Ministry of Agriculture
P.O. Box 96, Rarotonga
COOK ISLANDS
Phone: +682 – 28711
Fax: +682 - 21881
Email: tiria@agriculture.gov.ck

Mr William Wigmore
Director of Research
Ministry of Agriculture
P O Box 96, Rarotonga
COOK ISLANDS
Phone: +682- 28711- 25403
Fax: +682- 21881
Email: research@oyster.net.ck

FEDERATED STATES OF MICRONESIA

Mr Adelino Lorens
Chief, Agriculture Pohnpei
Office of Economic Affairs
Pohnpei State Government

P O Box 1028, Pohnpei 96941
FEDERATED STATES OF MICRONESIA
Phone: +691- 320 2400- 320 2712
Fax: +691- 320 2127
Email: pniagriculture@mail.fm

FIJI ISLANDS

Mr Peter Kjaer
Farmer representative - Member: Tei Tei Taveuni
PO Box 52, Waiyevo, Taveuni
FIJI ISLANDS
Phone: +679- 888 0420
Mob. +679- 9921 358
Email: ppl@connect.com.fj; pkppl@connect.com.fj

Mr Poasa Nauluvula
Principal Research Officer,
Koronivia Research Station
Ministry of Agriculture, Suva
FIJI ISLANDS
Phone: +679- 3477044
Fax: +679- 3400 262
Email: poasa_n@ymail.com

Mr Osea Ratuyawa
FAO National Correspondent
Department of Agriculture
Ministry of Primary Industry
Private Mail Bag, Raiwaqa, Suva
FIJI ISLANDS
Phone : + 679-3384 233
Fax:+679 -3383546

KIRIBATI

Mr Tianeti Ioane Beena
FAO National Correspondent
Ministry of Environment, Lands &Agricultural Development
P O Box 234, Bikenibeu, Tarawa
REPUBLIC OF KIRIBATI
Phone: + 686- 28108 Mobile:+686 96131
Fax: +686- 28121
Email: jetuati@gmail.com; beenna_ti@yahoo.com;

Ms Kinaai Kairo
Director of Agriculture
Ministry of Environment, Lands &Agricultural Development

P O Box 267, Bikenibeu, Tarawa
REPUBLIC OF KIRIBATI
Phone: +686- 28 108 - 28 507
Fax: +686- 28 121 - 28344
Email: kinaaikairo@gmail.com

MARSHALL ISLANDS

Mr Henry Capelle
Chief – Agriculture / Quarantine
Ministry of Resources and Development
P O Box 1727, Majuro MH 96960
REPUBLIC OF MARSHALL ISLANDS
Phone: +692- 625 3206 – 625 4020
Fax: +692- 625 7471
Email: kikurto@yahoo.com

Ms Rebecca Lorennij
FAO National Correspondent
Ministry of Resources and Development
P.O.Box 1727, Majuro MH 96960
REPUBLIC OF MARSHALL ISLANDS
Phone: +692- 625 3206 - 6254020
Fax: +692- 625 7471
Email: rlorennij@hotmail.com

NAURU

Mr Frankie Ribauw
Director of Agriculture
Ministry of Commerce, Industry and Environment
Government Offices, Yaren District
REPUBLIC OF NAURU
Phone: +674-556 4106
Fax: +674-
Email: frankie.ribauw@naurugov.nr

Mr Gregory Adonis Stephen
Senior Project Officer – Agriculture Division
Commerce, Industry and Environment (C.I.E)
Government Office, Yaren District
REPUBLIC OF NAURU
Phone: +674- 444 3133 xtn 309
Fax: +674-
Email: gregory.stephen@naurugov.nr

NEW ZEALAND

Dr Bill Griffin
Breeding & Genomics Portfolio Manager
The New Zealand Institute for Plant & Food Research Limited, Plant & Food Research Lincoln
Private Bag 4704, Christ Church, 8140
NEW ZEALAND
Physical Address: Plant & Food Research Lincoln
Gerald Street, Lincoln, 7608, New Zealand.
Phone: +64 3 325 9547 Mob: +64 27 229 9347
Fax: +64 3 325 2074
Email: bill.griffin@plantandfood.co.nz
Web: www.plantandfood.co.nz

NIUE

Mr Brandon Tauasi
Head of Forestry & Chief Quarantine Officer
Department of Agriculture, Forestry & Fisheries
P O Box 74, Alofi
NIUE
Tel: +683- 4032 -3711
Fax: +683- 4079
Email: flextauasi@yahoo.com

Ms Alana Tukuniu
Crop Research Officer
Department of Agriculture, Forestry & Fisheries
P O Box 74, Alofi
NIUE
Phone: +683- 4032
Fax: +683- 4079
Email: atukuniu@niue.nu

PALAU

Dr Aurora G Del Rosario
Researcher/Extension Specialist
Palau Community College
Cooperative Research and Extension
P O Box 9, Koror 96940
REPUBLIC OF PALAU
Phone: +680- 488 2746
Fax:+680- 488 3307
Email: aderose929@yahoo.com

Mr Fernando M Sengebau
Director, Bureau of Agriculture
Ministry of Natural Resources, Environment & Tourism
PO Box 460, Koror 96940
REPUBLIC OF PALAU
Ph : +680- 544 5804 Mobile (680) 775 0200
Fax : +680 -544 5090
Email: FFMS@palaunet.com;
fredsengebau@yahoo.com;

PAPUA NEW GUINEA

Mr Ario Movis
Chief Food Crops Advisor, Food Security Branch,
Department of Agriculture and Livestock
P.O. Box 2033, Port Moresby, NCD,
PAPUA NEW GUINEA
Fax: +675 – 7398841; 72636263
Phone: +675 - 4720258
Email: jjave52@yahoo.com

Ms Janet Paofa
Research Associate, Plant Research-Curator
NARI Dry Lowlands Programme Laloki,
P O Box 1828, Port Moresby
PAPUA NEW GUINEA
Phone: +675- 323 5511
Fax: +675- 323 4733
Email: Janet.paofa@nari.org.pg; banag_jay@yahoo.com.au

SAMOA

Mr Tolo Iosefa

Manager, USP/SPC Taro Improvement Project
The University of the South Pacific
USP Alafua Campus, Private Mail Bag, Apia
SAMOA
Phone: +685- 21671
Fax: +(685- 22347
Email: iosefa_t@samoa.usp.ac.fj

Mr Parate Matalavea
Principal Research Officer
Ministry of Agriculture & Fisheries
P O Box 1874, Apia
SAMOA
Phone: +685- 20605 -7205788
Fax: +6850- 24576
Email: pmatalavea@lesamoa.net

SOLOMON ISLANDS

Mr John Bosco Sulifoa
Principal Research Officer
Ministry of Agriculture, Research and Livestock
PO Box G13, Honiara
SOLOMON ISLANDS
Phone: +677- 22143
Fax: +677- 283 65
Email: j_sulifoa@yahoo.com

TONGA

Mr Manaia Halafihi
Chief Agronomist, Officer-in-Charge – Vava'u MAFF,
Ministry of Agriculture & Food, Forest and Fisheries (MAFFF), P O Box 45, Neiafu, Vavau Island
KINGDOM OF TONGA
Phone: +676- 70-401
Fax: +676- 70-400
Email: mhalafihi@gmail.com

Mrs Luseana Taufa
FAO National Correspondents
Ministry of Agriculture, P.O. Box 14
Plant Pathologist Unit, Research and Extension Division, Vaini Farm
KINGDOM OF TONGA
Phone: +676 23038 -23402
Fax: +676 - 24271
Email: luseane04@yahoo.co.nz; luseane.taufa@mafff.gov.to

TUVALU

Mr Itaia Lausaveve
Director of Agriculture
FAO National Correspondent
Ministry of Natural Resources and Lands, Funafuti
TUVALU
Phone: +688 - 20836 (Extn : 2205)
Fax: +688-20167 - 20800 (temporary)
Email: ilausaveve@gov.tv

