



Regional Consultation on Crops for The Future: Towards Food, Nutritional, Economic and Environmental Security in The Pacific

21 - 22 September 2009
Nadi, Fiji Islands

PROCEEDINGS



Organized by:
Secretariat of the Pacific Community
Asia-Pacific Association of Agricultural Research Institutions
Biodiversity International
Crops for the Future
National Agricultural Research Institute, PNG



**Regional Consultation
on
Crops for The Future: Towards Food, Nutritional,
Economic and Environmental Security in The Pacific**

21 - 22 September 2009

Nadi, Fiji Islands

PROCEEDINGS

Editors

Mary Taylor, Hannah Jaenicke, Posa Skelton and P.N. Mathur

Organized by:

**Secretariat of the Pacific Community
Asia-Pacific Association of Agricultural Research Institutions
Bioversity International
Crops for the Future
National Agricultural Research Institute, PNG**

Contents

Foreword	v
Acronyms and Abbreviations	vii
Executive Summary	ix
Rationale and Objectives	1
Inaugural Session	3
Session I: Setting The Stage	5
Session II: Country Reports	7
Session III: Presentations From Regional and International Agencies	12
Session IV: Plenary Session– Breakout Group Discussion and Recommendations on Priority Crops for the Future, Research for Development Impact and Knowledge Sharing	14
Session V: Plenary Session– Presentation of Group Recommendations and Discussion on General Recommendations	19
Future Road Map	20
Annexure I: Programme	22
Annexure II: List of Participants	24
Annexure III: Matrix to Assess Ongoing Work and Opportunities for Underutilized Crops in the Pacific	28

Foreword

On global scale, currently only 30 staple crops feed the world, whereas rice, wheat, and maize provide more than half of the world's food supply despite the fact that over 30,000 plant species are edible and about 7,000 have been or still are cultivated to some extent for food. We are all aware that placing too much reliance on just a handful of crops is rather risky in the context of increasing population pressure and environmental degradation. It has been well recognized that a large number of crops, that are now overlooked, have the potential to play a much important role in sustaining livelihood and enhancing environmental health. Such crops have been defined as 'underutilised', 'neglected', 'orphan', 'minor', 'promising', etc. In recent past, both the International Centre for Underutilised Crops (ICUC) and the Global Facilitation Unit for Underutilised Species (GFU) have made efforts to realize the potential of underutilised species to help alleviate poverty and protect the environment. More recently, a new global body, called as "Crops for the Future" has been established which is expected to spearhead the drive to bring underutilised crops into the mainstream.

The recent food crisis, financial and economic losses, and the growing impact of climate change have highlighted the importance of self-reliance and resilience of Pacific communities through increasing local food production. In this context, a need to have the regional consultation was felt by the members of the Pacific Plant Genetic Resources Network (PAPGREN) especially to address issues concerning effective utilization of crop diversity to increase local food security.

Considering above, the Asia-Pacific Association of Agricultural Research Institutions (APAARI), in collaboration with the Secretariat of the Pacific Community (SPC), Bioversity International, Crops for the Future (CFF), and National Agricultural Research Institute (NARI), Papua New Guinea organised a regional consultation on "Crops for the Future: Towards Food, Nutritional, Economic and Environmental Security in the Pacific" on 21-22 September, 2009 in Nadi, Fiji Islands to address issues concerning effective utilization of crop diversity to manage climate change and to increase local food production and to develop appropriate strategy for effective use of neglected species from the region for sustainable food production as well as food security.

Thirty participants from 15 countries as well as regional and international organizations participated. The consultation consisted of plenary and working group sessions. Three working groups, basically representing the three sub-regions (Melanesia, Micronesia, and Polynesia), developed a priority list of species/species groups, at the same time providing justification for their sub-regional importance. In addition to the list of priority species, a strategy was developed, which consisted of five distinct elements: (i) Generation and collection of knowledge/research; (ii) Communication and dissemination; (iii) Policy advocacy, market development, and partnerships; (iv) Capacity building; and (v) Institutional strengthening.

It is expected that the role of these underutilized crops will become increasingly important as the vagaries of climate change become more pronounced, and countries have to diversify their food systems to ensure food and nutritional security. Through this consultation the Pacific region is well placed to take advantage of opportunities to develop these species and also to strengthen available expertise and skills by building new partnerships to augment existing capacity of National Agricultural Research Systems (NARS).

We hope that the wide circulation of these proceedings will generate awareness and appropriate action by the NARS in the Pacific to implement the strategic recommendations of this Regional Consultation. We are thankful to all the participants, special invitees, and lead speakers for their active participation. Support from SPC, CFF, Bioversity International, and NARI, PNG for co-sponsoring the event is duly acknowledged. APAARI is especially privileged to catalyse this process in partnership with SPC and shall continue to endeavour fostering new partnerships in the region.



(Raj Paroda)

Executive Secretary

Asia-Pacific Association of Agricultural Research Institutions

Acronyms and Abbreviations

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
APAARI	Asia-Pacific Association of Agricultural Research Institutions
AusAID	Australian Agency for International Development
Bioversity	Bioversity International
CePaCT	Centre for Pacific Crops and Trees
CFF	Crops for the Future
CGIAR	Consultative Group on International Agricultural Research
CHEEF	Culture, Health, Environment, Economy and Food-security
CINE	Centre of Indigenous Peoples' Nutrition and Environment, McGill University
CIRAD	La Recherche Agronomique pour le Developpement
CNMI	Commonwealth State of Northern Mariana Islands
EBM	Ecosystem Based Management
EU	European Union
FACT	Facilitation of Agricultural Commodity Trade in the Pacific
FAO	Food and Agriculture Organization of the United Nations
FSM	Federated States of Micronesia
GCDT	Global Crop Diversity Trust
GCARD	Global Conference on Agricultural Research for Development
GEF	Global Environment Facility
GFAR	Global Forum on Agricultural Research
GFU	Global Facilitation Unit for Underutilized Species
HOAFs	Heads of Agriculture and Forestry
IARCs	International Agricultural Research Centres
ICUC	International Centre for Underutilized Crops
IFPRI	International Food Policy Research Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture

LRD	Land Resources Division
MAQFF	Ministry of Agriculture, Quarantine, Forestry and Fisheries, Vanuatu
MOAFs	Ministers of Agriculture and Forestry
MoU	Memorandum of Understanding
NARI	National Agricultural Research Institute, PNG
NARs	National Agricultural Research Systems
NGO	Non-Governmental Organization
NUS	Neglected and Underutilized Species
NZAID	New Zealand International Aid and Development Agency
PAPGREN	Pacific Agricultural Plant Genetic Resources Network
PARDI	Pacific Agribusiness Research for Development Initiative
PGR	Plant Genetic Resources
PHAMA	Pacific Horticultural and Agricultural Market Access Programme
PNG	Papua New Guinea
SPC	Secretariat of the Pacific Community
WTO	World Trade Organization

Executive Summary

This consultation was called by the Secretariat of the Pacific Community (SPC), Asia-Pacific Association of Agricultural Research Institutions (APAARI), Crops for the Future (CFF), National Agricultural Research Institute (NARI), and Bioversity International on behalf of the Pacific Plant Genetic Resources Network (PAPGREN) to address issues concerning the more effective utilization of crop diversity to manage climate change and to increase local food production whilst at the same time ensuring effective conservation in the Pacific. Whilst underutilized plants are recognized as having the potential to address food security and malnutrition by alleviating an over-reliance on a few main staple crops and imported processed food, lack of a priority list of underutilized species for the Pacific region, lack of information and documentation on these species, lack of policy support from government and donor agencies and in general poor awareness at all levels about the value and potential of underutilized species were considered as significant constraints in progressing the development and utilization of these crops. The main objective of the consultation was to develop a strategy with representatives from the Pacific region which would effectively promote and encourage the use of these neglected species.

Thirty participants from 15 countries as well as regional and international organizations participated. The consultation was held over two days and consisted of plenary and working group sessions. Three working groups, basically representing the three sub-regions (Melanesia, Micronesia, and Polynesia), developed a priority list of species/species groups, at the same time providing justification for their sub-regional importance. Regional priorities were clearly breadfruit (*Artocarpus altilis*), bananas of the Fe'i group and/or Pacific plantain, Polynesian chestnut (*Inocarpus fagifer*), and tava (*Pometia pinnata*). Other species, which were not prioritized in these sessions, yet had been identified as important in the various country reports and preceding discussions, were bele (*Abelmoschus manihot*), Pandanus (*Pandanus tectoris*) and the lesser aroids *Alocasia macrorrhizos*, (often known as *A. macrorrhiza*), *Xanthosoma sagittifolium*, and *Cyrtosperma merkusii*.

In addition to the list of priority species, a strategy was developed over the course of the consultation which consisted of five distinct elements: generation and collection of knowledge/research; communication and dissemination; policy advocacy; market development; partnerships; capacity building; and institutional strengthening. All elements are equally important but the resources and time required to address them effectively will vary. The participants agreed that good progress could be achieved in the first instance, with basically no resources, through the development of a matrix to assess ongoing work on and opportunities for these species in the Pacific.

The role of these underutilized crops will become increasingly important as the vagaries of climate change become more pronounced, and countries have to diversify their food systems to ensure food and nutritional security. Through this consultation the Pacific region is well placed to take advantage of opportunities to develop these species and also to strengthen its expertise and skills in this area by building on partnerships, which can augment and supplement existing capacity.

