A Global Strategy
for the conservation and use of Coconut Genetic Resources
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LA RECHERCHE AGRONOMIQUE POUR LE DÉVELOPPEMENT

COGENT
Coconut genetic resources for enhanced livelihoods

Bioversity International

Coconuts and tourism

In 2012, two small Samoan islands started to be converted to traditional coconut conservatoires Namu'a Island hosts a small resort owned by local people. Nuusafe'e Island is uninhabited, but tourists regularly hire boats from fishermen and resorts for day trips. Funding for the research programme and the subsequent scientific visits to these islands was insufficient to fully develop and follow ecotourism activities. Nevertheless some recommendations have been drafted:

- Planting of the islands needs to be continued. For a while, tourists could be invited to sponsor/plant a seedling (especially in the hard but picturesque slopes of Namu'a). During the initial planting, Niu afa seedlings were planted by American female tourists,
- When the new coconut palms bear fruit, after all unwanted palms have been felled; it will become possible to create nurseries from the seednuts harvested in the islands. Tourists could be taught how to recognize the different varieties produced by the islands by using the colour of the germinating sprout: red for Dwarf, green for Niu afa Tall and brown for their hybrids,
- Tourists could be taught about floral biology and how to emasculate Dwarf inflorescences in order to increase the proportion of hybrid seednuts produced by the islands,
- Extracting and braiding fibres from the Niu afa variety could be demonstrated and the resulting artefacts sold.

Beyond *ex situ* genebanks, rationalizing coconut conservation can often be achieved by reducing the total number of coconut palms and simultaneously by increasing their genetic diversity. It is crucial for COGENT to convince the scientific community, including botanists and ecologists, to share these views. The research programmes initiated in Samoa islands and Tetiaroa Atoll needs to be pursued by integrating a broader ecological approach. Moreover, as highlighted in the next section, collaboration with botanists and ecologists is crucial in other areas related to conserving coconut genetic resources.

3.4.4 Coconut reproduction patterns

As pointed out in section 1.1.4, the complexity of natural breeding modes of the coconut palm remains a challenge that needs to be better managed.

The most important topic relates to pollination distance. Although some experiments have been conducted in the past (Sangare 1981), further study is needed on the pollination distance for optimizing the production of certified varieties in geographical and reproductive isolation. As discussed in section 3.4.1, production of seednuts of traditional varieties should not be conducted on Tall-type palms planted close to coconut hybrids or other varieties; otherwise the resulting seednuts will not be true-to-type. Three elements need to be determined:

1. The ***minimum isolation distance*** needed to produce at least 95% of true-to-type seedlings.
2. As an alternative guarantee of sufficient isolation for seednut production, ***the size and thickness of a buffer zone*** made from the same varieties and surrounding the

seed garden. This kind of design was envisioned for replanting the Samoan *ex situ* collection[29].

3. If ***such buffer zones can feasibly be used*** in *ex situ* genebanks in order to avoid making controlled pollinations, as explained in the above Samoan example. Presently it is estimated that conserving one accession by using buffer zones will require 8 to 10 ha, when compared to 0.7 ha for conserving the same accession in classical *ex situ* genebanks.

Another important topic is related to self-pollination, inducing an inbreeding depression of 20-30% in the yields of 10-30% of the natural progenies of most Tall-type coconut palms. Simple techniques need to be tested for selecting the seednuts, which result only from cross-pollination. This will consist in sowing seednuts selected only from green-coloured parents in populations mixed of green and brown colours; then comparing the yields of the progenies according to the colour of their sprouting. In this case, seednuts from natural self-pollination show a green sprout. Seednuts with brown sprout come from the cross between a Green coloured female parent with a brown coloured male parent, but never from self-pollination. Thus, in these progenies, comparing the yields of green sprouting and brow sprouting palms will allow to estimate the losses in yield due to self-pollination.

As discussed in section 2.5.6 with regard to fruit quality, the characteristics of the triploid kernel are influenced by the set of chromosomes transmitted by the pollen. Thus, it is important to assess how many male parents are represented in a coconut bunch.

Many farmers plant seednuts directly harvested on Dwarf x Tall hybrids, so *the reproduction mode of these hybrids needs further assessment to better understand the consequences of this practice.* We presently do not know the percentage of selfing in such seednuts.

From a more general perspective, it appears crucial to convince ecologists to conduct more fundamental research on the coconut palm. Most of ecological studies are presently devoted to wild palm species. The coconut palm is an extraordinary model for ecological studies because of its dispersal pattern, because of the co-existence of different reproduction modes and because of the specificities of its coastal habitats and associated fauna.

Thus, a better understanding of the natural reproduction pattern of the coconut palm could greatly benefit the quality of conservation and of production of planting material.

3.5 Collecting and filling gaps in *ex situ* collections

The global objective of COGENT for filling gaps within the next decade in *ex situ* collection is to collect up to 500 well-chosen populations or varieties and successfully transfer them in *ex situ* genebanks. COGENT country members will probably collect more germplasm in the framework of their national programmes; but

[29] See the URL : http://coconutsamoa.blogspot.fr/2010/03/15.html