VANUATU

Ms Marie Melteras
Chief Executive Officer
Vanuatu Agricultural Research & Technical Centre, Department of Agriculture & Rural Development,
P O Box 231, Port Vila
REPUBLIC OF VANUATU
Phone: +678- 36420 -25947
Fax: +678- 36355-25947
Email: m_melteras@vanuatu.com.vu

Mr James Wasi
FAO National Correspondent
Ministry of Agriculture, Quarantine, Forestry
and Fisheries, PMB 039, Port Vila
REPUBLIC OF VANUATU
Phone: + 678- 23406 Mobile: + 678- 5522550
Fax: +678- 26498
Email: j_wasi@hotmail.com; jwasi@vanuatu.gov.vu

SECRETARIAT OF THE PACIFIC COMMUNITY

Mr Ulufala Aiavao
Consultant
440 Hillsborough Rd, Lynfield
Auckland
NEW ZEALAND

Phonel: +64 22 6800 332 (Auckland)
Phone: +685 778 7073 (Apia)
Email: ulafala@gmail.com

Ms Sainimili Baiculacula
Lab Technician
Centre for Pacific Crops and Trees (CePaCT)
Secretariat of the Pacific Community (SPC)
Narere, Suva
FIJI ISLANDS
Phone: (679) 3370 733 xtn 35273
Fax: (679) 3370 021
Email: sainimilib@spc.int

Mr Elliot Child
Research Assistant – Agricultural Traditional Knowledge
Australian National University, Canberra,
AUSTRALIA
Email: u4418303@anu.edu.au

Ms Ulamila Lutu
Lab Technician - Cryopreservation
Centre for Pacific Crops and Trees (CePaCT)
Secretariat of the Pacific Community (SPC)
Narere, Suva,
FIJI ISLANDS
Phone: (679) 3370 733 xtn 35273
Fax: (679) 3370 021
Email: ulamilal@spc.int

Ms Reapi Masau
Project Assistant - Genetic Resources
Centre for Pacific Crops and Trees (CePaCT)
Secretariat of the Pacific Community (SPC)
Narere, Suva
FIJI ISLANDS
Phone: (679) 3370 733 xtn 35230
Fax: (679) 3370 021
Email: reapim@spc.int

Ms Shiwangni Rao
Research Assistant
Centre for Pacific Crops and Trees (CePaCT)
Secretariat of the Pacific Community (SPC)
Narere, Suva,
FIJI ISLANDS

Phone: (679) 3370 733 xtn 35273
Fax: (679) 3370 021
Email: wani.rao@gmail.com

Mr Amit Sukal
Lab Technician - Virus Indexing
Centre for Pacific Crops and Trees (CePaCT)
Secretariat of the Pacific Community (SPC)
Narere, Suva
FIJI ISLANDS
Phone: (679) 3370 733 xtn 35273
Fax: (679) 3370 021
Email: amits@spc.int

Mr Waisale Tabuavou
Communication & Extension Assistant
Information Communication & Extension Unit
Secretariat of the Pacific Community (SPC), Suva
FIJI ISLANDS
Phone: (679) 3370 733 xtn 35238
Fax: (679) 3370 021
Email: waisalet@spc.int

Dr Mary Taylor
Genetic Resources Coordinator/Manager of the Centre of Pacific Crops and Trees (CePaCT)
Land Resources Division
Secretariat of the Pacific Community
Private Mail Bag, Suva
FIJI ISLANDS
Phone: (679) 3379271
Fax: (679) 3370021
Email: maryt@spc.int

Ms Valerie S Tuia
Curator
Centre for Pacific Crops and Trees (CePaCT)
Secretariat of the Pacific Community (SPC)
Narere, Suva
FIJI ISLANDS
Phone: (679) 3370 733 xtn 35274
Fax: (679) 3370 021
Email: valeriet@spc.int

BIOVERSITY INTERNATIONAL

Mr Leocadio Sebastian
Regional Director
Bioversity International
Regional Office for Asia, the Pacific and Oceania
43400 Serdang
Selangor
MALAYSIA
Email: l.sebastian@cgiar.org

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Mr Dan Leskien
Senior Liaison Officer
Secretariat of the Commission on Genetic Resources for Food and Agriculture
FAO
Viale delle Terme di Caracalla
00153 Rome
ITALY
Phone: +39 06 57054666
Fax: +39 06 5705246
Email: dan.leskien@fao.org

GLOBAL CROP DIVERSITY TRUST

Ms Mellissa Wood
Director of Programme Development
Global Crop Diversity Trust
c/o FAO
Viale delle Terme di Caracalla
00153 Rome
ITALY
Phone: +39 06 57055426
Fax: +39 06 57054951
Email: mellissa.wood@croptrust.org

INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Mr Daniele Manzella
Treaty Support Officer
International Treaty on Plant Genetic Resources for Food and Agriculture
Food and Agriculture Organization of the United Nations

Viale delle Terme di Caracalla
00153 Rome
ITALY
Phone: daniele.manzella@fao.org
Email: +39 06 57 05 61 30

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Mr Stefano Diulgheroff
Information Management Officer
Seeds and Plant Genetic Resources
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome
ITALY
Phone: +39 06 57 05 55 44
Fax: +39 06 57 05 30 57
Email: Stefano.Diulgheroff@fao.org

Mr Chikelu Mba
Agricultural Officer (Plant Genetic Resources Use)
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome
ITALY
Phone: +39 06 57 05 62 65
Fax: +39 06 57 05 30 57
Email: Chikelu.Mba@fao.org
Ms Barbara Pick
Consultant
Seed and Plant Genetic Resources
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00153 Rome
ITALY
Phone: +39 06 57 05 30 91
Fax: +39 06 57 05 30 57
Email: Barbara.Pick@fao.org

Mr Duncan Vaughan
Chief Technical Adviser
Regional Office for Asia and the Pacific
Food and Agriculture Organization of the United Nations
Maliwan Mansion
Phra Atit Road

Bangkok 10200
THAILAND
Telephone: (+66 2) 697 4000
Fax: (+66 2) 697 4445
Email: Duncan.Vaughan@fao.org

ANNEX 3

REGIONAL SYNTHESIS OF GAPS AND NEEDS IN THE SECTOR OF PGRFA IN THE PACIFIC ISLAND COUNTRIES

Prepared by Dr. Mary Taylor Genetic Resources Coordinator/CePaCT Manager, SPC

1. Regional Background

For this regional synthesis the Pacific region comprises of the 22 Pacific Island Countries and Territories (PICTs) that are members of SPC. Four of these are Territories of France and the United States of America, namely French Polynesia and New Caledonia, and American Samoa and Guam. The other countries are Cook Islands, Federated States of Micronesia, Fiji Islands, Kiribati, Marshall Islands, Nauru, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Wallis and Futuna. The PICTs are geographically, ecologically, sociologically and economically diverse. The region is home to an estimated 9.5 million people on islands with a land area of 550,000km^2 surrounded by the largest ocean in the world. Five of the PICTs (Fiji Islands, New Caledonia, Papua New Guinea, Solomon Islands and Vanuatu) account for 90 percent of this total land area and more than 85 percent of the population. The region is also home to some of the world's smallest island states and territories, such as Nauru, Tuvalu and Tokelau.

Most of the people live in rural areas and rely on agriculture, together with fishing and forest products, for their livelihoods. The Pacific is a centre of diversity and/or origin for a small number of crops, but in general, due to its history of human colonization, crop genetic diversity in the mostly vegetatively propagated crops of the region declines markedly from west to east. Traditionally, the Pacific Islands have depended on local staples, such as root and tubers for food and nutritional security. The aroids, banana/plantain, breadfruit, coconut, sweet potato and yams were all rated priority crops in the rationalization process conducted to arrive at a "Regional Strategy for the *ex situ* conservation and utilization of crop diversity in the Pacific Islands region".[6]

Root and tuber crops are of significant importance in the region, for food and nutritional security, for income generation and for cultural identity. The region is a primary centre of diversity for taro (*Colocasia esculenta*), the Pacific genepool being separate to that found in Southeast Asia (Lebot *et al*., 2004). Similarly, Micronesia and the atolls are primary centres of diversity for giant swamp taro (*Cyrtosperma merkusii*). For yams, the picture is more complex, primary and secondary centres are found in the Pacific. Melanesia, for example, is the primary centre of diversity for *D. alata (*Lebot, 2009). Papua New Guinea is a secondary centre of diversity for sweet potato.