Rationale and Objectives

Over 7,000 plant species have been grown or collected for food, worldwide, however, less than 150 have been commercialized and just three crops—maize, wheat, and rice—supply half of the world’s daily protein and calories. Therefore, placing too much reliance on a handful of crops is risky in the context of increasing population pressure and changing climate.

The recent food crisis, financial and economic losses, and the growing impact of climate change have highlighted the importance of strengthening the self-reliance and resilience of Pacific communities through improving local food production. Diversity can make a significant contribution to the resilience of food production systems. However, crop production in the Pacific, like many regions in the world tends to depend on a few crops, which do not reflect the diversity that exists in this region. One group of species neglected over the years has been the group of species known commonly as “**underutilized.**”

These species can thrive in hostile and difficult terrains not suited to large-scale commercial agriculture. In other regions of the world it has been shown that such species can make a valuable contribution to the nutritional status of diets. The nutritional value of food is an important consideration in the Pacific, where in recent years there has been an alarming increase in lifestyle-related diseases, attributed to an over-reliance on imported and nutritionally poor foods. Underutilized species are highly beneficial and valuable as they provide a unique opportunity to both combat food and nutritional insecurity within communities and at the same time, support the development of niche markets for global trade in an increasingly competitive world.

Creating awareness as to the benefits of these underutilized species and at the same time, improving access and availability will strengthen self reliance in food production, and make a significant contribution to improving the health of Pacific households and communities.

A definition of underutilized species: “those species with under-exploited potential for contributing to food security, health (nutritional/medicinal), income generation, and environmental services.”

These species

- Represent an enormous wealth of agrobiodiversity and have great potential for contributing to improved incomes, food security and nutrition, and for combating the ‘hidden hunger’ caused by micronutrient (vitamin and mineral) deficiencies
- Are strongly linked to the cultural heritage of their places of origin
- Are mainly local and traditional crops (with their ecotypes and landraces) or wild species whose distribution, biology, cultivation, and uses are poorly documented
- Tend to be adapted to specific agro-ecological niches and marginal land
- Have weak or no formal seed supply systems
- Are recognized to have traditional uses in localized areas
- Are collected from the wild or produced in traditional production systems with little or no external inputs
- Receive little attention from research, extension services, farmers, policy and decision makers, donors, technology providers and consumers
- May be highly nutritious and/or have medicinal properties or other multiple uses. (Jaenicke and Höschle-Zeledon, 2006)

Both the Strategic Framework for Underutilized Plant Species Research and Development (Jaenicke and Höschle-Zeledon, 2006)¹ and the subsequent International Symposium on “Underutilized Plant Species for Food, Nutrition, Income and Sustainable Development” held in Tanzania, during March 2008, highlighted the important role that underutilized species play in supporting the lives of rural people. This expert consultation is thus a logical follow up to these earlier strategic processes.

Pacific Islanders traditionally have enjoyed diverse ways to achieve food security. However, numerous factors have contributed to a weakening of local food production systems, including poor investment in agriculture, urbanization, and availability of cheap food imports. An increasing reliance on imported food products has not only affected the health of Pacific communities but also threatened food security. Climate change poses further challenges to food security, through its impact on food production, health, infrastructure, the ability of countries to import food, and the ability of households to purchase food.

This regional consultation was organized jointly by the SPC, APAARI, Bioversity, CFF (Formerly ICUC), and the NARI, Papua New Guinea. The focus of the consultation was in line with two of the three objectives of the SPC Land Resources Division Strategic Plan 2009–2012 *viz.*, “Improved Food and Nutritional Security”, “Improved Biosecurity and Increased Trade in Agriculture and Forestry products,” which was endorsed by the Heads of Agriculture and Forestry (HOAFs) and Ministers of Agriculture and Forestry (MOAFs), in Samoa in September 2008. The consultation also addressed both the APAARI objective of assigning urgent research for development needs for food and environment security in the Pacific and Bioversity International’s Focus Area 1 on “Managing agricultural biodiversity for better nutrition, improved livelihoods, and more sustainable production systems for the poor. Pacific 2020² also notes “there are both domestic opportunities for supplying urban and tourist markets and export opportunities for traditional tree crops and new horticultural and spice products.”

At a number of the Pacific Plant Genetic Resources Network (PAPGREN) meetings the following issues have been identified as the most critical constraints to promote the use of underutilized and neglected crops:

- Lack of information/documentation on underutilized species in the Pacific
- No regional priority list of underutilized species
- Lack of policy support from various government agencies
- Poor awareness at all levels about the value and potential of underutilized species

This consultation primarily addressed these constraints, explored the potential of underutilized species in the Pacific region and highlighted the areas/gaps that would benefit from immediate action. The outcomes from this consultation may be used by Global Forum on Agricultural Research (GFAR) and Consultative Group on International Agricultural Research (CGIAR) in developing their strategies for agriculture research, and could also assist donor agencies such as

¹Jaenicke, H. and Höschle-Zeledon, I. (eds) 2006 Strategic Framework for Underutilized Plant Species Research and Development, with Special Reference to Asia and the Pacific, and to Sub-Saharan Africa International Centre for Underutilised Crops, Colombo, Sri Lanka and Global Facilitation Unit for Underutilized Species, Rome, Italy.

²Pacific 2020: Challenges and Opportunities for Growth, Commonwealth of Australia 2006

Asian Development Bank (ADB), Australian Agency for International Development (AusAID), Australian Centre for International Agricultural Research (ACIAR), New Zealand International Aid and Development Agency (NZAID), European Union (EU), etc. in their allocation of resources in the Pacific.

Objectives

The overall purpose of this consultation was “to assist Pacific communities to improve food, nutritional, income, and environmental security.” The major objective was to develop a regional strategy on “Crops for the Future in the Pacific.” This would necessitate achieving the following outputs:

1. Regional priority list of at least ten underutilized species, based on identified constraints/problems and opportunities
2. Framework of research and development issues and projects to be pursued to address development of these crops and their contribution to sustainable agriculture in the Pacific
3. Capacity needs assessment to identify training gaps
4. Mechanism for sharing information on underutilized species established and agreement on how to develop database
5. Specific recommendations on how best to raise awareness at all levels - community to policy makers
6. Establishment of a regional task force to pursue collaboration, partnership, and networking
7. Regional strategy on “Crops for the Future in the Pacific” to be incorporated into the next phase of the Pacific PGR Network (PAPGREN) project
8. Agreement on priority funding mechanisms

Inaugural Session

The opening session was chaired by Dr. Mary Taylor, Genetic Resources Coordinator, SPC, with welcome statements by NARI, Crops for the Future and Bioversity International as co-sponsors of the Consultation. Dr. Raj Paroda, Executive Secretary of APAARI, also a co-sponsor of the Consultation was the Chief Guest of inauguration function.

On behalf of SPC, Dr. Mary Taylor welcomed the participants, and commented that the Genetic Resources Programme of the Land Resources Division (LRD) was particularly pleased with the Consultation, as LRD’s focus has traditionally been on well-known or well-utilized species. This Consultation provided the opportunity to develop a Pacific regional framework or strategy for underutilized species. The challenges that Pacific Islands face, such as increasing incidences of non-communicable diseases, climate change, food security, and economic development have made this Consultation a timely one.

This Consultation also provided an opportunity to strategize on how to raise public awareness on underutilized species utilizing events such as the 2010 Pacific Food Summit meeting, where a Food Secure Pacific Declaration and Plan of Action will be developed, which will feed into the

Forum Leaders meeting in 2010 for endorsement and adoption. National food summits are taking place throughout the Pacific. Participants were urged to participate in this consultative process, to sensitize donors/funding bodies to support underutilized species in the region. Finally, the participants were encouraged to participate in the global electronic consultation on underutilized species which will feed into the Global Conference on Agricultural Research for Development (GCARD).

This Consultation was only possible through partnering with various agencies. SPC signed a Memorandum of Understanding (MoU) earlier in the year with APAARI, and sees this Consultation as the first of many collaborative activities with APAARI. The support from NZAID, APAARI, NARI, CFF, and Bioversity was kindly acknowledged.

On behalf of Bioversity International, Dr. Prem Mathur welcomed the participants and supported Dr. Taylor's comments on the opportunities provided by the Consultation for the Pacific. He noted that the recent food crisis, global economic losses, and climate change are serious threats to Pacific communities and that self-reliance and resilience of Pacific communities can be achieved through improving local food production. He acknowledged that to make progress in the development of underutilized species, some serious challenges must be addressed, such as, utilizing traditional knowledge on underutilized species. Dr. Mathur stressed that in spite of the limitations, opportunities exist to enhance the use of underutilized species, especially with globalization and opening of new markets and the growing interest in dietary diversification. He also briefly mentioned the work being undertaken by various CGIAR Centres on promoting conservation and use of underutilized crops.

Dr. Raghunath Ghodake welcomed participants on behalf of NARI and noted the fundamental importance of agriculture to the Pacific region. Although different countries have different needs, there are many commonalities existing between all the countries, which the region should focus on in their efforts to obtain international support. Underutilized crops are of particular interest, providing food, nutritional, and economic security. Their importance to communities also underlines their cultural importance.

