

## Public awareness initiatives in coconut **Standardized catalogues of coconut germplasm: Catalogue of conserved germplasm and farmers' varieties**

*R Bourdeix<sup>1</sup> and P Batugal<sup>2</sup>*

<sup>1</sup>*Coconut Breeder, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Cedex 5, Montpellier, France*

<sup>2</sup>*Coordinator, COGENT, and Senior Scientist, International Plant Genetic Resources Institute - Regional Office for Asia, the Pacific and Oceania (IPGRI-APO), Serdang, Selangor, Malaysia*

### ***Introduction***

Coconut genetic diversity is essential to ensure sustainable coconut production. This diversity is vital for breeding improved varieties and hybrids which are high-yielding and possessing other traits which are preferred by smallholder producers and adapted to biotic and abiotic stresses. Unfortunately, most of the 38 member countries of the International Coconut Genetic Resources Network (COGENT) do not have, individually, a wide range of coconut genetic diversity. Breeding programmes in some of these countries use a limited range of germplasm, which may not be suitable or adequate to effectively achieve their breeding objectives. Many of them are not fully aware of the characteristics of many coconut accessions worldwide. This constraint has been partly alleviated through the development and dissemination of COGENT's International Coconut Genetic Resources Database (CGRD). At present, there are 1416 coconut accessions conserved in 25 COGENT member countries. This collection is not exhaustive, as more varieties exist in farmers' fields which have recently been identified and characterized under various COGENT-coordinated projects. While some of these are described in the CGRD, the data contained therein do not sufficiently describe the origin, history and morphological and agronomic characteristics of the varieties; other relevant information like conservation sites and global distribution are also non-existent. These data, if incorporated, would be useful not only to coconut breeders but also to other researchers, students and industry players who are working to promote the conservation and use of coconut genetic diversity to benefit smallholders.

Illustrated descriptions of coconut varieties were initially published by a few authors such as Pruhdhomme (1906) and Liyanage (1958). In their papers, a few full pages of drawings or photographs of coconut

fruits of different shape and sizes are shown. In some documents related to surveys, characterization or exploration of coconut germplasm, there are also a few pictures and drawings describing various coconut varieties (Whitehead 1966; Le saint *et al.* 1983; Sangare *et al.* 1984; Foale 1987; N'Cho *et al.* 1988). However, such publications are limited in number. The first catalogue of coconut germplasm entitled, 'Coconut descriptors', was published in India in 1995 (Ratnambal *et al.* 1995). In this publication, a variety is described using colour plates of its different parts and two pages of textual information following standardized descriptors (IBPGR 1995). However, this book was mainly designated and written for scientists and researchers, without any ethnobotanical, economical or historical description of the varieties. The second volume of the publication was published in 2001 and distributed in CD-ROM.

To address the situation, COGENT and the Centre de Cooperation Internationale en Recherche Agronomique pour le Développement (CIRAD), initiated the development of two catalogues: the Catalogue of Conserved Coconut Germplasm and the Catalogue of Farmers' Coconut Varieties. The former contains textual and pictorial description of coconut varieties conserved in genebanks of COGENT member countries, while the latter describes coconut varieties that have been identified in farmers' fields under the previous Asian Development Bank (ADB)- and the current International Fund for Agricultural Development (IFAD)-funded 'Poverty reduction in coconut growing communities' projects. The idea of making these fully-illustrated catalogues as printed materials was approved in the 2000 COGENT Steering Committee meeting held in Bangkok, Thailand.

Since then, COGENT and CIRAD have been collaborating to develop and publish these two high-quality catalogues. The objective of this effort is not only to showcase as many referenced varieties as possible, but also to provide comprehensive information (pictures and text) to help stakeholders identify and select the appropriate coconut varieties either for their breeding work or replanting programme. The information in the catalogues is presented to make them attractive and understandable to the general public while retaining their technical soundness to be appreciated by scientists and researchers, thereby appealing to a much wider spectrum of audiences.

In this catalogue, each variety is described using one-page picture plate and one-page text, as detailed below:

### **Textual information**

In the textual description (Annex 1), each variety is described following the headings below:

- **The international name and abbreviation of the variety;**

- The author(s) of the text;
- **History and description:** Historical, botanical and morphological data of the variety;
- **Identification:** Description of the traits that differentiate the variety described from other varieties. This part also has information on the relationship of the variety to other varieties with which it is commonly confused;
- **Yield and production:** Contains data on production of fruits, copra or toddy, depending on the uses;
- **Other topics:** Any other interesting facts about the variety, including common pests and diseases and breeding techniques; and
- **References** for additional information regarding the variety.