Papua New Guinea is a primary centre of diversity for banana, being home to ten wild bananas, of which one species *Musa ingens*, is only found in Papua New Guinea. Unique to

[6] Developed by PAPGREN and submitted to the Global Crop Diversity Trust, 2005 - http://www.croptrust.org/main/

the Pacific are the Iholena and Maoli-Popo'ulu bananas, which together form the Pacific plantains. The fe'i bananas, belonging to the Australimusa section are important in the Pacific, particularly in French Polynesia. This group of bananas has recently been receiving global attention for their high beta-carotene content (Englberger and Lorens, 2004).

The Pacific is a primary centre of diversity for breadfruit, (*Artocarpus spp*). The species is significant for food and nutritional security, and also cultural value, and has nourished Pacific Islanders for more than 3,000 years. Genetic diversity is greatest within the cultivars from Melenesia and Micronesia, which are mostly seeded, out-crossing, fertile diploids or hybrids. In contrast, those of Polynesia represent a much narrower genetic base and sterile triploids predominate (Ragone, 2007).

The Pacific is a primary centre of diversity for coconut and a recent press release from the GCDT drew attention to the Niu Afa coconut variety, found in Samoa, and recognized for producing the largest known coconuts. Sadly farmers now rarely cultivate it since hybrid coconuts have become more common.

Pacific Island Countries face many challenges, including small populations and economies; weak institutional capacity in both the public and private sector; remoteness from international markets; susceptibility to natural disasters and climate change; fragility of land and marine ecosystems; limited fresh water supply; high costs of transportation; limited diversification in production and exports; dependence on international markets; export concentration; and income volatility and vulnerability to exogenous economic shocks such as cost of fossil fuels. These constraints and challenges do not provide an environment in which it is relatively easy to sustainably conserve PGRFA.

Other threats exist. As rural people move to cities and adopt modern lifestyles, they change their eating habits, forget their traditional foods and their crop varieties, no longer value them, and often abandon them. Rice and flour have now replaced root crops as the single most important source of starch and energy. Despite the proven nutritional superiority of traditional root crops, all PICTs, apart from Fiji, Papua New Guinea and Solomon Islands, rely exclusively on cereal imports. The low nutritional value of these imported foods is a major factor contributing to food-related chronic disease and mortality in the Pacific, such that the people of the Pacific have some of the highest rates of obesity in the world. This in turn leads to elevated rates of non-communicable diseases (NCDs). Pacific Island countries and territories have the highest death rates from ischaemic heart disease, cerebrovascular disease and diabetes[7] (WHO, 2006). A recent study funded by the Technical Centre for Agricultural and Rural Cooperation and implemented by SPC on traditional knowledge related to agricultural practices highlighted the easy availability of imported food as a significant threat to the loss of this knowledge, because of the decreasing importance of locally-produced traditional food crops.

Outbreaks of new pests and diseases, made more likely by easier travel, and climate change, can wreak havoc with crops which do not include resistant varieties. A dramatic example of this was seen in Samoa in the early 1990s with taro leaf blight. The introduction of this fungus wiped out not only a crop crucial for food security, but one that was generating significant

[7] Towards a Food Secure Pacific: Framework for Action on Food Security in the Pacific presented to the Pacific Food Summit, Vanuatu 21-23 April 2010

foreign exchange. The introduction of modern crop varieties, and of new cash crops, often means that farmers are happy to get rid of traditional local ones – until, that is, they succumb to diseases, or prove too expensive or environmentally unsound to maintain. All these processes are causing the disappearance of local cultivars of traditional crops. And the loss of this biodiversity is leading to deteriorating health and nutrition, to a lessening of income generating opportunities and an inexorable narrowing of future options.

In April 2010 Ministers and senior policy makers from three vital sectors—trade, health and agriculture, met in Vanuatu and jointly developed a multisectoral approach to food security. The Summit recognized that "local production needs to remain the core of the food system and the capacity of farmers and fisherman to trade their produce locally, regionally and internationally needs to be supported and extended. Developing and investing in sustainable farming methods is necessary, as is improving the ability of farmers to withstand and adapt to environmental and economic changes"[8]. The Summit endorsed the Framework for Action on Food Security in the Pacific with its focus on seven themes, one of which was "Enhanced and sustainable production, processing and trading of safe nutritious local food".

Meeting the demand to enhance local food production within an environment where climate change will increasingly challenge agricultural production systems will only be possible if there is access to PGRFA and capacity to use that diversity. As such the focus areas of the *Global Plan of Action* are important and present an opportunity to analyse the region's gaps and needs.

2. The Big Picture on PGRFA and Institutions in the Region

As previously highlighted the Pacific region is very diverse, with islands as large as Papua New Guinea, with a land area of 462,840 km^2 and a population of just under 7 million to Niue, a raised atoll with a land area of 260 km^2 and a population of about 1,400. The region is highly populated with atolls, for example, Kiribati, a country composed of 32 atolls, one raised coral island, dispersed over an area of 1,351,000 square miles, and straddling the equator. This diversity is reflected in the approach to PGRFA in the region, with larger countries, such as Papua New Guinea, having the resources necessary both to provide PGRFA and to sustain a national PGRFA programme. In contrast, smaller countries are more the recipients of PGRFA, evaluating material for use in their countries. However, smaller countries can also be host to unique diversity, such as evident in Kiribati, Pohnpei and Tuvalu with swamp taro (*Cyrtosperma merkusii*).

The National Agriculture Research Institute (NARI) in Papua New Guinea holds much genetic diversity of the region's major crops. It maintains large collections of taro, yams, sweet potato and banana, for example the collection of sweet potato consists of over 1900 accessions. Collecting, conservation and characterization are all components of a very active PGRFA programme. Collecting is not restricted to major crops, recognizing the important nutritional and food security value of species, such as *Saccharum edule* (pitpit, duruka) and *Abelmoschus manihot* (aibika, bele). NARI is also very active in documentation with recent publications on cassava and aibika. The VARTC in collaboration with the Department of Agriculture and Rural Development (DARD) is similarly active, though its focus tends to be on

[8] Towards a Food Secure Pacific: Framework for Action on Food Security in the Pacific presented to the Pacific Food Summit, Vanuatu 21-23 April 2010

crop improvement, using traditional landraces and where appropriate, introducing exotic diversity.

In the eighties more countries were involved in PGRFA, embarking on collecting missions and establishing field genebanks, supported by donor funds. However, eventually limited human and financial resources, pest and disease outbreaks and climatic disasters became too much of a challenge for many of these genebanks and very few survived. At the same time the cultivation of traditional landraces of many of the staple crops was not seen as a priority when trying to get food to the table or generate income through market sales. The situation in Samoa highlighted the problem that can occur when market forces dictate the use of just one cultivar.

In response to this concern regarding PGRFA, the SPC held a meeting in 1996, at which the Pacific Ministers of Agriculture resolved to put in place, both in their countries and through regional cooperation, policies and programmes to conserve, protect and use their plant genetic resources effectively and efficiently for development. The RGC, now CePaCT was the immediate response from SPC to this recommendation, opening in Suva, Fiji in September 1998.