On behalf of Crops for the Future (formerly ICUC), Dr. Hannah Jaenicke echoed the views of previous speakers and stressed the importance of having consistent participation to ensure they become advocates for underutilized species.

Dr. Raj Paroda, Executive Secretary of APAARI in his opening address, noted that the MoU between APAARI and SPC has brought all the partners together, and took the opportunity to emphasize the importance of sharing knowledge through partnerships. APAARI provides a platform within which South-South collaboration can be strengthened. One area where APAARI can work with the Pacific region is in supporting documentation. The importance of underutilized species is known in most countries in the Asia-Pacific region, however, in order to progress the development of these species, some significant challenges have to be addressed, such as linking farmers to markets, and ensuring that any development is sustainable. Agricultural development at this time has to be considered within the framework of climate change, which will have a significant impact on the Asia and Pacific region.

The workshop was opened followed by the launching of the APAARI publication on "Taro Improvement and Development in Papua New Guinea – A Success Story."

Session I: Setting the Stage

Dr. Mary Taylor, Genetic Resources Coordinator/Centre for Pacific Crops and Trees Manager, SPC provided a brief introduction to the workshop. She noted the over-dependence of the world on a few crop species for food security. To raise the profile and achieve action for the lesser known species is not easy and requires a coordinated and concerted effort to heighten awareness as to their importance, marketing coordination, national and regional policies, adequate resources, sound knowledge, and research and development.

Dr. Alan Quartermain from PNG University of Natural Resources and Environment gave a presentation on the importance of genetic diversity in meeting the challenges facing the Pacific. Traditionally, many crops and varieties were planted for food by Pacific communities, with the region being host to significant crop diversity. However, this diversity is under threat as a result of a number of factors, such as urbanization and a shift of community reliance to imported goods. The immense challenges facing Pacific communities are attributed to their relatively small population, subsistence lifestyle, small land areas and economies, remoteness but dependence on international markets and susceptibility to natural disasters and climate change. The weak institutional capacity and the absence of research and development in support of policy further hinder development.

Making any progress in agriculture and in particular, underutilized species requires research and an enabling environment in which to operate. Traditional knowledge is important and must be documented and utilized. Government support is vital, as is community engagement and awareness. Criteria for identifying crops for prioritization must be identified and could include the following: potential for domestication or commercialization; staple crops with unrealized potential; indigenous crops or wild plants with unknown potentials - bioprospecting and biodiscovery.

Likely areas of intervention include: capacity in plant variety selection and breeding; atoll uniqueness; biodiscovery; maintenance and improvement of soil fertility; community nutrition; advancing crops to full commercialization; enabling environment; markets and constraints; innovation studies and supporting policies. Utilizing genetic diversity can provide numerous opportunities to make progress in agricultural development. However, efforts to develop and work with any “new” diversity should not be at the expense of research and development programmes associated with currently utilized staple crops and export commodities, nor improving the livelihoods of remote communities.

The presentation generated significant discussion. The challenges faced by atoll countries and communities are significant and to tackle these challenges effectively requires a regional approach. A planned meeting for 2010 in Tarawa, Kiribati for Pacific atolls will provide such an opportunity. One of the major challenges in the atolls is the transfer of knowledge and technology.

Another serious issue is the reach and prevalence of imported “fast-food” in rural communities. However, despite awareness of the problem constraints exist as to the action Governments can take, due to restrictions by the World Trade Organization (WTO). There are some measures that Government agencies can employ, such as that recently taken by the Fiji Government, where all television advertisements of “instant noodles” must show vegetables.

When considering awareness campaigns, emphasizing the cultural value of underutilized species can help in revitalizing traditional knowledge. This has been observed in a traditional food

consumption campaign in Pohnpei where they have focused on the message embodied in the acronym “CHEEF” (Culture, Health, Environment, Economy and Food-security).

Dr. Hannah Jaenicke from Crops for the Future gave a presentation on “Underutilized species: a silver bullet”? She mentioned that of the 7,000 plant species utilized for food and agriculture globally only three (maize, rice, and wheat) are used to provide 60% of the world’s food energy. Global challenges including hunger, poverty, malnutrition, and non-communicable diseases continue to persist. Can underutilized species be the silver bullet to address some of these global challenges? This question was addressed by looking at a series of case-studies from Africa and Asia, looking in turn at nutrition, marketing and building resilience to climate change.

Many underutilized species provide valuable nutrients to poorer people, In Burkina Faso, a study asked children to document their and their families’ diet for a week, noting down the portions of fruits consumed, while in Kenya, food consumption during the dry season was surveyed. In both cases, a diverse range of fruits was consumed, but by no means was the Food and Agriculture Organization (FAO) recommended level reached. However, fruits provided a valuable addition to an otherwise vitamin-poor diet. In Nepal, food calendars were created by analyzing the plant species available within home gardens. Gaps during some months in the year in certain nutrients that became apparent during this study were filled by providing farmers with a targeted ‘diversity kit’ of complementary species.

The marketability of underutilized crops, often grown in backyards, is not an easy task. Substantial barriers have to be overcome, such as: poorly defined markets, market demand, quality of the product, and consistency of supply. There are also logistical problems in addition to the internal support mechanisms within countries. Some success stories have been documented and these could be used to assist in the promotion of underutilized species, such as the reintroduction of indigenous vegetables in West Kenya. The exploitation of the Galip nut (*Canarium indicum*) in PNG is also a potential success story.

Opportunities exist for underutilized crops to generate income for small entrepreneurs, but several areas require attention, namely, research, capacity building, and advocacy. The role of underutilized crops in building resilience to climate change is another important consideration. There is some evidence to indicate that some local crops are better suited for extreme climate events (droughts, floods). Having more genetic diversity on farms can provide a buffer to climate change. However, what is required is hard evidence in support of underutilized crops and resilience to climate change.

While underutilized crops may not be the silver bullet, they can contribute substantially to enhancing community wellbeing and building resilience to external shock. There are important gaps that need to be addressed but a concerted effort involving a multitude of skills and expertise will go a long way. Dr. Jaenicke ended her presentation with “*Let us work together to develop a Crops for the Future strategy for the Pacific.*”

The presentation generated significant discussion and following issues emerged from these discussions:

- Customs, social beliefs, and misconceptions can often be constraints in the development of certain food crops. For example, in Africa, there are beliefs that eating green vegetables

makes your face go green, or vegetables are only good for women and children. Working with communities, in particular, women's groups, is one-way of tackling this issue.

- A success story from Pohnpei (highlighted by Dr. Lois Englberger) was used to demonstrate how the higher nutritional status of the traditional neglected and underutilized species (compared to other varieties) was used to promote these species and was successful with the communities.
- Raising the profile of underutilized species at the ministerial level and engaging other government sectors, apart from agriculture, is also important.
- For any commercial development of these species, the demand side of the market has to be analyzed. Much can be gained from improved South-South collaboration. Public-private partnerships are increasingly being recognized as the way forward in developing and securing markets for many of these species/crops.

Session II: Country Reports

Fourteen country reports were presented during this session. Summary of these presentations are described below:

Commonwealth of the Northern Mariana Islands

Dr. Dilip Nandwani from Commonwealth of the Northern Mariana Islands (CNMI) delivered a presentation on what are referred to in CNMI as specialty crops. These speciality crops equate to underutilized crops in that they have a high potential for the tourism market and export potential. Agriculture in CNMI is subsistence in nature. Although soil and other growing conditions are conducive to agriculture production in the islands, frequent typhoons, pests and diseases, the lack of planting materials, lack of information and awareness, limited genetic diversity, natural disasters, water, low soil fertility, high production cost, and lack of marketing chains are some of the constraints. A list of underutilized crops was provided including fruits, vegetables, root crops, forest trees, etc. Research project activities at Northern Marianas College include micropropagation of bananas, taro and sweet potato, field evaluations, grafting in fruit trees, bioenergy crops and papaya improvement. Some of the issues facing CNMI in pursuing crop development include dissemination of food information, propagation of good varieties, development of harvesting and processing techniques, spice industry, and traditional crops. CNMI highlighted the following crops as a focus for further research and development: breadfruit (*Artocarpus altilis*), giant swamp taro (*Cyrtosperma merkusii*), banana (*Musa* spp.), coconut (*Cocos nucifera*), and noni (*Morinda citrifolia*).

French Polynesia

Dr. Maurice Wong from French Polynesia highlighted a number of priority underutilized species from French Polynesia. Breadfruit is a top priority since it is adaptable to both atoll and high islands and will fruit under a range of conditions. Despite being a common crop in the Pacific, there is limited data available to realize the true potential of this crop both for food and nutritional security and trade. Fe'i banana is highly nutritional being rich in beta-carotene and is generally well liked by the people. Polynesian chestnut (*Inocarpus fagifer*) bears long-lasting fruit, grows

in a wide range of soil from wet land to atoll, and may be tolerant of salinity. Other priority crops named include taro (for the nutritious leaves); *Amaranthus* spp. (short crop cycle, but water-demanding and requires a lot of fertilizer; *Xanthosomas sagittifolium* (long lasting and tolerant to drought conditions).

