A Global Strategy
for the conservation and use of Coconut Genetic Resources
2018-2028

Compiled by R. Bourdeix and A. Prades

cirad
LA RECHERCHE AGRONOMIQUE POUR LE DÉVELOPPEMENT

COGENT
Coconut genetic resources for enhanced livelihoods

Bioversity International

uncontrolled mixture of various traditional varieties and sometimes modern hybrids. The "best palms" harvested for seednuts are often natural crosses between traditional varieties, or crossed between traditional varieties and modern hybrids. Seednuts are sometimes harvested on Tall-type palms planted very close to Dwarf x Tall hybrids, or even directly on such hybrids.

Governments in many countries are promoting farmers' organizations. Some countries have tried to engage with such organizations and to strengthen their role and efficiency in seednut production. The idea is for researchers to interact with farmers' organizations using participatory approaches, and then to use both breeders' and farmers' knowledge to educate trainers to help women and men farmers to improve their breeding and seednut production, also in gender-responsive ways. Finally, such interactions increase the knowledge of breeders about the real needs (including gendered trait-preferences) of the farmers or private sector stakeholders and thus lead to better breeding scheme's programing, and more relevant outputs.

2.5.3 Past and contemporary coconut breeding

Coconut breeding programmes aim to improve yield, to develop varieties tolerant to biotic and abiotic stress and well adapted to the main uses of the coconut palm (Arunachalam and Rajesh 2008). As with most perennial crops, coconut breeding is complex and takes a long time, yet despite this, important achievements have been recorded.

Scientific research on coconut started in India in 1916 but many studies were interrupted by world wars and by the 1929 economic crisis. (Ratnambal and Nair 1998). The first coconut hybrids created by a scientist were produced in Fiji in 1926, by crossing the Malayan Red Dwarf (a classical Dwarf) with the Niu Leka Dwarf (a Compact Dwarf) (Marechal 1928).

Traditional coconut varieties are classified in four types: **Tall**; two kinds of **Dwarfs** (**autogamous Malayan** type and **allogamous Compact** type); and a few rare varieties intermediate between Tall and Dwarf and called **Semi-Tall**. Coconut breeders have tested crosses within and between most of these types.

The first "scientific" hybridizations between Dwarf and Tall coconut varieties were initiated by Indian researchers (Patel 1938). However, recent study shows that Indian farmers from Kerala have long been able to select natural hybrids within the progeny of the Chowgat Orange Dwarf. They choose and value the rare seedlings with brown sprouts in the progeny of the Orange Dwarf that otherwise has an orange sprouts due to selfing (Bourdeix et al. 2008). Indian scientists very probably observed what farmers did and then amplified their efforts with scientific research.

"Modern" coconut breeding only resumed after the Second World War, with the first scientific surveys studying coconut diversity. From 1945 to 1960, numerous hybridizations were produced thanks to the involvement of institutions like CPCRI and IRHO with generally a low number of palms per progeny. Even when hybrids displayed a high yield potential, the lack of reliable seednut production prevented their distribution to farmers.

The development of mass production techniques for hybrid seednuts dates back to the 1970s. These techniques opened the way for distributing coconut hybrids at scale, enabling many farmers to adopt them.

The first international meeting of coconut breeders was organized by Burotrop, GTZ and IPGRI (now Bioversity) and hosted at Marc Delorme Research Station in Côte d'Ivoire in 1994. The meeting aimed to create a connection between the existing coconut breeding programmes around the world and to standardize the techniques employed in coconut breeding (Batugal and Rao 1998, Santos et al. 1996). At the end of the meeting, it was observed that most of the national breeding programmes preferred to rely on their local cultivars rather than to introduce advanced varieties from the largest breeding centres, such as the Marc Delorme research station in Côte d'Ivoire.

In 2001, COGENT supported the APCC in conducting a survey on farmers' varietal preferences in 10 coconut-producing countries. The results showed that: 1) social facts are critical for explaining varietal preferences (Bourdeix et al. 2008); 2) although, there is no universal hybrid, hybrids generally performed better than the Tall traditional varieties under adequate rainfall and good soil conditions; and 3) farmers had not focused exclusively on high yields but were also interested in other traits such as robustness requiring low inputs and special characteristics for producing high-value products.

Between 1999 and 2004, COGENT conducted a multi-location trial (CMT) involving seven countries from Africa, Latin America and the Caribbean. This experiment, funded by the Common Fund for Commodities (CFC) compared the same six promising hybrids for copra production, shipped from Côte d'Ivoire with hybrids and traditional varieties produced locally. Sixteen coconut hybrids tested in this project started to flower two and a half to three years after planting, compared with the five to six years normally required for traditional Tall-type varieties to reach flowering stage. Potential annual copra yield projections for the best hybrids was up to 5 t/ha at the peak of production (10-12 years) compared to the 1t/ha generally produced by the traditional cultivars (Batugal et al. 2005a). Exploitation of mutations has also been considered, such as the breeding work on varieties known as Makapuno/Kopyor or Aromatic (See box next page).

2.5.4 Breeding for yield increase

Coconut yield is expressed in different ways according to uses and markets. Until the 1990s, breeders mainly expressed yield in terms of tons of copra or oil per hectare. Those focused on coconut water consider the number of fruits per hectare, or the water volume per hectare. Sometimes yield is also expressed as the weight of whole fruits per hectare, or quantity of toddy per palm.