The response of SPC to the 1996 ministerial decision was not limited to the regional genebank. SPC facilitated the development of a Framework for Plant Genetic Resources Conservation, Management and Use in the Pacific[9], which was presented to the Directors of Agriculture in May 2001, who recommended that a Pacific Agricultural Plant Genetic Resource Network (PAPGREN) be established. PAPGREN was launched in September 2001, with funding from NZAID. The overall objectives of PAPGREN were to strengthen national PGR programmes and collaboration among them, so as to use scarce resources – human, financial and genetic – more effectively to solve common problems. In 2002 SPC prepared the strategy paper *Plant Genetic Resources for Food and Agriculture in the Pacific: The Way Forward for SPC*. This resulted in the LRD establishing a Genetic Resources Team within LRD recognizing that conservation and use of PGRFA provides the foundation for SPC's support of agricultural development in the Pacific.

With these initiatives there has been significant progress made in PGRFA over the last ten years. NZAID continued funding for PAPGREN into a 2nd phase which was completed in 2009, though project activities continued into 2010. Although funding for the actual network no longer exists, activities continue in many of the countries, funded both through national and regional funds. The GCDT has provided significant support to the Pacific in recent years, both in the development and implementation of the regional strategy for the *ex situ* conservation and utilization of crop diversity in the Pacific Island region, and also crop strategies, such as banana.

The effectiveness of the network is illustrated by the formal placing of the Annex 1 PGRFA held in trust for the region by the CePaCT into the MLS of the IT-PGRFA by the Samoan Agricultural Minister on behalf of Pacific Ministers of Agriculture and Forestry at the 2009 Session of the Governing Body of the IT-PGRFA. This clearly indicates that the region as a whole recognized the importance of sharing diversity and the need to be part of the global

[9] The authors of this framework document were 2000, the PNG-NARI Principal Scientist for PGR, Rosa Kambuou, the senior agronomist of Fiji's MASLR, Aliki Turagakula, and the SPC's RGC Adviser, Dr Mary Taylor,

system of PGRFA. To date, six countries have acceded to the IT-PGRFA (Cook Islands, Fiji, Kiribati, Palau, Samoa and Vanuatu) and New Caledonia and French Polynesia through France (though each country had to conduct internal consultations for national endorsement).

Different approaches have been used by PAPGREN in capacity building, which reflect an understanding that capacity needs to be built across the board and not just at one level. Capacity has been strengthened through the formal education system with the Masters' scholarships and then at the informal level through training and workshops in various technical aspects of genetic resources, for example, collection and characterization. Information and knowledge on PGRFA was very limited before PAPGREN – it existed but was either not documented or if documented was only available within country. Valuable information has been documented such as the Directory of PGR Collections in the Pacific (Guarino, 2004). PAPGREN has also facilitated the sharing of information generated by the countries, such as the Minimum Descriptor list for a number of crops compiled by the PGR staff within NARI, Papua New Guinea.

In the past there was more activity with crop networks in the region. Currently, only the Asia-Pacific Banana Network (BAPNET), is effective, with Papua New Guinea and SPC members of the BAPNET Steering Committee providing an opportunity for the Pacific's needs to be reflected in any programme initiated and established by BAPNET, and also ensuring that experiences from banana growers in Asia are shared with the Pacific.

The CePaCT has made good progress since it began in 1998 as the Regional Germplasm Centre. The taro collection now exceeds 840 accessions and collections of other aroids, Pacific bananas and breadfruit are expanding. The relocation to Narere provided the genebank with much-needed enlarged and improved facilities, for example, CePaCT now includes a virus indexing facility whereas before virus indexing was carried out in a shared facility at the University of the South Pacific (USP). In recognition of the diversity found within the taro and yam genepool in the Pacific, the CePaCT receives a long-term grant from the GCDT. Through CePaCT the region can easily access PGRFA from outside the region, in particular from the IARCs. This linkage has become increasingly valuable with the challenge posed by climate change and the urgent need to evaluate crop varieties that are more suited to unfavourable environments.

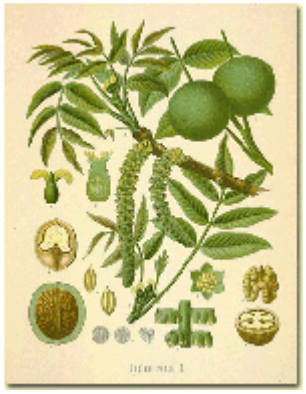
The last decade has shown how the countries of the region work together in the conservation and use of PGRFA, each country operating where it has the capacity to do so, and where there is limited capacity, the regional mechanism is supportive. Improved taro lines bred in Samoa can be shared through CePaCT and PAPGREN. Swamp taro collected in Kiribati and Tuvalu can be evaluated for salinity tolerance in the CePaCT and then recommendations made for the region. The development of the Pacific banana strategy has seen countries working together to identify their unique germplasm, for example the fei bananas and Pacific plantains found in abundance in French Polynesia.

Despite the progress made by the region in recent years, much remains to be achieved. Although there has been some capacity building, there is room for much more, particularly in the area of crop improvement. Similarly documentation is still lagging behind and there is an urgent need to capture the information that exists both nationally and regionally before it is lost. The focus with crop conservation to date has been on *ex situ* conservation, with little

focus on any other conservation methodology. *In situ* conservation, in particular has been neglected and the expertise that exists in some countries needs to be built on and shared. Finally there is much neglected area of underutilized species or crops for the future, which were the focus of the September 2009 "Pacific Crops for the Future" meeting. At this meeting the participants identified eight crops or crop groups for research and development, and agreed on a regional strategy consisting of six inter-related elements which would support the advancement of these target crops/varieties (Taylor *et al*., 2009).

In the last ten years progress has been made in promoting the utilization of PGR, ensuring that collections, whether they are national or regional, do not become museums of diversity. Some collections have been characterized but the focus has been on morphological and molecular data. There is little data to support market development and economic growth. Such data would include nutritional values and also processing traits, such as pasting, digestibility etc. Utilization for climate change is obviously very important bearing in mind the evidence that exists highlighting the impact that predicted weather patterns will have on crop production. Information on stress-resistant crops and varieties is urgently needed to ensure that farmers can continue to produce yields under predicted future climate conditions.

Effective conservation and use of PGRFA is so vital for future food and nutritional security. Progress has been made through national and regional efforts, but gaps exist. In addition, we live within a very unpredictable and demanding environment and to meet the future food and nutritional security needs as well as attempting, where relevant, to establish markets, requires a continuous evaluation of the situation and attention to any new relevant development. The updating of the *Global Plan of Action* provides an excellent opportunity in which to do this.



3. The Regional Synthesis Process

The regional synthesis of gaps and needs for the *Global Plan of Action* in the Pacific region was derived from country reports which served as inputs to the SoWPGR-2. Unfortunately these reports only include Cook Islands, Fiji Islands, Kiribati, Papua New Guinea and Samoa. Other information has been gained from the country reports provided at the September 2009 meeting of the PAPGREN, and from the "Regional Strategy for the *ex situ* conservation and utilization of crop diversity in the Pacific Islands region" submitted to the GCDT. In addition, the proceedings from the "Regional Consultation on Crops for the Future: Towards Food, Nutritional Economic and Environmental Security" provides some valuable insights into the region's priorities and needs.

4. Priority Areas in the *Global Plan of Action* in a Regional Context

The four thematic sections identified in the *Global Plan of Action* of *in situ* conservation and development, *ex situ* conservation, utilization of plant genetic resources and institutions and capacity building are all relevant for the Pacific region. However, where the focus lies depend

to a large extent on the individual country, its diversity and capacity. For example, Papua New Guinea, in its status of PGRFA report for the SoWPGR-2, placed significant emphasis on *in situ* conservation, compared to Cook Islands, where *ex situ* conservation was more of a priority. Palau similarly did not identify *in situ* conservation as a national priority. Of the thematic areas most of the countries in the Pacific would identify "utilization of plant genetic resources" as an area which needs significant strengthening at the national and regional level. This does not deny the importance of the other thematic areas. In addition, because of the regional collaboration that exists, strengthening capacity in one country in a specific area will have benefits for the region as a whole.