### The picture plate

In the picture plate (Annex 2), the international name and abbreviation of the variety are located on the top right hand side of the sheet. Each plate is a composite of the following six pictures for each entry:

1. **Whole palm.** This picture of coconut palm in the field shows the entire tree from the bole to the tip of its leaves. Dry leaves and weeds in excess are removed before making the picture. If needed, two to three leaves are also generally cut in order to have a better view of bunches and fruits in the crown. Some of the pictures could also show workers, farmers or researchers for ethnology, and also as basis of comparison of the tree's height.
2. **Fruits (whole and split).** This is a composite picture showing 12 fruits: three young fruits (9-10 month old), three fully-matured fruits (12 month old) with brown-grey epidermis, three nuts split longitudinally (vertically) and three nuts split equatorially (horizontally). Each is arranged according to size (i.e., big, medium and small) to give an idea of the existing phenotypical variation. The three immature fruits are also chosen for their different colours, if available, especially for the Talls. A measuring unit (20 cm) is also included for size comparison;
3. **Fruit bunches.** This shows fruit bunches or a single bunch on the tree before all the fruits turns completely brown-grey. Most fruit bunch photos show one mature bunch and a younger bunch, as the latter may have traits that are also useful for varietal identification;
4. **Inflorescence.** This shows a fully-opened inflorescence on the palm, with one third to half of the male flowers already fallen and with a representative number of female flowers. It will not be possible to count the male nor the female flowers from the pictures but

- the shape, colour and size of the inflorescence vary with the number of female flowers and the stage of maturity;
5. **Husked nuts.** This picture is located at the top left of the page next to the name of the variety, arranged as small, medium and big. These pictures were included mainly because people, especially from the Northern Hemisphere, often know coconut only as husked nuts. In addition, there is a strong genetic variation in the size, the shape and the position of the three coconut 'eyes' that is not yet included in the IPGRI standard descriptors for coconut;
  6. **'Special' picture.** Oval-shaped, at the top right side of the plate, this photo can show any additional, interesting or unique feature of the variety (e.g. pink colour inside the husk, detail of inflorescence, special aspect of the young palm, ethnobotanical aspect, etc) or could also show the whole crown of the palm.

This catalogue may not contain all of the varieties conserved in COGENT's member countries and countries participating in COGENT's poverty reduction project, but this certainly covers a vast majority of these varieties. This catalogue is envisioned to serve the needs of researchers, students, policy officers of national programmes and other players of the coconut industry in general and help promote the coconut as a prime economic commodity.

## References

- Bourdeix, R. 1999. Coconut varieties: Malayan Dwarf. *In: COGENT Newsletter 2:13.*
- Bourdeix, R, JL Konan and JP Labouisse. 2000. Coconut cultivars: The Rennell Island Tall. *In: COGENT Newsletter 3:10-11.*
- Bourdeix R, V Tuia, LM Fili and V Kumar. 2002. Coconut varieties of 'Niu Kafa'. *COGENT Newsletter 5:14-15.*
- Foale, MA. 1987. Coconut germplasm in the South Pacific Islands. ACIAR Technical Report, Series No. 4.
- Haile, NS. 1974. The quest for the mysterious coconut pearl. The Straits Times Annual. pp 75-77, 159.
- IBPGR. 1992. Descriptors for coconut. International Board for Plant Genetic Resources, Rome. 61pp.
- Konan JL, YP N'Cho, A Kullaya, R Bourdeix and P Batugal. 2000. West African Tall. *In: COGENT Newsletter 4:13.*
- Le Saint, JP, M de Nuce de Lamothe and A Sangare. 1983. The dwarf coconut palms at Port Bouet (Ivory Coast) Part II. Sri Lanka Green

