Food and Agriculture Organization of the United Nations

International Treaty on Plant Genetic Resources for Food and Agriculture

Key descriptors for **Pili nut** (*Canarium ovatum* Engl.)

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UNIVERSITY OF THE PHILIPPINES LOS BAÑOS
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The University of the Philippines Los Baños (UPLB), as the Philippines premier learning institution in agriculture, biotechnology and the environment, is committed to knowledge creation, innovation and public service through instruction, research and extension. UPLB's activities are linked to the country's vision to achieve a just, equitable and prosperous society through strengthened agricultural base and to grow confidently into industry and services.

The objectives of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) are the conservation and sustainable use of all plant genetic resources for food and agriculture (PGRFA) and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity (CBD), for sustainable agriculture and food security.

The ITPGRFA text stresses the importance of *in situ* conservation and the need to collect and make publicly available related information. Particularly Article 5d which states that Contracting Parties shall *"Promote* in situ *conservation of wild crop relatives and wild plants for food production, including in protected areas, by supporting, inter alia, the efforts of indigenous and local communities"*.

Since 2015, the ITPGRFA has intensified its support to national institutions on the documentation and exchange of PGRFA data in the context of its Article 17 and the development of the Global Information System on PGRFA.

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Cover Photo: *Canarium ovatum* fruits

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CONTENTS

PREFACE

The *Pili nut Key descriptors for (*Canarium ovatum *Engl.)* consists of an initial minimum and strategic set of characterization and evaluation descriptors for this species. This strategic set aims at facilitating access to and utilization of pili nut. It does not exclude the addition of other descriptors if needed.

This work has been done jointly with the University of the Philippines Los Baños (UPLB) and the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). The list was based on a preliminary List developed by UPLB. In addition, internet searches were carried out looking for the most updated information on relevant characteristics and traits.

The key set of access and utilization descriptors was defined through an online survey, in which 26 experts from 14 different organizations/universities from three countries participated. Survey results were subsequently validated in consultation with a Core Advisory Group (see "Contributors") led by Teresita Borromeo from UPLB.

The strategic set of data standards is designed to facilitate access to and utilization of plant genetic resources for food and agriculture information. Together with passport information (Alercia *et al.* 2015, 2018), descriptors are critical to the effective sharing of characterization and evaluation data and to the efficient use of plant genetic resources for food and agriculture.

INTRODUCTION

Canarium ovatum, also known as Philippine nut and pili nut, is a dioecious tree species belonging to the Burseraceae family. It is an important endemic tree in the Philippines and the centre of diversity is in Bicol, Leyte and Samar Islands.

It is valued primarily for its kernel, oil, and resin. The pulp and kernel are edible and contain a considerable amount of essential nutrients, antioxidants, and unsaturated fatty acids of high economic importance. The resinous substance extracted from the bark is processed into multiple industrial products. Globally, commercial demand for pili nuts, oil and other by-products is growing progressively. Given the stable supply, pili pulp and kernel oil have the potential to compete in the international market.

Pili is adapted to a wide range of agro-climatic conditions particularly up to 400 m above sea level. The seeds are dispersed by frugivores and grow naturally across their geographical distribution range. It exhibits resistance to biotic stresses and could withstand catastrophic weather events making it suitable for agroforestry rehabilitation and restoration. Moreover, its canopy architecture and evergreen habit are ideal for urban landscaping and agri-tourism.

At present, pili botanical collections are found in Indonesia, Singapore, and Hawaii. While the extent of genetic diversity is being maintained in various research stations, in farmers' fields, and *in situ* specifically in the rainforests of Sorsogon in the Philippines.

Despite its economic and ecological importance, pili remains an underutilized crop in the Philippines. It is deemed that this publication is a vital tool for *Canarium ovatum* research and development programs geared towards germplasm characterization, genetic conservation, and utilization.

This descriptor list which follows the international standardized documentation system for the characterization and study of genetic resources (Alercia, 2011), is expected to support studies focusing on genetic and morphological diversity of *Canarium ovatum*, conservation of its genetic resources, domestication and to increase production and use of its products.

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Recognition goes to the Crop Leaders, Teresita Borromeo and Leah Endonela and members of the Core Advisory Group namely, Renerio Gentallan Jr., Emmanuel Bonifacio Timog, Michael Cedric Bartolome and Nestor Altoveros for providing valuable scientific direction and to all the reviewers who participated in the survey for their advice. Their names are included in the "Contributors" list.

Special thanks are due to Ana Laura Cerutti for working at different stages of the production process. Adriana Alercia, from the International Treaty on Plant Genetic Resources of FAO, coordinated and managed the entire production of this document and provided technical and scientific advice.

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KEY SET OF CHARACTERIZATION AND EVALUATION DESCRIPTORS FOR *CANARIUM OVATUM* (PILI NUT)

This is an initial, minimum set of Characterization and Evaluation descriptors for pili nut, that are useful in assisting researchers to utilize accessions more easily. This is not intended to be an exhaustive descriptor list, but rather a key list of descriptors and traits that are relevant to describing, categorizing, and especially utilizing germplasm of indigenous fruit trees.