The core messages from the SoWPGR-2 reflect the key issues in the region:

- Climate change is a major challenge, therefore the region needs capacity in plant breeding with which to expand existing diversity generating varieties with traits better suited to climatic extremes. At the September 2009 IT-PGRFA capacity building workshop, the point was made that the region could make better use of exotic germplasm imported through the MLS of the It-PGRFA, if there was greater capacity in plant breeding.
- PGRFA diversity is inadequately documented in farmers' fields and *in situ.* For those countries where *in situ* conservation is important, documentation is much needed and methodologies and indicators that will enable better management of *in situ* conservation.
- The Pacific Crops for the Future meeting in September 2009 highlighted the importance of underutilized species in supporting food and nutritional security in the region.
- New techniques for PGRFA conservation and use would support the Pacific in rationalizing collections and developing specialized sub-sets for specific uses.
- Although there has been good progress made in raising awareness of the importance of PGRFA conservation and use, integrating PGRFA conservation and use into national policy is required.

5. *In Situ* Conservation and Development

Not all the countries in the region would consider *in situ* conservation and development important. Of the SoWPGR-2 reports from the Pacific, only Papua New Guinea stated this activity as a priority, however, the other countries did highlight the following as constraints to implementing an *in situ* programme:

- Lack of policy supported by implementing strategies to promote conservation of PGRFA *in situ* and on farm.
- Weak technical capacity, and in some countries, insufficient number of staff.
- Lack of incentives for farmers for on-farm conservation.
- Poor evaluation of methodologies.

Very few countries have carried out *in situ/*on farm studies. Papua New Guinea conducted a study in the Pinu village in the Kairuku-Hiri district of Central Province. The study evaluated the diversity present in the village, and attempted to record both the diversity loss and the reasons for that loss. Similarly both Solomon Islands and Vanuatu have also conducted studies. These studies provide a good framework on which to develop further work.

To strengthen work in this area, countries would need:

- Policies that would promote consumption of local food, thereby increasing the incentive to conserve and utilize PGRFA diversity. Such policies would have to be multisectoral, which would ensure trade, health and education sectors are supportive. These policies should generate change in consumer behavior patterns and improved markets for local foods;
- Development of management systems for on farm conservation;
- Documentation and dissemination of existing information to be made available in different formats. Documentation should include traditional knowledge;
- Improving technical capacity to include participatory approaches to PGRFA development and food processing skills.

5.1 Surveying and inventorying plant genetic resources for food and agriculture

Capacity is a serious constraint in surveying and inventorying PGRFA, both in the methodology with which to carry out this task but also the skills required to implement it successfully. The Pacific is very weak in taxonomic expertise. As the documentation of traditional knowledge would be an important component of such a survey/inventory, training approaches to gathering and documenting traditional knowledge is required.

5.2 Supporting on-farm management and improvement of plant genetic resources for food and agriculture

There has been very limited experience in on-farm management and improvement of PGRFA. As previously stated, Papua New Guinea, Solomon Islands and Vanuatu have carried out preliminary on-farm studies. In Samoa, the Taro Improvement Programme (TIP) utilizes participatory varietal selection and plant breeding to develop taro lines tolerant/resistant to taro leaf blight. The TIP is researcher-led with lines produced on-station but evaluated and selected by farmers, and improved lines are made available to the region through CePaCT. Policy support would be required to further this activity and to promote the products of on-farm management and improvement. Policy support should lead to improved markets for farmers' products. Strengthening capacity in participatory approaches to management and improvement of PGRFA would also contribute to supporting on-farm management and improvement of PGRFA.

5.3 Assisting farmers in disaster situation to restore agricultural systems

With climate change projections of unpredictability and increased intensity, efficient and effective mechanisms to restore agricultural systems are essential. In the Pacific, weaknesses in these mechanisms have already been revealed with recent disasters. The needs for this activity would include an analysis to determine existing systems, focusing on the supply of planting material. An analysis conducted after a recent cyclone in Fiji highlighted the need for a central planting material supply centre, such as a tissue culture laboratory which feeds into a combination of community genebanks and private nurseries. In addition, capacity in seed production was identified as a gap which warranted attention. Strengthening of capacity in seed production, thereby increasing self reliance of communities is a regional requirement.

5.4 Promoting in situ conservation of wild crop relatives and wild plants for food production

The needs in this area would be significant. Assessing, identifying and cataloguing the diversity of wild crop relatives would be the first task. There would have to be a similar process to document wild plants for food. At the same time, recognizing that any work on wild crop relatives is likely to require coordination between different sectors mechanisms would have to be established to ensure improved coordination.

6. *Ex Situ* Conservation

As described in Section 2, the recommendation from the Ministers of Agriculture in 1996 supported the strengthening of *ex situ* conservation in the Pacific. This set the stage for several PGRFA-focused projects. In 1998, the AusAID funded Taro Genetic Resources:

Conservation and Utilization (TaroGen) provided support for taro collecting and conservation and essentially this project supported the establishment of the Regional Germplasm Centre, now the CePaCT. Funding for TaroGen covered many of the components of a crop conservation and utilization strategy from collecting to core collection development to cryopreservation research. At the same time, EU funding supported the collecting and conservation of *Dioscorea alata,* through the South Pacific Yam Network, although the focus was on collecting yams with traits desired in commercial production. The momentum from these projects has continued with the establishment of PAPGREN and the strengthening of the regional genebank.

When the regional strategy was developed 13 of the 22 SPC PICTs maintained collections, the majority in the field. Papua New Guinea and Vanuatu hold the largest number of collections, reflecting their diversity. Some countries are actively collecting, for example, French Polynesia, who is focusing its efforts on bananas, breadfruit and aroids. The Directory of Plant Genetic Resources Collections in the Pacific Island Countries and Territories is currently being converted into a web-based format so that countries will be able to regularly update their collection information.

Currently the CePaCT is working with countries in building up its aroid collection, extending its focus from *Colocasia esculenta* to include the other aroids, namely *Xanthosoma sagittifolium (*9 accessions) *Alocasia macrorrhizos* (10 accessions) and *Cyrtosperma merkusii* (32 accessions). The yam collection is also being expanded and currently includes 247 accessions, mainly of *D alata*, but also *D esculenta*, *D nummularia, D. pentaphylla* and *D. bulbifera*. Efforts are underway to also establish a Pacific banana collection, with funding support from the GCDT. Breadfruit is also receiving attention because of its importance in the region.

The "*ex situ*" system seems to be working well with the regional collections held in the CePaCT, duplicated at the University of the South Pacific, Alafua Campus, Samoa. Those countries with the resources and the diversity have established collections which are being evaluated and used. The region works together well in developing collections of common interest, such as banana and breadfruit, though obviously the funds have to be available to support the work. Support from the GCDT in conserving specific collections, supporting regeneration of collections and targeted research, such as the cryopreservation of aroids, continues to sustain and strengthen the *ex situ* system in the region.

Investment in cryopreservation would reap benefits – a protocol for taro cryopreservation exists but there is no funding to support the labour input required to implement the protocol with all the accession. Both Papua New Guinea and CePaCT would benefit from any investment to support this work

In some countries, *ex situ* collections (often functioning as working collections) are maintained but their success and viability is largely the result of commitment from a few staff. Insufficient funds are often allocated from governments for conservation of PGRFA, yet at the same time agriculture departments are expected to make recommendations to farmers and to supply planting material. The implementation of a supportive policy would do much to rectify this situation.

6.1 Sustaining existing ex situ collections/regenerating threatened ex situ collections

As previously stated the GCDT is providing funds to support regeneration of target collections and to maintain some collections, such as the taro and yam collections held by CePaCT. However, despite this much appreciated support, countries still face the constraints of limited resources. Improving the tools with which to manage, characterize and rationalize collections would make significant inroads into achieving this aim. Policy is also important, because having the appropriate policies in place would result in increased support for this area.