Palau

Dr. Aurora Del Rosario from Palau pointed out that despite the diversity of underutilized species that exists in the country Palauans are highly dependent on imported food from USA, Japan, Philippines, Taiwan, and Korea. The staple food in Palau includes: taro, cassava, sweet potato, giantswamp taro, coconut, and banana. A priority list was provided, which included breadfruit, yam, *Xanthosoma sagittifolium*, *Alocasia macrorrhizos*, and *Pangium edule* (football fruit).

Samoa

Mr. Parate Matalavea identified a range of crops important for food security in Samoa, including root and tuber crops, fruit trees, nuts, vegetables, and spices. Some information on underutilized species, such as technical information on planting, management and maintenance, harvesting, pest and disease control, and marketing is also available. Threats to these species are natural disasters, pests and diseases, declining importance compared to other species and declining labour due to urban migration. Specific occasions, such as career days (talomua), open day, World Food Day are used as opportunities to raise awareness. However, the costs of producing awareness materials and dissemination are quite high. Samoa identified bele (*Abelmoschus manihot*), green pepper, cucumber, tomato, and eggplants as priority species, mainly due to income generation opportunities for farmers and their high cost during the off-season.

Fiji Islands

Mr. Poasa Nauluvula from Fiji informed that information on underutilized crops is available but there is little research or development work done so far. The priority species for Fiji include: *Pometia pinnata*, *Saccharum edule*, *Inocarpus fagifer*, *Artocarpus altilis*, *Spondias dulcis*, *Barringtonia edulis*, *Diplazium esculentum*, *Syzygium malaccense*, *Musa* spp., and *Moringa oleifera* (saijan, drumstick). World Food Day and Agriculture Shows and other similar events, are used to raise awareness about these crops and food and nutritional security in general. Some brochures and leaflets have been produced but their effectiveness in raising awareness has yet to be determined. Future needs for research and development include crop characterization and assessing nutritional and medicinal values; raising awareness and promoting the use of underutilized crops for local and export markets; value adding, especially of those crops with short fruiting season; and documenting traditional knowledge on use and preservation. Fiji looks forward to networking and sharing of information with other countries in the region on underutilized species.

Tonga

Mr. Manaia Halafihi from Tonga informed that underutilized crop species in Tonga include the root crops (*Alocasia macrorrhizos*, *Xanthosoma sagittifolium*, *Discorea esculenta*), fruit trees (*Spondias dulcis*, *Citrus maxima*, *Annona reticulate*, *A. squamosa*, *A. muricata*, *Syzygium malaccense*, *Pometia pinnata*), and nuts (*Terminalia catappa*, *Canarium ovatum*, *Inocarpus fagifer*). In terms

of priority, species *A. macrorrhizos*, *X. sagittifolium*, sweet yams (*Dioscorea esculenta*), yams (*Dioscorea* spp.), and cassava were identified for their contribution to food security, managing climate change and potential for trade. Research and development at the national level includes establishing collections, agronomic evaluation, crop improvement, and value-adding. Areas requiring action include documentation on genetic variability, production, and management. He also stressed that where any of these underutilized species are considered “**endangered**” strategies should be established for their secure conservation.

Kiribati

Mr. Tianeti Beenna in his presentation indicated that the priority underutilized species for Kiribati include *Artocarpus altilis* (seed and seedless breadfruits), *Pandanus tectorius*, *Ficus tinctoria* (fig-tree), *Cyrtosperma merkusii* (giant swamp taro), and *Cocos* sp. (dwarf coconut). *Morinda citrifolia* (noni) and *Tacca leonopetaloides* (arrowroot) are also important. Some information on these underutilized crops is available but is not widely disseminated, and in addition requires validation and/or simplifying. Awareness activities on underutilized crops have been undertaken by the agriculture department in partnership with the Ministry of Health, SPC, FAO, and other agencies/organizations. Conservation efforts are undertaken but on a small scale, such as community nurseries. Priority activities for Kiribati include developing the recently established Centre of Excellence for Atoll Agriculture, awareness raising and conservation, value-adding and post-harvest.

Papua New Guinea

Dr. Alan Quartermain in his presentation informed that Papua New Guinea (PNG) has over 200 crop species that are being utilized. Information in terms of quantity and quality is extremely variable on these crops. Crop species of interest for PNG is determined by growing conditions (agro-ecological zones), but about 11 indigenous species and 25 exotic fruits and nuts have been identified. Future research needs include evaluating these crops for biodiscovery and biofuels, identifying varieties that are high yielding and of high nutritive value, crops for meeting domestic and export demands, pest and disease tolerance/resistance, and those suitable for crop rotations and intercropping. Post-harvest is also seen as important in the development of underutilized crops. The priority species for PNG include the major staples (aroids, sweet potato) and galip (*Canarium indicum*), noni (*Morinda citrifolia*), okari (*Terminalia kaernbacchii*), sago (*Metroxylon sagu*), aibika (*Abelmoschus manihot*), aupa (*Amaranthus* spp.), pitpit (*Sacchurum edule*), pandanus (*Pandanus* spp.), and kava (*Piper methysticum*). Galip nut was highlighted as a good example of where some progress had been made in development for commercialization. Many factors are important for success but public-private partnerships are possibly one of the major factors.

Vanuatu

Ms. Marie Melteras informed that Vanuatu utilizes many crops for subsistence, however, there is a heavy reliance on imported foods, which are often competitively priced compared with locally grown crops. While most of the crops are grown for consumption, others are used for traditional ceremonies. The low to non-existent export value of these crops is attributed to poor production, low quality, lack of market access for farmers, supporting infrastructure (e.g. laboratory for food analysis), unfortunate shipping connections (most are moving east-ward from Australia

to Vanuatu then around the Pacific islands before they reach Australia again, thus don't allow fresh produce to be shipped to the main markets of Australia and New Zealand). Quarantine is also another hurdle for the exportation of farmers' crops. There is a serious erosion of agrobiodiversity, with the change in people's diet being the principal cause for this genetic erosion. Awareness activities on underutilized crops are undertaken, for example, in partnership with Fond Francais pou l'Environnement Mondial, La Recherche Agronomique pour le Developpement (CIRAD), Ministry of Agriculture, Quarantine, Forestry and Fisheries (MAQFF), etc. The priority crops for Vanuatu were given as yams, taro, sweet potatoes, banana and plantain, breadfruit, and cassava.

New Caledonia

Mr. Thierry Mennesson from New Caledonia indicated that crops are grown for consumption, income generation, and cultural needs (exchanges). Crops of interest due to high local demands and nutritional value include cooking bananas, breadfruit, and Choux kanak or bele/aibika (*Abelmoschus manihot*). Research activities have focused on identification, conservation (*in situ* and *ex situ*) of local genetic diversity, and characterization of crops. Twenty eight local banana cultivars have been identified. The challenges to these crops are mainly pests and diseases, natural disasters, and change in lifestyle for locals. Regional collaboration was identified as important and this includes working with French Polynesia to improve management of banana genetic resources in the Pacific. Other challenges that need to be addressed at the regional level include food processing and post-harvest management, market access, nutritional, and medicinal value of selected crops.

Solomon Islands

Mr. John Bosco from Solomon Islands in his presentation mentioned that many underutilized species are used by locals but are poorly researched. Root and tuber crops were probably more studied than fruits, vegetables, and nut crops. Many potentially important crops, depended upon during difficult times, grow in the wild or in the forests and are being threatened by logging and other activities. There is an urgent need to raise awareness as to the food security value of these crops. The priority underutilized species for the Solomon Islands include ngali nut (*Canarium* spp.), fern (*Diplazium* spp.), Malay apple (*Syzygium malaccense*), mangrove (*Bruguiera* spp.), and losi or duruka (*Saccharum edule*). Future research and development in the Solomon Islands would need to focus on characterization, domestication, and agronomic/production factors.

Niue

Mrs. Terriane Mokoia from Niue mentioned during her presentation that information is available on underutilized species but most of this information is written in English and not translated into the local language which farmers can understand. Translation is therefore a need, as is, the updating of some of the information. Fruits and vegetables are imported mostly from New Zealand, and local fruits (e.g. bananas and papayas) are sold to expats and tourists or are used as animal feed. With the relatively recent increase in the cost of imported foods there has been increasing interest in local food production, however, the poor soil and pest and disease problems are hindering efforts. Health Department campaigns have seen an increased consumption of island cabbage (*Abelmoschus manihot*) and spinach. Through the FAO Food Security Project an awareness

campaign was conducted to support the introduction of sweet orange. Priority species for Niue are lime, papaya, bananas, coconut, passion-fruit, and *Citrus*. Identifying fruit tree species suitable for the Niue climate is a priority. Niue would be keen to collaborate with other countries in some form of exchange scheme to see how other island countries manage different crops.

Federated States of Micronesia

Dr. Lois Englberger from Federated States of Micronesia informed that a study led by CINE, McGill University, Canada documented some of the underutilized species in FSM and this information can be found in the 2009 CINE FAO book (Chapter 6: Pohnpei study). A database from the study contains information such as the scientific, common and local names of underutilized species, and also includes parts of the plants that are utilized (e.g. leaves, fruit, root, flower, etc.). Some local crops are extremely neglected, some are threatened and most are not marketed. In FSM, a local campaign successfully increased the consumption of local bananas through increasing awareness on their nutritional value. The campaign provided scientific evidence to support the nutritional superiority of these bananas and a whole range of promotion and awareness tools to get the information out to the consumer, such as workshops, planting, posters, stamps, and significant media involvement. In terms of priority crops, rare bananas, breadfruit, giant swamp taro (*Cyrtosperma merkusii*), chestnut (*Inocarpus fagifer*), and garlic pear (*Crataeva speciosa*) were identified as important for both mountainous island and atolls. Making local food more convenient and available and understanding peoples' behavior with regards to food preferences are considered important national issues. Other actions that could be undertaken to promote the use of underutilized species include having strong policies, taxes on unhealthy imported foods, awareness and research/extension on salt-water resistant varieties and characterization of varieties.