- Dwarf, and additional information about Malayan Yellow and Red Dwarfs, Equatorial Guinea Green Dwarf and Cameroon Red Dwarf. *Oléagineux* 38:595- 606.
- Liyanage, DV. 1958. Varieties and forms of the coconut palm grown in Ceylon. *Ceylon Coconut Quarterly* 9: 1-10.
- N'cho YP, JP Le Saint and A Sangare. 1988. The dwarf coconut palms at Port Bouet (Ivory Coast) Part III. New Guinea Brown Dwarf, Thailand Green Dwarf, Polynesia Red Dwarf. *Oléagineux* 43: 55-66.
- Prudhomme, E. 1906. *Le cocotier, culture, industrie et commerce*. Paris, France.
- Ratnambal, MJ, MK Nair, K Muralidharan, PM Kumaran, EVV Bhaskara Rao and RV Pillai. 1995. *Coconut descriptors, Part I*. CPCRI, Kasaragod, Kerala, India. 198pp.
- Sangare, A, JP Le Saint and MW de Nuce de Lamothe. 1984. The tall coconut palms at Port Bouet (Ivory Coast) Part III. Cambodia Tall, Tonga Tall, Rotuman Tall. *Oléagineux* 39: 205-215.
- Whitehead, RA. 1966. Sample survey and collection of coconut germplasm in the Pacific Islands (30 May - 5 September 1964). Ministry of Overseas Development, HMSO, London.

## **Annex 1. Sample textual description (varietal writeup) (Malayan Red Dwarf)**

### **Malayan Red Dwarf (MRD)**

*R Bourdeix, A Othman and JL Konan*

#### **History and description**

The Dwarf palms of Malaysia – in red, green and yellow forms- were supposedly introduced from Indonesia between 1890 to 1900. The colour of the seedling sprouts, the leaf stalks, the inflorescence and the immature fruit is not really red but more like bright orange.

The palm generally has a thin stem, about 22 to 25 cm in diameter, with no bole. When growing conditions are good, it may have a small bole (35 to 40 cm in diameter).

The youngest leaves at the top of the palm are quite soft. Its upper canopy resembles dishevelled hair, compared, for example, with the Cameroon Red Dwarf (CRD), which has a straight and erect canopy.

Because of its short peduncle, the bunch is well supported by the leaf petioles. The reproduction system has been described as direct autogamy. MRD characterization data can be found in at least seven countries: Brazil, Côte d'Ivoire, Fiji, India, Philippines, Tanzania, and Vanuatu.

#### **Identification**

More than 30 types of Red Dwarfs are referenced worldwide. Some of them look very similar to the Malayan type: Red Dwarfs from Sri Lanka, from Chowgat in India, from Nias in Indonesia, from Chumpon in Thailand, and even from Cuba. Molecular analysis techniques will help to determine if these Red Dwarfs are identical or not.

Other Red Dwarfs can be easily distinguished from the Malayan type. CRD bears pear-shaped fruits with paler orange colour. Some Red Dwarfs from the Pacific region produce bunches with long peduncle and numerous smaller fruits having a more intense red-orange colour (such as the Tahiti Red Dwarf). Fruits of some other Red Dwarfs from Papua New Guinea have a tit or lug at the bottom.

#### **Yield and production**

MRD produces medium-sized, oblong fruits that are generally bigger than those of the Malayan Yellow Dwarf. The average fruit weight ranges from 668 g (in Brazil) to 1080 g (in Vanuatu). Inside the fruits, the nuts are almost spherical and weigh from 443 g to 755 g on average.

Under ideal agronomic conditions, MRD starts flowering on the second to the third year and may produce about 70-90 fruits per palm per year (without irrigation).

MRD is mainly an ornamental palm, planted in homegardens. Water from young nuts is sweet and tasty, but not as sweet as some green Dwarfs. The albumen is thin and gives rubbery copra. MRD is sensitive to drought and is subject to alternate bearing.

#### **Other topics**

The MRD is tolerant to the Lethal Yellowing Disease (LYD) of Jamaica (Romney 1980) but sensitive to the LYD found in Tanzania and Ghana.

#### **References**

- Nuce de Lamothé, MW de and F Rognon. 1977. Les cocotiers nains à Port Bouët (Côte d'Ivoire). I. Nain Jaune Ghana, Nain Rouge Malaisie, Nain Vert Guinée Equatoriale et Nain Rouge Cameroun. Oléagineux 32:367- 375.
- Romney, DH. 1980. Agronomic performance of 'Malayan Dwarf' coconut in Jamaica. Oléagineux 35 (12):551-554.

**Annex 2.** Sample picture plate (Malayan Red Dwarf)