6.2 Supporting planned and targeted collecting of PGRFA

Support for planned and targeted collecting is needed but linked to PGRFA rationalization strategies. Collecting expeditions, especially in countries like Papua New Guinea, are costly and require significant resources to fund and expertise to implement. Efforts should be focused on underutilized crops and crop wild relatives. Funding for collecting missions is rare, and generally countries lack the resources with which to implement any collecting missions. Recently banana and breadfruit collecting was made possible through funds that had been allocated for climate change and market development. Targeted collecting is required especially for the more underutilized crops and crop wild relatives.

6.3 Expanding ex situ conservation activities

The Pacific regional strategy identified priority crops and priority activities, and determined the activities currently supported by the Trust. This strategy is valid today and guides the work in the region. The priority crops are taro, sweet potato, yams, breadfruit, swamp taro, banana, and coconut. For the most important crops the following activities were identified:

- Taro
    - Ensure the taro collection at the CePaCT is securely conserved.
    - Ensure that the national collection maintained by Papua New Guinea is cryopreserved.
    - Ensure the continuation of the taro improvement programmes in Samoa and Papua New Guinea.
- Sweet potato
    - Describe and rationalize the sweet potato collection of Papua New Guinea.
    - Define a core collection of sweet potato collection for conservation in Papua New Guinea and CePaCT.
    - Investigate yield decline in Papua New Guinea's Highlands.
    - Establish a participatory pre-improvement programme.
- Yams
    - Characterize, document and rationalize the Melanesian yam collections.
    - Clarify the taxonomy of Pacific yams.
    - Develop virus indexing technology to facilitate germplasm movement and sharing.
- Breadfruit
    - To support the long-term conservation of the field collection at the Breadfruit Institute, National Tropical Botanic Garden (NTBG), Mauii, Hawaii.
    - Duplicate the NTBG collection *in vitro*.

    - Establish an *in vitro* based protocol for safe movement of germplasm.
    - Distribute and evaluate the sub-sample of varieties providing all-year-round fruiting.
    - Provide training to PICT scientists in characterization, evaluation and documentation of breadfruit genetic resources.
    - Carry out seed conservation research.
- Swamp taro
    - Duplicate the Pohnpei collection *in vitro* in CePaCT.
    - Develop a descriptor list.
    - Collect germplasm throughout the region.
    - Develop a safe transfer protocol.
    - Establish a collection of germplasm specifically for atoll countries.
- Banana
    - Characterize and document the national collections in Papua New Guinea, Samoa, Solomon Islands, New Caledonia and Pohnpei.
    - Establish a collection of Pacific bananas.
    - Provide a duplication *in vitro* in CePaCT.
    - Identify a sample of nutritionally valuable accessions and make available for distribution and evaluation.
- Coconut
    - Support for the establishment of the International Coconut GB (Madang, Papua New Guinea) with possible duplication *in vitro* at CePaCT.
    - Support for the continued operation of the genebank and hybrid trials at VARTC.
    - Assess the status of the Solomon Islands collection and carry out rescue activities as necessary.

Progress has been made in some areas, for example, with taro and yams, but with other crops, such as breadfruit, a re-evaluation of the objectives was required. The region is now establishing its own collections, both nationally and regionally, the aim being to have one or more core collections for sharing based on both genetic diversity and traits such as nutritional value. Breadfruit collecting has been conducted in Vanuatu and French Polynesia. The CePaCT currently has 13 breadfruit accessions from the following countries; Fiji, Kiribati, Samoa, Marshall Islands, Hawaii and the Society Islands. Funding is limited so the process is slow.

The Regional Strategy only addressed the major crops in the Pacific, although some are considered underutilized because their full potential has not been exploited. The Pacific Crops for the Future strategy prioritized breadfruit, bananas of the fei and Pacific Plantain groups, Polynesian chestnut (*Inocarpus fagifer)* and tava (*Pometia pinnata)* at the regional level. Other crops/species identified as important were *Canarium, Pandanus, Alocasia, Xanthosoma, Saccharum edule,* and *Abelmoschus manihot*. Papua New Guinea and Vanuatu have significant collections of *A. manihot*, but these collections need rationalization. Sharing of these collections would require the development of either an efficient virus indexing protocol or a safe seed system. Some countries, such as French Polynesia, Tonga and Samoa are working with the CePaCT in building up the aroid collection, but again activities are restricted by lack of funds. These funds can be made maximized by ensuring the approach to any *ex situ* activity is taken without a rationalized system, highlighting again the need for increased characterization, documentation etc.

7. Utilization of Plant Genetic Resources

This is the area where the region would agree significant gaps exist. Across the board the constraint is human resource capacity, though this would be more of a constraint with the smaller countries. As in Section 6 where characterization was identified as essential to ensure rationalization of collections, it is also recognized by those countries with collections as vital to improving use. Similarly when collections are evaluated the documentation and sharing of that information is necessary to support utilization.

Utilization of accessions from the CePaCT is hindered because any material that is distributed to PICTs has to be free of known viruses, and virus testing is a costly process. Opportunities to work with overseas institutes can support progress in molecular characterization as with the project supported by the Trust which has seen sweet potato accessions subject to molecular characterization at CIP. The Vanuatu Agriculture and Research Training Centre have an excellent collaboration with CIRAD which facilitates molecular characterization. Such collaboration needs to be strengthened and expanded.

7.1 Expanding the characterization, evaluation and number of core collections to facilitate use

As indicated in the SoWPGR-2 more efforts are required in the characterization and evaluation of PGRFA collections. Similarly in the Pacific region, there is a need to increase the documentation, characterization and evaluation of genebank material. Some collections are characterized but not all. Those countries with large collections would benefit from increased efforts in this area. The development of minimum descriptor lists, and photo guidelines would do much to support this work, reducing the time necessary for characterization. The more information that is available on national and regional collections, the easier it will be to rationalize collections. This will not only lead to savings in resources, it will also lead to increased use of the PGRFA in the collections.

The concept of a core collection should be extended beyond one that represents genetic diversity to encompass cores that are relevant to markets, for example, cores based on nutritional value or processing traits. There are some laboratories in the region that are capable of using molecular tools, but there is limited expertise. Opportunities exist, as previously stated to make progress in this area through partnerships and collaboration.

Documentation was highlighted in the Pacific Crops for the Future meeting as an activity that is vitally important yet often funds are not allocated or as an activity it is left until after the project is completed. Evaluation of the PGRFA distributed from the CePaCT urgently needs attention. There is an active distribution programme but obtaining evaluation information is a challenge, but can be largely explained by the lack of funds to support this work. Country partners are struggling with ever-increasing workloads and to take on board the task of monitoring field trials, and at a later stage, performance in the farmers' field is not an easy task.

7.2 Increasing genetic enhancement and base-broadening efforts

To support this objective evaluation of collections must be increased and the resulting information made available. There are active breeding programmes in Papua New Guinea, Vanuatu and Samoa. The programme in Samoa works closely with farmers, following a participatory approach and focuses on taro. The programme in Papua New Guinea is currently focusing on breeding taro lines, sweet potato and aibika (*Abelmoschus manihot*). In Vanuatu the breeding programme encompasses taro, yams, sweet potato and cassava. It could be argued that as long as these programmes are sustained and the breeding lines produced can be shared, they can service the region. However, considering the challenge posed by climate change, more location-specific breeding would have more immediate and long-term benefits. With this in mind capacity building in participatory varietal selection and participatory plant breeding are skills that would be of great benefit to the region at the national and community level. Capacity building in this area could take the form of exchanges, not just within the region, but also through south-south collaboration.

Base broadening needs the support of the policy makers and other sectors to ensure that market preferences do not dictate preferred varieties. Base broadening reinforces needs identified in other sections for increased efforts to collect crop wild relatives and underutilized species.