Cook Islands

Mr. William Wigmore from Cook Islands informed that the importance of underutilized species is not realized in Cook Islands because of the shift towards and the increasing importance of convenient foods such as bread, noodles, and rice. In addition, outbreaks of pests and diseases have threatened some underutilized species, e.g. *Xanthosoma sagittifolium*. There is generally a lack of awareness and promotion of underutilized species, and knowledge associated with these species tends to be confined to the older generation. The inconsistent supply, the high costs of some of these crops and the limited market demand for a few varieties has further marginalized the diversity of underutilized species. A multisectoral approach at the national level is recognized as essential for the development of these crops and would help to raise awareness in both schools and with communities. Banana, breadfruit, bele, Polynesian chestnut, and tamarind (*Tamarindus indica*) were identified as priority underutilized species for Cook Islands.

The country presentations highlighted the level of enthusiasm that surrounds underutilized species and the consensus that these species have significant potential, which is generally not being realized. The lack of documentation on this group of species was very evident, despite the information that exists in the countries and in the region as a whole. Lack of documentation obviously hampers sharing of information. There was concern from many countries as to the loss of traditional knowledge, and acknowledgement that this was a source of information vitally important to the development of these crops.

Raising awareness was another area where some countries had experience in, and there was much to be learnt about what worked, and what didn't. Several countries commented on the expense of producing awareness materials and how to measure the impact of these materials to get a better understanding of the benefits of that investment.

In the discussions, the countries also identified areas/issues where a regional approach is required to make progress. Education and research and development are critical to better understand and develop underutilized species but these are two areas that need support at the regional level. The Centre of Excellence for Atoll Agriculture in Tarawa, Kiribati was noted and the need to engage regional and international support to fully utilize this important initiative.

Session III: Presentations from Regional and International Agencies

Bioversity International

Dr. Prem Mathur in his presentation briefly mentioned the six focal areas on which Bioversity focus its project activities in partnership with its stakeholders. Most of the research work on promoting conservation and use of Neglected and Underutilized Species (NUS) is being carried out under the Focus Area 1 "Managing agricultural biodiversity for better nutrition, improved livelihoods and more sustainable production systems for the poor". Bioversity has supported several programmes for conservation and use of NUS, including IFAD global project addressing sustainable conservation and use of Neglected and Underutilised Species (NUS). These efforts have contributed *inter alia* to safeguard more than several hundred accessions of priority species along with their multiplication, characterization, documentation, and use enhanced related activities. Core collections have also been developed for large collections such as small millets collections in India. Research has also been supported for developing community gene-seed-grain banks, technology for saponin removal for Andean grains, nutrition screening protocols. Dr. Mathur also briefly mentioned regarding policies, legislations, and public awareness activities for promoting NUS.

Asia-Pacific Association of Agricultural Research Institutions

Dr. Raj Paroda in his presentation informed that the Asia-Pacific Association of Agricultural Research Institutions (APAARI) was established in 1991 as an apolitical, non-profit, and neutral forum of National Agricultural Research Systems (NARS) in the region. It strengthens the research capabilities of NARS and promotes information sharing among them in order to alleviate poverty, increase agricultural productivity and resource use, protect/conserves the environment, and improve sustainability. Besides the NARS, several International Agricultural Research Centres (IARCs) and CGIAR Centres are associate members and regional organizations as reciprocal members. The APAARI programmes are aimed to enhance exchange of scientific and technical know-how and information in agricultural research for development, assist in strengthening research capability of member institutions, and promote cross linkages among national, regional, and international research organizations. APAARI, in consultation with its stakeholders, has developed a long-term perspective plan and strategies to address relevant issues, including regional collaboration, networking of research programmes, human resource development, policy advocacy, resource generation, and publication enhancement. In the past years, it has supported several initiatives on underutilized crops and has had a long-standing relationship with Bioversity International (Bioversity) and

ICUC (now Crops for the Future). APAARI's contribution to the Pacific Crops for the Future can be through knowledge sharing, publication of success stories, participation in expert consultations, and human resource development in key areas. He also urged Pacific Island countries to become members of APAARI for strengthening regional cooperation for Agricultural Research for Development.

Crops for the Future

Dr. Hannah Jaenicke from "Crops for the Future" in her presentation on "Paths out of poverty" informed that Crops for the Future (CFF) is a new global organization to foster collaboration amongst underutilized crop research and development stakeholders formed from a merger of GFU (Global Facilitation Unit for Underutilized Species) and International Centre for Underutilized Crops (ICUC). It focuses on support, collection, synthesis, and promotion of knowledge of neglected and underutilized crops for the benefit of the poor and the environment. It operates as a coalition of two organizations (GFU and ICUC) and another two initial partners (Bioversity International and the University of Nottingham in Malaysia). CFF has four strategic objectives: (1) Increase the knowledge base for NUS especially in the areas of sustained market access, nutritional security and health and climate change; (2) Advocate a favourable policy environment to promote the use of NUS; (3) Increase awareness on the potential and contributions of NUS for livelihoods and wellbeing; and (4) Strengthen capacity in relevant sectors at different levels. It builds upon an existing network of partners, networks (such as APAARI) and seeks new partners, for example, in the Pacific region.

Secretariat for the Pacific Community

Mr. Tevita Kete, Plant Genetic Resources officer from the Secretariat for the Pacific Community informed that the Pacific Agricultural Plant Genetic Resources Network (PAPGREN) is one component of the Genetic Resources Programme within the Land Resources Division of SPC. The PAPGREN project is funded by NZAID through Bioversity International, implemented by SPC with technical support from Bioversity. The current phase of PAPGREN (Phase 2) has focused on a number of key areas, namely support for national programmes for the conservation and use of local diversity, capacity building/training, and documentation of plant genetic resources for food and agriculture. Capacity building/training takes place in a number of ways, either through workshops, such as the genebank management training planned in the coming week and also through Masters' scholarships. The project has been supporting two Masters' students, one of which has been working on *Saccharum edule* (duruka) – a recognized underutilized species. One of the major activities of Phase 2 has been the development of a distance and flexible learning course, modular-based to be made available to the countries in 2010. The target audience for this course is PGR personnel who are unable to take time off to study, and also school-leavers who are interested in this area. The PAPGREN project is facilitating the collection and conservation of yam and breadfruit species with funding support from the Global Crop Diversity Trust (GCDDT) as part of their global regeneration project.

Centre of Pacific Crops and Trees

Ms. Valerie Tuia from the Centre of Pacific Crops and Trees (CePaCT), Secretariat of the Pacific Community informed that CePaCT is the regional genebank for the Pacific and the other major

component of the Genetic Resources program. The Centre focuses on the conservation, evaluation, distribution, and research on the major crops of the Pacific, namely taro, banana, sweet potato, yam, and cassava. CePaCT works with PAPGREN supporting the member countries in conserving and expanding their diversity. Since 2005, 28,000 plants have been distributed by CePaCT to 23 countries. These plants not only include new crops/varieties but also the repatriation of lost varieties. Virus indexing is a key activity within the CePaCT thereby ensuring that all plants distributed have tested negatively for viruses. Although the focus in the past has been on the major staples, more recently the emphasis on underutilized species has been increasing with collections of breadfruit (*Artocarpus altilis*), giant swamp taro (*Cyrtosperma merkusii*), and pandanus (*Pandanus tectoris*). Research activities vary in the centre, currently three staff are studying for Masters in sandalwood micropropagation, taro cryopreservation, and taro viruses. Smaller research activities are investigating micropropagation systems for breadfruit, pandanus, and giant swamp taro.

Session IV: Breakout group discussion and recommendations on priority crops for the future, research for development impact and knowledge sharing

During this session, three working groups established on a sub-regional basis (Melanesia, Polynesia, and Micronesia) to discuss priority lists either on national and/or a sub-regional basis. Based on discussions, the following species/species groups were prioritised, including a justification for their sub-regional importance by each group:

WG1: Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia, Fiji		WG2: Tonga, Samoa, French Polynesia, Cook Islands		WG3: Kiribati, Niue, CNMI, Palau, FSM	
Species	Justification	Species	Justification	Species	Justification
<i>Artocarpus altilis</i> (breadfruit)	Staple during food storage, market potential, nutrition	<i>Artocarpus altilis</i> (breadfruit)	Nutritional value, staple crop, market potential – fresh or process, cultural heritage important, environmental services	<i>Artocarpus altilis</i> (breadfruit)	CHEEF - Culture, Health, Environment, Economic and Food Security
<i>Abelmoschus manihot</i> (bele)	Nutritional value, adapted to PICs, market potential	<i>Xanthosoma</i> spp., <i>Alocasia</i> spp. (lesser aroids)	Nutritional, staple crop, climate change (dry/wet), market potential	<i>Cyrtosperma merkusii</i> (giant swamp taro)	CHEEF
<i>Saccharum edule</i> (pitpit, duruka)	Nutritional value, adaptation to climate change, market potential	<i>Musa</i> spp. (Fe'i bananas/plantain)	Health, cultural value, market potential	<i>Pandanus</i> spp.	CHEEF
<i>Musa</i> spp. (plantain)	Nutritional value, adapted to environment, market potential (export and local)	<i>Inocarpus fagifer</i> (Polynesian chestnut)	Market potential, environmental services, firewood, nutritional	<i>Musa</i> spp. (Fe'I bananas)	CHEEF

Contd...

