Draft Concept Paper for

Coconut Research and Development in the South Pacific

COGENT Steering Committee Meeting
Bangkok Thailand, June 2002

Introduction

The South Pacific Island nations are collectively one of the major producers and exporters of copra. Copra and coconut products continue to be an important for the domestic and export markets. Coconuts are important for household food security and the many uses of coconuts that make them an essential part of life in the Pacific. Mainly small holders produce coconuts and the decline in copra prices is increasing poverty in the Pacific. The environmental benefits of coconuts are very important in the fragile ecologies of the Pacific Islands. These benefits include prevention of soil and beach erosion, nutrient recycling, windbreaks to prevent wind erosion, provide shade to reduce soil temperatures and conserve soil moisture.

However the coconut industry is undergoing rapid change due to competition from other edible oils and more profitable crops. The coconut paradigm must change with the times and that is the challenge that faces us today. Despite the decline in copra prices coconut remains an important component of agriculture in the Pacific.

COGENT in collaboration with international, regional, and national partners have made a significant contribution to the coconut industry in the South Pacific. A number of coconut research and development strategies have emerged in discussion among the Pacific Islands that will build on previous projects and activities and provide the foundation for the increase in income for small scale coconut farmers in the Pacific through immediate development activities and long term research.

The potential components for a regional coconut project consist of the following:

- Value adding
- Coconut-based farming systems
- Germplasm conservation and exchange
- Indigenous coconut germplasm
- Hybrid trials
- Synthetic varieties

Overview of Project Components

1. Value adding:

In order to increase the income of coconut farmers, there is a need to have more options on what to do with coconut for food and non- food products. There is widespread interest and support for this component of the project. In discussions thus far the greatest area of interest is for technologies for oil extraction in a variety of sizes and costs for families or groups. There are coconut products and technologies that are indigenous in the Pacific and some new technologies from Asia that may be appropriate for the Pacific. The primary focus is on coconut value adding for household use and the local market including the tourist market. Aspects of the value-adding component include:

- Pilot projects at the village level in each of the participating countries to document the current value adding that is being done in coconut producing areas, determine appropriate new technologies and products, and introduce new technologies and products along with training.
- A national and region inventory of the various kinds of current and potential coconut value adding that could be done at the village level. Some traditional coconut technologies are disappearing and there need to be documentation of these technologies at the national level. A regional inventory of coconut technologies and products will encourage the sharing among Pacific Island countries.

The suggested steps in the process:

1. Use Participatory methodologies at the village level to determine what coconut products rural families are producing. This would be a pilot effort looking at several villages where coconut production is or was one of the important activities.
2. At the same time determine new products and technologies with market potential that could be promoted in the village and assess their interest for trying new technologies.
3. Provide training and test technologies with the villages.
4. Follow up assessment of the technologies and assist with problems.
5. From these pilot studies it should give us an indication of the direction to pursue for wider national efforts in value adding that is appropriate for Pacific islands.

Component Implementation:

The project will provide funding assistance for carrying out the village assessment & village training, training of extension staff in coconut products and technologies and costs of some coconut technologies. Information on technologies will be documented at a national level and the inventory of technologies and products will be compiled at the regional level by SPC.

2.Coconut-Based Farming Systems:

Coconut-based farming systems are important to the present and future of the coconut industry. There is a wide range of experiences in the Pacific and from other regions concerning coconut based farming systems. Information needs to be compiled so that the various systems are documented, economic data collected, and labor requirement are described. This component will build on the information that was gathered during the COGENT/IFAD project. As a result a publication will be produced with information on coconut based farming systems that can be used by extension staff with farmers under a variety of conditions.

Component Implementation:

The project will provide assist the countries to gather the information in a standardized form, compile the results, reviewing the literature and developing a publication.

3. Germplasm conservation and exchange:

The International Coconut Genebank in PNG and laboratory are established and operational. Coconut embryos have been sent to the ICG from the SPC Regional Germplasm Centre that had been collected in Cook Islands, Kiribati, Marshall Islands and Tuvalu by Jean-Pierre Labouisse and Dr. Roland Bourdeix of CIRAD with the assistance of national agriculture staff. Coconut embryo training was done with Fiji, Samoa, and Tonga earlier this year. Recently in collaboration with Fiji Ministry of Agriculture some shipment of Fiji Tall embryos have been sent to the ICG. Many lessons have been learned about transferring coconut embryos so that it can be done effectively.

Component Implementation:

The regional project will provide support to transfer of coconuts to the ICG, support to the ICG laboratory and for establishment of the field ICG and movement of coconut embryos from the ICG and other sites to the COGENT member countries.