7.3 Promoting sustainable agriculture through the diversification of crop production and broader diversity of crops

Subsistence farmers in countries such as Papua New Guinea, mostly follow the mixed cropping or mixed farming system where diversity of food crops is an integral component of the system. In the smaller countries and where markets play a more dominant role, the degree to which mixed cropping occurs, can be affected. This activity requires multi-sectoral policy support to promote crop diversity. In the Pacific organic production is being strongly supported at the policy and grass-roots level, which will benefit diversification. Donors also need to play their part in supporting diversification, in particular with trade-focused projects.

There needs to be more evidence-based studies to show that diversity does strengthen the resilience of an agricultural system which in turn would help farmers better manage climate change. These studies could develop tools and methodologies for assessing genetic vulnerability and identifying, if possible, how best to balance genetic uniformity and diversity. Such information could be used by policy makers.

7.4 Promoting the development and commercialization of underutilized crops and species

The Pacific Crops for the Future meeting in which 30 participants from 15 countries, as well as regional and international organizations participated, recognized the importance of these crops/species for their contribution to food and nutritional security and income generation through market development. The meeting identified regional and national priority species (see Section 6.3), and developed a strategy that consisted of six main elements: generation and collection of knowledge/research; communication and dissemination; policy advocacy; market development; partnerships; capacity building and institutional strengthening.

7.5 Supporting seed production and distribution

Planting material networks need to be evaluated to ensure that they are efficient and effective in the supply of good quality planting material. In some countries where planting material has to be urgently sourced after a disaster, such as a cyclone has hit, the linkages in the supply system have been shown to be weak. Public-private partnerships could create opportunities to improve both quality and quantity.

The focus on planting material in the Pacific tends to be on vegetatively propagated crops because they form the bulk of the staple crops. The seed sector has not received much support, however with the need to diversity crop production, the increasing importance of the vegetable sector both for home consumption for improved health and in those countries where tourism is important, to supply the hotels and restaurants, the seed sector is increasing in importance. A recent seed study implemented by SPC with support from FAO and conducted in Fiji, Tonga, Kiribati and Vanuatu, highlighted the poor seed supply to the countries. Problems identified were:

- Varieties poorly adapted to local conditions.
- Inconsistent supply.
- Lack of open-pollinated seeds.
- Limited seed production capacity.

There is an urgent need to strengthen local capacity at the national and community level to produce and distribute seed. Access to open-pollinated seeds is crucial. A MOU has been signed between AVRDC and SPC, and AVRDC has also established working relationships with several countries, which will facilitate access to open-pollinated seeds. Current constraints to progress include funding and capacity. Policy support is also required to encourage seed production by both the public and private sector.

7.6 Developing new markets for local varieties and "diversity-rich" products

Developing new markets for local varieties and "diversity-rich" products requires strong policy support to bring about the change necessary in most countries in the region. Consumers are constantly "persuaded" that non-traditional foods are preferable from the continuous promotional pressure to which they are exposed from advertizing. The youth in the region generally are not interested in traditional food, or in the process, namely agriculture, that brings such food to the table. The convenience of non-traditional foods is more attractive than the long and arduous process of cooking taro straight from the garden. Making progress with this activity, as with others discussed, requires a multisectoral approach, involving agriculture, health, education, environment and trade. In addition, capacity building is required to strengthen value adding skills so that traditional foods can be rendered more convenient for busy lives. This activity also highlights the need to develop new and strengthen existing programmes for encouraging youth to engage in agriculture.

8. Institutions and Capacity Building

Common needs under this thematic area would be policy, staff training and user-friendly information systems.

8.1 Building strong national programmes

National programmes on PGRFA vary in strength and levels of coordination. For the larger countries, such as Papua New Guinea, there is a well-defined structure which facilitates coordination of all PGRFA activities. However, a common constraint to all countries would be the limited number of staff, limited capacity (due in part to staff numbers) and heavy workload. With those countries, where the importance of PGRFA has not been acknowledged at the government level, policy development is crucial. Capacity in policy development, programme development and coordination are needed, even with those countries, which do recognize the importance of PGRFA. Linked to this is the need to strengthen the capacity of PGRFA staff in developing proposals so that funding for PGRFA activities is not always the responsibility of the government, though they should in their programme/strategy development identify core activities for government support.

Cook Islands, Fiji, Kiribati, Palau, Papua New Guinea and Samoa have been assisted to develop their National Information Sharing Mechanism (NISM). At the country level, the database serves as a working instrument for the National PGR Committee and for national institutions for drafting strategies and plans. Reinforcing the benefits that can be gained from NISM will encourage other countries to develop their NISM, for which assistance will be required.

8.2 Promoting networks for plant genetic resources for food and agriculture

The PAPGREN was supported by donor funds until late 2009. Although the network as such is no longer supported, member countries are still active in PGRFA, through their own efforts and support from other donors, such as the GCDT and the AusAID International Climate Change Initiative (ICCAI). With a region as diverse as the Pacific, where the ocean operates as a very effective isolating mechanism regional collaboration is not an option, it is essential. The Pacific has the advantage that SPC does acknowledge the importance of PGRFA and to date has shown this through investment in the genebank and funding of some staff through core funds. However, the absence of funding for the actual network has removed one position from the Genetic Resources group, thereby adding significant workload to existing staff, with the effect that some important activities, have had to be abandoned.

At the recent International Symposium for Sustainable Agricultural Development and Use of Agrobiodiversity (Korea, October 2010) there was significant discussion on the benefits of networks with unanimous agreement that often benefits are unseen and need to be quantified and made more visible to the donors. For example, the most significant impact of PAPGREN has been the fostering and facilitating of trust between country participants. This was due mainly to the regular contact made possible through the network meetings over two phases of PAPGREN. Through this process countries learnt the value and benefits of regional collaboration, understood the challenges faced by their neighbours and were able to build rapport with regional colleagues. This understanding and trust established over time no doubt contributed significantly to the placing of the CePaCT Annex 1 collections into the MLS of the Treaty. Some analysis of networks which can show the hidden impacts and benefits to both donors and policy makers at the national level is urgently needed.

Policy again is important in that an enabling policy environment would help to secure funds for core network activities.

8.3 Constructing Comprehensive Information Systems for Plant Genetic Resources for Food and Agriculture

As stated in 8.1 several countries have established a NISM, but there is no guarantee that this mechanism will be sustainable or that other countries in the region will adopt NISM. Further awareness and capacity building is required for full use to be made of the mechanism.

Different countries have different systems depending on resources and expertise. Very few countries have database specialists that they can devote to the development of a system specifically for PGRFA. Even within the regional organizations this expertise is lacking, and it is only recently that a database person has been engaged to work specifically on the database for CePaCT. The need for this was reinforced by the development of GRIN-Global. Within Papua New Guinea, PGRFA information is stored and managed using Excel Spreadsheet. With some crops global systems are available, such as the Musa Germplasm Information System (MGIS), though inputting requires time and skill. Palau produces catalogues based on morphological characterization but reports that significant information remains unpublished. Other countries report the need for standard documentation systems, database expertise, and in some cases, insufficient number of computers. Often capacity building with new programmes are implemented as one-off workshops; participants return to their countries where they have to try and transfer their data to these new systems, often with old computers and irregular electricity supply. In many cases technical back-up for the use of these new systems is not as supportive as it should be.

8.4 Developing Monitoring and Early Warning Systems for Loss of Plant Genetic Resources for Food and Agriculture

There has been no mention of the need to develop tools and methodologies for such systems. Some information is gained when conducting baseline surveys for projects, such as reported for the *in situ* conservation study implemented by Papua New Guinea. Similarly CePaCT under the AusAID ICCAI is working with communities in two islands to try and assess the impact of climate change on agrobiodiversity, and one of the first activities has been a baseline survey of existing PGRFA.