Contd...

WG1: Papua New Guinea, Solomon Islands, Vanuatu, New Caledonia, Fiji		WG2: Tonga, Samoa, French Polynesia, Cook Islands		WG3: Kiribati, Niue, CNMI, Palau, FSM	
Species	Justification	Species	Justification	Species	Justification
<i>Canarium ovatum</i> (galip nut)	Limited to Western Pacific—good market potential	<i>Pometia pinnata</i> (tava)	Nutritional, timber and firewood, soil adaptation (atoll and volcanic islands), market potential	<i>Cocos nucifera</i> (coconut)	CHEEF
<i>Dioscorea</i> spp. (yam)	Food and nutritional security, cultural, market potential	<i>Cocos nucifera</i> (coconut)			
<i>Citrus</i> spp.	Nutritional, market potential				
<i>Inocarpus fagifer</i> (Polynesian chestnut)	Market potential, environmental services, firewood, nutritional				
<i>Metroxylon sagu</i> (sago)	Food security, cultural (PNG only)				
<i>Amaranthus</i> spp. (aupā)	Nutritional (PNG, Fiji, Solomon only)				

As per the suggestions of the participants, the outcomes of the three working groups were also shared with the participants of the Heads of Forestry meeting, which was also conducted in Nadi from 21-24 September, 2009. This group, who recognize the importance of agroforestry systems for sustainable food production, biodiversity conservation and as an adaptation mechanism in the face of climate change and climate variability recommended that the SPC Centre for Pacific Crops and Trees (CePaCT) give priority to most of the species identified in this consultation as priority species, namely: breadfruit, bananas (fe'i and plantains), coconut, yams, *Canarium*, *Pandanus*, *Alocasia* and *Xanthosoma* (lesser aroids), *Cyrtosperma merkusii* (giant swamp taro), *Saccharum edule* (pitpit, duruka), *Abelmoschus manihot* (bele), and *Pometia pinnata*.

A second working group session looked at two major pillars of underutilized crops research and development in the region: Research for development impact and Knowledge sharing. Results from these working groups fed into the following six heads viz., (i) Generation and collection of knowledge/research; (ii) Communication and dissemination; (iii) Policy advocacy; (iv) Market development; (v) Partnerships; and (vi) Capacity building and institutional strengthening. These were further discussed during the plenary session for developing the strategy for Crops for the Future in the Pacific: The Strategy consists of the following six interrelated elements:

1. Generation and collection of knowledge/research

- Many countries have ongoing research programmes on the improvement of a number of the prioritized species, notably there are collections of breadfruit, giant swamp taro, lesser aroids, local bananas, and bele. There will be increased regional exchange of information on ongoing activities to determine gaps and to identify areas of future research focus, in particular, increased capacity for plant breeding.
- Traditional knowledge (TK) is an important resource for underutilized crops improvement and steps will be taken to include TK into crop characterization/information.
- Proposals for funding will be prepared to provide additional opportunities for these activities. This may include proposals targeting climate change adaptability or agrobiodiversity.
- Possible sources are Australia, the Fond Pacifique, GEF.

2. Communication and dissemination

- Communication must include the whole chain of actors (farmer to consumer) as well as cut across sectors (health, education, etc.). Lessons can be learnt from some partners who have TV or radio broadcasts, interactive websites, community activities, etc.
- There is a considerable body of information available on several priority species. However, it is often not in accessible format. Existing information should be reviewed/new information documented and made available in various relevant formats through a portal. At the same time, countries should make efforts to contribute to existing databases (e.g. CFF, SPC, FAO) to ensure they contain relevant information about the priority species.
- SPC should be the focal point for communications; the PAPGREN platform could serve as a platform for exchange and the SPC-LRD quarterly newsletter as an outlet for information. In addition, as a regional activity, an awareness raising DVD could be developed.
- Key upcoming events for communication are: World Food Day (16 October), international

conferences, such as the International Horticultural Congress June 2010 in Lisbon, Portugal where there will be a session on underutilized crops, the 2nd International Symposium on Underutilized Plants in Malaysia in 2011, the Pacific Scientific Conference in 2011.

- The opportunity provided by the International Year of Biodiversity 2010 should be taken for further promotion.
- APAARI should be considered as a region-wide platform which facilitates the dissemination of information and success stories.

3. Policy advocacy

- An official position should be developed at the regional level and communicated, for example, through a policy brief developed by SPC. This could be prepared in time for the upcoming Pacific Food Summit and HOAFS meetings in 2010.
- Participants will assist in forging stronger links between technical staff and government members to raise the levels of awareness.

4. Market development

- Quarantine issues are an important consideration in this region. Work must be carried out to develop acceptable procedures so that market access is facilitated, while preventing spread of diseases and pests. Economies of scale are important to make products viable for the market. Country-collaboration will be important to achieve this.
- For the successful commercialization of underutilized crop products, the NGO and private sectors need to be engaged from the beginning of project development or even lead their development. Important new initiatives for this area are the AusAID PHAMA project and the ACIAR PARDI project which both look into the commercialization of key Pacific products.
- Post-harvest activities are particularly important and pertain to storage, processing, and marketing. The SPC FACT (Facilitation of Agricultural Commodity Trade in the Pacific) project should be evaluated as to its feasibility as a vehicle for underutilized crops.

5. Partnerships

- The group recognized the importance of partnerships in this dispersed region which

comprises of small countries. APAARI will be an important partner for the documentation and dissemination of information.

- For plant genetic resources-related activities, the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) will be an important vehicle. It facilitates germplasm access of “Annex 1” species, to which several of the prioritized species belong (breadfruit, lesser aroids, and bananas). The Global Crop Diversity Trust prioritizes “Annex 1” species and will therefore be an important partner for these crops in particular. The PAPGREN network provides an immediate platform for partnership and collaboration.
- Partnerships should also be strengthened between academic and research organizations within the region and with other countries, especially for training and capacity building. Crops for the Future will play an important role in this regard.
- Public-private partnerships are essential to reduce transaction costs and to reach economies of scale.
- In a region as dispersed as the Pacific, distance learning is an attractive option for capacity building. SPC in collaboration with Bioversity International is developing a course for PAPGREN which can serve as a model.
- Underutilized crops should feature in the curricula of all levels, from schools to universities. Opportunities exist to include underutilized crops into PhD projects, for example, in New Caledonia, as well as to invite participants from the Pacific to ongoing training courses, such as Bioversity International *in vitro* and cryopreservation conservation techniques course planned for New Delhi, 9-31 November, 2009.
- There are few adequately equipped labs and nurseries in the region – efforts must be made to raise the necessary funds to update these facilities and to provide the necessary assistance to countries and their research institutions to strengthen their capacity to carry out research and development on the prioritized underutilized crops.

6. Capacity building and institutional strengthening

Session V: Plenary Session– Presentation of group recommendations and discussion on general recommendations

In the plenary session, the outcome of discussions held during each working group were presented and the following general recommendations emerged:

- The propriety list of crops presented by each sub-regional group (Melanesia, Polynesia, and Micronesia) was agreed upon. In general, breadfruit (*Artocarpus altilis*), bananas of the Fe'i group and/or Pacific plantain, Polynesian chestnut (*Inocarpus fagifer*), and *Pometia pinnata*, were clearly identified as regional priorities, though the importance of giant swamp taro (*Cyrtosperma merkusii*) and *Pandanus* to the atoll islands was also recognized. Most of other crops were mentioned by either one or other groups. However, in the preceding discussion, the general consensus emerged that crops like bele (*Abelmoschus manihot*) and lesser aroids (*Alocasia* and *Xanthosoma*) were also important across the region.
- It was agreed that role of these crops will become increasingly important as the vagaries of climate change become more pronounced. Therefore, the Pacific countries have to diversify their food systems to ensure food and nutrition security.
- Establishment of a regional task force to pursue collaboration, partnership and networking was suggested. It was agreed that the members of the task force will consist of PAPGREN Steering Committee members (representatives from Kiribati, Papua New Guinea, Tonga, French Polynesia, and Bioversity International) with Crops for the Future and some active NGO representation.
- Recognizing that good quality work on some of the prioritized species is already being undertaken in some countries, it was agreed that efforts be made now to accelerate information sharing. Also there is need to determine gaps and to identify areas for further research and development activities, besides effective conservation and use of these crops. It was agreed that existing information will be compiled and shared in relevant formats through a regional portal. SPC will be the focal point for information dissemination and PAPGREN platform could collaborate for exchange of such information.
- It was also agreed that APAARI should be considered as a region-wide platform, which can facilitate the dissemination of information more widely through its newsletter and website, as well as through publication of success stories.
- Documentation of Traditional Knowledge (TK) was identified as an important requirement for promoting conservation and use of these crops.
- Participants of this Consultation agreed that quarantine issues are an essential important consideration for the safe exchange of genetic materials as well as market products in the region. Therefore, there is an urgent need to develop acceptable protocols so that market access and safe exchange of genetic materials is facilitated. In this context, inter-country collaboration was considered important to achieve this.
- Participation of NGOs and private sector was recognized as significant in the context of successful commercialization of underutilised crop products from the beginning of the project development or even at later stage for outscaling and adoption.