4. Indigenous coconut varieties:

There is a need for further pre-prospecting and collection of other important farmer varieties. Different coconut cultivars have different uses from farmer's perspective. These populations are usually not collected because previous collection activities concentrated on copra yield. Some of the countries in the region have started this work in the ADB/COGENT phase 1 and 2. The target population should also include those with special adaptation to extreme agro-ecological conditions like atoll, highlands and also swampy lands. In this work, to determine whether the populations are really unique the following activities need to be carried out:

a. Morphological characterization as stipulated in the STANTECH Manual and complimented by DNA finger printing. CIRAD and COGENT have standardized the use of such analysis and the capability to do the analysis should be developed in the Pacific
b. Training of staff of the PIC's would be required also for the collection of the sample and it's safe transfer to the laboratory.
c. Those selected from the project would be conserved *in situ*.

Component Implementation:

The project will provide training, some collecting costs, technical assistance and assist in preparing a laboratory in the region for DNA analysis capability.

5. Hybrid coconuts:

A project called "Production and Dissemination of Improved Coconut Cultivars" (PDICC) was started in 1989 as a component of the EU funded Pacific Regional Agricultural Programme (PRAP). The purpose of PDICC Project was the improvement of the potential of coconut production in the region by increasing the choice of hybrid coconut cultivars in the South Pacific Region through the evaluation of diverse hybrids in at the Saraoutou research station now the Vanuatu Agriculture Research and Training Centre (VARTC). During the Project, 39 new hybrid crossings were created by hand-pollination and 8 trials were successfully established in Saraoutou station between 1992 and 1999. This represents a total surface area of 57 hectares with approximately 9000 palms under individual observation. Each of first seven trials incorporates hybrids created by crossing diverse dwarf cultivars with a tall cultivar native of different countries of the region. The results of these trials will permit the construction of a database of great value for the research and extension services within the region. To date, a wealth of data has been collected and analysed on the characteristics of these hybrids including: speed of germination, age of flowering, production, fruit component analysis and oil content. As two cyclones struck VARTC in 1999 and 2001, interesting observations were done on the resistance of each hybrid to strong winds.

- 4 years after planting, all the hybrids bear flowers.

- There is significant difference between the hybrids for the resistance to strong winds. Malayan Red Dwarf x Rennell Tall (MRDxRIT) is the most susceptible.
- For the yield, the hybrid MRDxRIT shows good performances in all the trials. The hybrids Malayan Yellow Dwarf x Rennell Tall, Brazilian Green Dwarf x Rennell Tall, Malayan Red Dwarf x Tonga Tall, Malayan Red Dwarf x Rotuman Tall seem also very promising.
- All the hybrids with Madang Brown Dwarf as female parent show the higher copra content in the trials. The hybrids with Brazilian Green Dwarf as female parent and the hybrids with Rotuman Tall as male parent have also good copra content.
- For oil content, there are slight differences between the hybrids. MRDxRIT shows the lower oil content.

Full evaluation of a hybrid cultivar takes 9-10 years after field planting is completed. So the evaluation of the first 7 PRAP trials established in Vanuatu will be achieved by Year 2005-2006. Until then, they must be maintained and the yield and characteristics of the fruits must continue to be recorded and analysed.

Component Implementation:

The project will provide funding to VARTC, which is now under the management of Vanuatu, to continue the trials and gather data so that is can be used in coconut breeding programmes in the future.

6. Synthetic varieties:

There is a need to increase the productivity of coconuts. One of the ways of doing this is through hybrid production; which is also commonly practiced. While this is effective (hybrid vigor) it is however expensive to establish and maintain seed gardens and also offspring of the resulting original cross cannot be used as seed material because the genetic vigor is not maintained (segregation). Also hybrids do narrow down the diversity.

One way of that has been suggested to overcoming these problems is the use of synthetic varieties, whereby 5 to 7 high yielding and adapted varieties are inter-planted in a block of 15 hectares. The resulting offspring could be also used as seeds while having an increased yield. The varieties used would have to have synchronized pollination and vigorous selection in the seed nursery. There would also needs to be adequate isolation to prevent foreign pollen from entering the block. This method has been successfully used in the Philippines it is proven to yield 2-3 tones per hectare.

To assist in this program CIRAD and VARTC have carried out a number of evaluations on a number of coconut cultivars both from the region and also from other countries. This would assist in selection of the germplasm that would be used for creating the synthetic varieties.

Component Implementation:

The project will supply some initial funding for the establishment of pilot sites at the ICG in Papua New Guinea to test this approach. This would be a long-term project that would require substantial commitment by the host country.

Project Implementation arrangement

The CRDSP project will have duration of 3-5 years. SPC will coordinate the project through the SPC Agriculture Adviser and PGR Adviser. A part-time project leader from the Pacific will focus on the various regional outputs of the project on value adding, coconut based farming systems and indigenous germplasm. Technical advice and short-term training can be provided from member countries, CIARD, or through COGENT member countries. SPC can host a coconut website, publication on CD ROM and hardcopies of project publications. MOUs will be developed with countries for national activities.