8.5 Expanding and improving education and training

Shortage of trained staff and a lack of awareness at various levels have repeatedly been identified as the main constraints to the sustainable conservation and use of PGR in the Pacific. In the Phase 2 of PAPGREN one of the major outputs was to improve capacity for the conservation and use of PGRFA in the Pacific. The activities put in place to achieve this output were:

- A baseline capacity assessment.
- Training materials for schools and Rural Training Centres developed.
- One training course per year, to be hosted by regional training institution.

- Two competitive MSc Scholarships awarded.
- Distance learning materials (with the University of the South Pacific) developed.

The wide range of activities aims to target all levels of staff involved in PGRFA conservation and use. Human resources in the region is such that countries are unable to release staff for full-time studies, and that staff require different forms of capacity building from the very general to more focused and specific. Each of these activities was achieved to some extent. However, despite this effort there is still an urgent need for capacity building and to ensure all needs are catered for, different systems/approaches would have to be available. Distance learning systems work well in the Pacific, but face-to-face is essential for practical training and the staff exchange system needs further investment.

The baseline capacity assessment is an attempt to put in place a system with which to monitor progress in capacity strengthening. Between 2007 and 2009, the assessment found a great improvement on awareness, knowledge and understanding relating to PGRFA conservation and use in the region, and asserted this progress to be directly linked to PAPGREN. The assessment also highlighted the continuous need to train nationals in PGRFA matters with the emphasis on proper management and documentation. The inclusion of non-PGR sectors, such as health, was also recommended as part of the training and capacity building process. Training was best achieved in partnership with training institutions such as the University of the South Pacific (School of Agriculture). Continuous training was seen as an important solution to address issues of high-staff turnover in the agriculture sector.

8.6 Promoting public awareness of the value of plant genetic resources for food and agriculture conservation and use

Public awareness was not specifically addressed by either Phase 1 or Phase 2 of PAPGREN, although public awareness activities were often addressed as a component of another activity. Regional and annual meetings always generate awareness with the right media support. Some training was provided during one PAPGREN meeting on public awareness. The SPC Regional Media Centre was asked to give a presentation on the key factors that should be addressed when engaging the media so that information is presented correctly. Scientists are not the best communicators so transferring information into a story-based context is often a challenge. Similarly the media are generally not accustomed to presenting stories on the importance of PGRFA. The same PAPGREN meeting also profiled a very successful public awareness campaign that has received global attention. Dr Lois Englberger and the Island Food Community of Pohnpei have successfully promoted the local Karat banana in Pohnpei from a very lowly status to where it is highly desired and sought after, both locally and globally. The Island Food Community of Pohnpei and the work of Dr Lois Englberger achieved amazing success with this orange-fleshed banana and with the promotion of local food in general, presenting good science in different ways and using all the media tools available.

Ideally genetic resources programmes should have as appropriate a focal point for public awareness, but in reality, this is unlikely. Therefore PGRFA workers need to be trained in how to articulate the importance of programme goals and activities in the broader context of sustainable agriculture and development. In addition, they need to be able to communicate this to all stakeholders using tools provided by public awareness specialists. Some analysis of

the various tools would be useful. Often funds are spent on producing posters, which are displayed at various events or in offices etc, but there appears to be little analysis of the actual impact they have and whether this impact is sustained.

References

Englberger, and A. Lorens (2004) Pohnpei Bananas: A photo collection: Carotenoid-rich varieties Island Food Community of Pohnpei and Secretariat of the Pacific Community, Suva, Fiji

Guarino, L. (2004) Directory of plant genetic resources collections in the Pacific Islands countries and territories. Suva, Fiji Islands: Secretariat of the Pacific Community

Lebot, V., Gunua, T., Pardales, J.R., Prana, M.S., Thongjiem, M., Viet, N.V. and Yap, T.C. (2004) Characterization of taro (*Colocasia esculenta* (L.) Schott) genetic resources in South-east Asia and Oceania. Genetic Resources and Crop Evolution 51, 381-392

Lebot, V. (2009) Tropical Root and Tuber Crops Crop Production science in horticulture; 17 CABI, UK

Ragone, D (2007) Breadfruit: Diversity, Conservation and Potential In Acta Hort 757 D. Ragone and M.B Taylor (Eds)

Taylor Mary, Hannah Jaenicke, Posa Skelton and P.N Mathur (2009) Regional Consultation on Crops for the Future: Towards Food, Nutritional, Economic and Environmental Security in the Pacific. APAARI (http://www.apaari.org)

ANNEX 4

SPECIFIC RECOMMENDATIONS

✓ **Conservation of PGRFA**

- Adopt cross-cutting policies that would promote consumption of local food, thereby increasing the incentive to conserve and utilize PGRFA diversity;
- Conserve genetically diverse crops in farmers' fields; Document and disseminate existing information in different formats, including traditional knowledge;
- Develop management systems for on farm conservation;
- Increase training of qualified staff in *ex situ* collections (often functioning as working collections); and
- Improve technical capacity to include participatory approaches to PGRFA development and food processing skills; Ensure that trade, health and education sectors are supportive.
- Rationalize the existing *ex situ* collections; Invest further in cryopreservation, including funding to support the labour input required to implement the existing taro cryopreservation protocol with all the accessions.
- Secure more resources allocated to PGRFA conservation.

✓ **Utilization of PGRFA**

- Strengthen capacity building in plant breeding, participatory varietal selection and participatory plant breeding, which could take the form of exchanges both within the region and through south-south collaboration;
- Increase technical assistance to introduce genetically diverse crops in farmers' fields;
- Strengthen linkages between PGRFA conservation and use;
- Strengthen local capacity at the national and community level to produce and distribute seeds;
- Promote awareness among policy-makers, donors and others on the necessity of forging strong linkages between plant breeding and seed systems for increasing food production;
- Increase efforts in characterization of all collections, including through the development of minimum descriptor lists and photo guidelines;
- Increase opportunities to work with overseas institutes in molecular characterization.

✓ **Policy related issues and networking**

- Increase understanding of the operational functioning of the Benefit-Sharing Fund of the International Treaty;
- Establish or strengthen comprehensive national strategies for PGRFA management that provide for linkages between PGRFA conservation and use and seed systems;
- Enhance collaboration and strengthen networking within and among and within all countries of the Pacific region;
- Increase understanding and enhance access to and use of the information sharing and reporting mechanisms for genetic resources for food and agriculture;
- Raise awareness and integrate PGRFA conservation and use into broader agricultural and environmental national policies.

LIST OF ACRONYMS

ACIAR	Australian Centre for International Agricultural Research
BAPNET	Asia-Pacific Banana Network
CBD	Convention on Biological Diversity
CePaCT	Centre for Pacific Crops and Trees
CGRFA	Commission on Genetic Resources for Food and Agriculture
CIRAD	Centre International de Recherche Agronomique pour le Développement
CWR	Crop Wild Relatives
DARD	Department of Agriculture and Rural Development
FAO	Food and Agriculture Organization of the United Nations
GCDT	Global Crop Diversity Trust
GIPB	Global Partnership Initiative for Plant Breeding Capacity Building
IARC	International Agriculture Research Centres
ICCAI	International Climate Change Adaptation Initiative
IPR	Intellectual Property Rights
IT-PGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
MDG	Millennium Development Goals
MLS	Multilateral System of Access and Benefit-sharing
NARI	National Agriculture Research Institute (Papua New Guinea)
NCDs	non-communicable diseases
NISM	National Information Sharing Mechanisms
NZAID	New Zealand Aid Programme
PAA	Priority Activity Area
PAPGREN	Pacific Agricultural Plant Genetic Resource Network
PGRFA	Plant genetic resources for food and agriculture

PICT	Pacific Island Countries and Territories
PNG	PNG
RGC	Regional Germplasm Centre
SMTA	Standard Material Transfer Agreement
SoWPGR-2	Second Report on Plant Genetic Resources for Food and Agriculture
SPC	Secretariat of the Pacific Community
TIP	Taro Improvement Programme
TLB	Taro Leaf Blight
USP	University of the South Pacific
VARTC	Vanuatu Agriculture Research and Training Centre