- Public awareness at all levels was identified as an important need for the promotion of these crops. It was suggested that crops for the future should feature in the curricula in national education system and distance learning be an attractive option for capacity building across the region. It was agreed that distance learning modules for the conservation and use of plant genetic resources, which is currently being developed by SPC and Bioversity International, should also include a Chapter on Underutilised Crops/Crops for the Future, including examples from the priority crops identified during this Consultation.

Future Road Map

In conclusion, the meeting discussed how best to implement the Strategy for Crops for the Future in the Pacific, with consideration of both short, medium, and long-term activities, and also those activities that could be implemented with no extra or minimum funding. It was agreed that SPC would circulate a matrix (Annexure III) for completion by PAPGREN focal points. The matrix would require input from the countries on:

- ❖ Ongoing activities
- ❖ Planned activities
- ❖ Information available but not documented
- Using the information contained in this matrix, the Regional Task Force will determine where attention can be focused with the current resources. Documentation is one area where efforts can be concentrated on in an attempt to update existing documentation and also produce new material, taking into account lessons learnt from case studies, such as the promotion of the local bananas by the Island Food Community of Pohnpei.
- In response to the recommendation from the meeting, an official position should be developed at the regional level and communicated. Accordingly, a policy brief will be developed by SPC, in consultation with the Regional Task Force. This brief will be available for the Pacific Food Summit (April, 2010) and the Heads of Agriculture and Forestry meeting in 2010.
- Raising awareness through communication is not a resource-demanding activity and several outlets for information exist, both in the Pacific and in the wider Asia-Pacific region. The PAPGREN “PGR News from the Pacific” is an ideal mechanism for getting information out on these underutilized species on a regular basis, as is the SPC LRD quarterly newsletter. To ensure a wider outreach, the APAARI and Bioversity-APO newsletters can serve as a useful means to disseminate information and could also serve useful purpose in strengthening South-South collaboration.
- The meeting also identified following events as opportunities to promote underutilized crops in the Pacific:
 - ❖ World Food Day (16th October)
 - ❖ FAO Global Commodity Groups for bananas and tropical fruits scheduled for early December, which could provide an avenue to highlight Pacific underutilized crops
 - ❖ International Year of Biodiversity 2010

- ❖ Global Conference on Agricultural research for Development in March 2010
- ❖ Pacific Food Summit April 2010, Vanuatu
- ❖ International Horticultural Congress, August 2010; there will be a side event on underutilized crop genetic resources
- ❖ APAARI and Bioversity International are organizing in collaboration with RDA, Republic of Korea an International Symposium on “Sustainable Agricultural Development and use of Agrobiodiversity in the Asia-Pacific Region” from 13 to 15 October 2010
- ❖ 2nd International Symposium for Underutilized Plants, Malaysia, June 2011
- ❖ The Pacific Science Association Conference, Kuala Lumpur, 2011
- ❖ Possible Pacific Crops for the Future Conference, French Polynesia, 2012
- Finally, to achieve the required progress for the development of these species, funding support is critical. Hence, proper funding sources will be identified and proposals written based on the elements of regional strategy so developed during this consultation.

Programme

Day 1: 21st September, 2009

08.30 - 09.00 am	Registration
09.00 - 10.00 am	Inaugural Session
	Opening Prayer
	Welcome Remarks - SPC (Dr. Mary Taylor)
	Welcome Remarks by Co-Organizers:
	Bioversity International - Dr. Prem Mathur
	NARI - Dr. Raghunath Ghodake
	Crops for the Future - Dr. Hannah Jaenicke
	Opening Address - APAARI (Dr. Raj Paroda)
10.00 - 10.30 am	Tea/Coffee break and Group Photograph
10.30 - 12.00 noon	Technical Session I: Setting the Stage
	Brief introduction to the workshop - Dr. Mary Taylor (SPC)
	The importance of genetic diversity in meeting the challenges facing the Pacific - Dr. Alan Quartermain (NARI)
	Underutilized species: A silver bullet - Dr. Hannah Jaenicke (CFF)
12.00 noon - 01.00 pm	Technical Session II: Country Reports I
	CNMI - Dr. Dilip Nandwani
	French Polynesia - Dr. Maurice Wong
	Palau - Dr. Aurora Del Rosario
	Samoa - Mr. Parate Matalavea
	Fiji - Mr. Poasa Nauluvula
	Tonga - Mr. Manaia Halafihi
01.00 - 02.00 pm	Lunch break
02.00 - 03.00 pm	Technical Session II: Country Reports II
	Kiribati - Mr. Tianeti Beenna
	PNG - Dr. Alan Quartermain
	Vanuatu - Ms. Marie Melteras
	New Caledonia - Mr. Thierry Mennesson
	Solomon Islands - Mr. John Bosco
	Niue - Mrs. Terriane Mokoia
03.00 - 03.30 pm	Tea/Coffee break

03.30 - 03.50 pm	Technical Session II: Country Reports III
	FSM - Dr. Lois Englberger
	Cook Islands - Mr. William Wigmore
03.50 - 05.00 pm	Technical Session III: Presentations from Regional and International Agencies
	Bioversity International: - Dr. Prem Mathur and Stefano Padulosi Managing agricultural biodiversity for better nutrition, improved livelihoods and more sustainable production systems for the poor
	APAARI: Strengthening Research in the Asia-Pacific Region - Dr. Raj Paroda
	Crops for the Future: Paths out of Poverty - Dr. Hannah Jaenicke
	SPC: The role of PAPGREN in strengthening PGR capacity in the Pacific - Mr. Tevita Kete
	SPC: Activities of the Centre for Pacific Crops and Trees (CePaCT) - Ms. Valerie Tuia
05.00 - 05.30 pm	Discussion of issues that have been raised during the day
Day 2: 22nd September, 2009	
08.00 - 08.30 am	Recap on Day 1
08.30 - 10.00 am	Session IV: Working Group Session I: Identifying sub-regional priority Underutilized Species/species group list for research and development
10.00 - 10.30 am	Tea/Coffee break
10.30 - 01.00 pm	Session IV: Working Group Session II: Identification of the key elements of a regional strategy through a focus on the two major pillars of underutilized crops research and development in the region: Research for development impact and Knowledge sharing
01.00 - 02.00 pm	Lunch break
02.00 - 03.00 pm	Session V: Presentation of Group Recommendations and Discussion on Group Recommendations
03.00 - 03.30 pm	Tea/Coffee break
03.30 - 05.00 pm	Session VI: Plenary Session: A Regional Strategy for “Crops for the Future in the Pacific”

List of Participants

Cook Islands

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) 3202400/3202712
 Fax: (691) 3202127
 Email: pniagriculture@mail.fm

Fiji

Mr. Poasa Nauluvula
 Principal Research Officer
 Koronivia Research Station
 Ministry of Agriculture, Suva, Fiji
 Phone: (679) 3477044, Fax: (679) 3400262
 Email: poasa_n@ymail.com

Kiribati

Mr. Tianeti Ioane Beenna
 Deputy Director of Agriculture,
 Agriculture Division, Ministry of
 Environment, Lands & Agricultural
 Development, P.O. Box 267, Bikenibeu,
 Tarawa, Republic of Kiribati
 Phone: (686) 28108/29695
 Fax: (686) 28121/28344
 Email: beenna_ti@yahoo.com;
 jetuati@gmail.com

Common Wealth-Northern Mariana Islands

Dr. Dilip Nandwani
 Plant Pathologist/Program Leader
 (Crop Production & Improvement),
 Cooperative Research, Extension and
 Education Service (CREES), Northern
 Marianas College, P.O. Box 501250, Saipan
 MP 96950, Northern Mariana Islands
 Phone: (670) 2343690, Ext 1725
 Fax: (670) 2340054
 Email: dilipnandwani@yahoo.com

Federated States of Micronesia

Dr. Lois Englberger
 Research Advisor, Island Food Community of
 Pohnpei, P.O. Box 1995, Kolonia
 Pohnpei 96941 FM,
 Federated States of Micronesia
 Phone: (691) 3203259, Fax: (691) 3202127
 Email: nutrition@mail.fm

French Polynesia

Dr. Maurice Wong
 Head, Research & Development
 Service du Développement Rural
 Ministère de l'Agriculture et de la Pêche
 Polynésie Française
 BP 100 Papeete, Tahiti
 Phone: (689) 574004, Fax: (689) 574690
 Email: maurice.wong@rural.gov.pf

New Caledonia

Mr. Thierry Mennesson
 Director General, Institut Agronomique
 Neo-Caledonien Centre de Cooperation,
 Internationale en Recherche
 Agronomique Pour le development
 B.P. 35, Paita Nouvelle-Caledonie,
 New Caledonia
 Phone: (687) 798760, Fax: (687) 437416
 Email: tmennesson@iac.nc

Niue

Mrs. Terriane Vaine Mokoia
Forester
Forestry Office, Department of Agriculture,
Forestry and Fisheries (DAFF),
P.O. Box 74, Fualahi, Alofi South, Niue
Phone: (683) 4032, Fax: (683) 4079
Email: tkalu25@yahoo.com.nz

Papua New Guinea

Ms. Janet Paofa
Research Associate
Plant Research-Curator NARI Dry Lowlands
Programme, Laloki, P.O. Box 1828,
Port Moresby, Papua New Guinea
Phone: (675) 3235511, Fax: (675) 3234733
Email: bang_jay@yahoo.com.au

Palau

Dr. Aurora G. Del Rosario
Researcher/Extension Specialist
Palau Community College
Cooperative Research and Extension
P.O. Box 9, Koror 96940, Palau
Phone: (680) 4882746, Fax: (680) 4883307
Email: aderose@yahoo.com;
tarothomas@yahoo.com

Samoa

Mr. Parate Matalavea
Principal Research Officer
Ministry of Agriculture & Fisheries
P.O. Box 1874A Pia, Samoa
Phone: (685) 20605/7205788, Fax: (685) 24576
Email: pmatalavea@lesamoa.net

Solomon Islands

Ms. Mary Afuna
Assistant Research Officer
Ministry of Agriculture and Livestock
P.O. Box G13, Honiara, Solomon Islands
Phone: (677) 22145/86512, Fax: (677) 28365
Email: afuna_mary@yahoo.com.au

Mr. Jack Kalisto
Program Coordinator
Kastom Gaden Association
P.O. Box 742, Honiara, Solomon Islands
Phone: (677) 39331, Fax: (677) 39331
Email: jack@kastomgaden.org

Mr. John Bosco Sulifoa
Chief Research Officer
Ministry of Agriculture, Research and Livestock
P.O. Box G13, Honiara, Solomon Islands
Phone: (677) 22143, Fax: (677) 28365
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 14
Nuku'Alofa, Kingdom of Tonga
Phone: (676) 23038/25355, Fax: (676) 23093
Email: mhalafihi@hotmail.com

Tuvalu

Mr. Itaia Lausaveve
Director of Agriculture, Ministry of Natural
Resources & Environment,
Department of Agriculture, Private Mail Bag,
Vaiaku, Funafuti, Tuvalu
Phone: (688) 20160, Fax: (688) 2082
Email: ilausaveve2@yahoo.com;
teniku@gmail.com

Vanuatu

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

Resource Persons

SPC - Fiji

Dr. Mary Taylor
Genetic Resources Coordinator/Centre for Pacific Crops and Trees Manager (CePaCT)
Land Resources Division, Secretariat of the Pacific Community, Private Mail Bag, Suva, Fiji
Phone: (679) 3370733, Ext 271,
Fax: (679) 3370-021/3386-326
Email: maryt@spc.int

Bioversity International - India

Dr. Prem N. Mathur
South Asia Coordinator and Senior Scientist,
Genetic Diversity Assessment and Use,
Bioversity International Sub-regional Office for South Asia, National Agriculture Science Centre, DPS Marg, Pusa Campus
New Delhi 110 012, India
Phone: (91-11) 25849000
Fax: (91-11) 25899002
Email: p.mathur@cgiar.org

APAARI - India

Dr. Raj Paroda
Executive Secretary, Asia Pacific Association of Agricultural Research Institutions (APAARI), C/o TAAS, Avenue II, IARI, Pusa Campus, New Delhi 110 012, India
Phone: (91-11) 65437870
Fax: (91-11) 25843243
Email: raj.paroda@apaari.org

NARI - PNG

Dr. Raghunath D. Ghodake
Acting Director, General National Agricultural Research Institute (NARI), Sir Alkan Tololo Research Centre, Ten mile-Bubia, P.O. Box 4415, Lae, Morobe Province, Papua New Guinea
Phone: (675) 4751445, Fax: (675) 4751449
Email: raghunath.ghodake@nari.org.pg

NARI - PNG

Dr. Alan Quartermain
PNG University of Natural Resources, Vudal, Papua New Guinea
Phone: (675) 9839282, Fax: (675) 9839247
Email: aquartermain@gmail.com

Crops for the Future - Sri Lanka

Dr. Hannah Jaenicke
International Centre for Underutilized Crops (ICUC) – Crops for the Future
P.O. Box 2075, Colombo, Sri Lanka
Phone (94-011) 2880000, Fax: (94-011) 2786854
Email: h.jaenicke@cgiar.org

Observers

Asian Development Bank (ADB) - Philippines

Ms. Lourdes S. Adriano
Principal Agriculture Sector Specialist
Agriculture, Rural Development and Food Security Unit, Regional and Sustainable Development Department, Asian Development Bank, 6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines
Phone: (63) 26324154, Fax: (63) 26362444
Email: ladriano@adb.org

Bioversity International - Italy

Dr. Gerald Moore
Honorary Fellow
Bioversity International
Via dei Tre Denari, 472/a 00057
Maccarese, Italy
Phone: (003906) 6118280, 9351171
Email: g.moore@cgiar.org

Dr. Stefano Padulosi

Senior Scientist, Integrated Conservation Methodologies and Use Diversity for Livelihoods Programme, Bioversity International, Via dei Tre Denari, 472A 00057 Maccarese, Rome, Italy
Phone: (39) 0661181, Fax: (39) 0661979661
Email: s.padulosi@cgiar.org

**Food and Agriculture Organization (FAO)
of the UN - Italy**

Dr. Daniele Manzella
Project Coordinator, Capacity Building
Project for IT-PGRFA Implementation
FAO of the UN
Via Terme di Caracalla 00100, Rome, Italy
Phone: (3906) 57056180
Fax: (3906) 57058444
Email: daniele.manzella@fao.org

Nature's Way - Fiji

Mr. Sant Kumar
General Manager
Nature's Way Co-operative (Fiji) Limited
Nasoso Road, Nadi, Fiji Islands
Phone: (679) 6724566, Fax: (679) 6724569
Email: nwc@connect.com.fj

NARI - PNG

Mr. Tio Nevenimo
NARI Keravat Programme
P.O. Box 204, Kokopo, East New Britain
Province, Rabaul, Papua New Guinea,
Phone: (675) 9839145
Fax: (675) 9839129
Email: tio.nevenimo@nari.org.pg

SPC - Fiji

Mr. Tevita Kete
Plant Genetic Resources Officer
Centre for Pacific Crops and Trees (CePaCT),
Land Resources Division,
Secretariat of the Pacific Community
Private Mail Bag, Suva Fiji
Phone: (679) 3370733, Ext 282
Fax: (679) 3370021/3386326
Email: tevitak@spc.int

Ms. Reapi Masau
Project Assistant
Centre for Pacific Crops and Trees (CePaCT)
Land Resources Division
Secretariat of the Pacific Community
Private Mail Bag, Suva, Fiji
Phone: (679) 3370-733, Ext 230
Fax: (679) 3370-021/3386-326
Email: reapim@spc.int

Mr. Waisale Tabuavou
ICE Communications & Extension Assistant
Secretariat of the Pacific Community,
Private Mail Bag, Suva, Fiji
Phone: (679) 3370733, Ext 238
Fax: (679) 3370021/3386326
Email: waisalet@spc.int

Dr. Posa A. Skelton
Coordinator - PACINETUSP/SPC/SPREP
Suva, Fiji
Phone: (679) 3232708, Mob. (679) 9089286
Email: skelton_p@usp.ac.fj; posas@spc.int

Ms. Valerie Tuia
Curator
Centre for Pacific Crops and Trees (CePaCT),
Land Resources Division, Secretariat of the
Pacific Community, Private Mail Bag, Suva, Fiji
Phone: (679) 3370733, Ext 274
Fax: (679) 3370021/3386326
Email: valeriet@spc.int

Mrs. Laiesene Samuelu Tuioti
Consultant Centre for Pacific Crops and
Trees (CePaCT), Land Resources Division,
Secretariat of the Pacific Community
Private Mail Bag, Suva, Fiji
Phone: (679) 3370733, Fax: (679) 3370021
Email: Ituioti@samoa.ws

Matrix to Assess Ongoing Work and Opportunities for Underutilized Crops in The Pacific

Country:

Crops/Species	Ongoing activities	Planned activities	Information available but not documented
<i>Artocarpus altilis</i> (breadfruit)			
<i>Musa</i> spp. (Fe'i bananas, plantains)			
<i>Xanthosoma</i> spp., <i>Alocasia</i> sp. (lesser aroids)			
<i>Pandanus</i> spp.			
<i>Cyrtosperma</i> <i>chamissonis</i> (giant swamp taro)			
<i>Abelmoschus</i> <i>manihot</i> (bele)			
<i>Saccharum</i> <i>edule</i> (pitpit)			
<i>Canarium ovatum</i> (galip nut)			
<i>Inocarpus fagifer</i> (Polynesian chestnut)			
<i>Pometia pinnata</i> (tava)			

Add other underutilized species of importance in your country here:

Participants were asked to complete this form with as much detail as possible and return to SPC (Maryt@spc.int) by 21st October, 2009