- Ideally, observations should be made on trees of the same age, unless otherwise stated.

- For fruit descriptors, record the average measurement, or predominant shape of 10 ripe fruits randomly selected.

CHARACTERIZATION

1. Crown shape

(See Figure 1)

1 Spherical
2 Semi-circular
3 Pyramidal
4 Elliptic
5 Triangular
6 Oblong
99 Other (specify in the **Notes** descriptor)

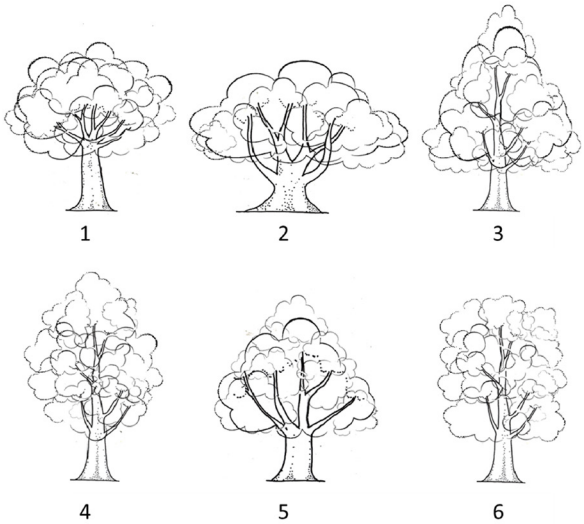

Figure 1. Crown shape

2. Number of days to flowering (d)
Number of days calculated from first flower opening to last flower opening.

3. Number of days from flowering to fruit maturity (d)
Recorded from anthesis to harvest.

4. Fruit maturity period

3 Early
5 Intermediate
7 Late

5. Peduncle length (cm)
Recorded as the average of 10 samples at harvest time (see Figure 2).

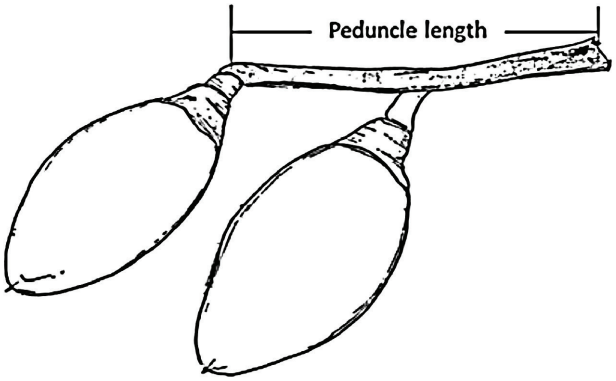

Figure 2. Peduncle length

6. Fruit shape
Record the predominant shape. Blossom end facing down (see Figure 3).

1 Narrow elliptic
2 Elliptic
3 Broad elliptic
4 Oval
5 Obovate
99 Other (specify in the **Notes** descriptor)

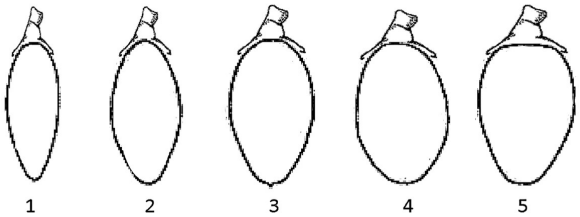

Figure 3. Fruit shape

7. Fruit weight (g)
Recorded as the average weight.

8. Fruit cross-section shape
Record the predominant shape (see Figure 4).

1 Round
2 Obovate
3 Orbicular
4 Triangular
5 Oblong
6 Broadly rounded
99 Other (Specify in the **Notes** descriptor)

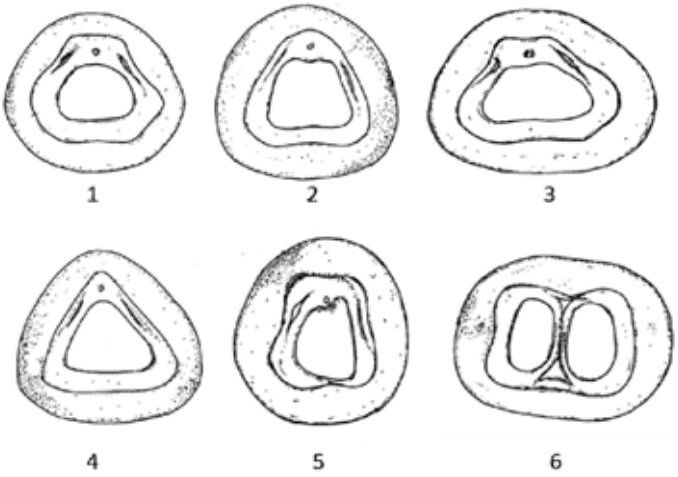

Figure 4. Fruit cross-section shape

9. Cooked fruit pulp eating quality
Combined assessment of taste, flavour, and peeling ability of the pulp.

3 Poor
5 Moderate
7 Good

10. Nut shape
(See Figure 5).

1 Elliptic
2 Obovate
3 Oval
4 Lanceolate
5 Ovate
6 Orbicular
99 Other (specify in the **Notes** descriptor)

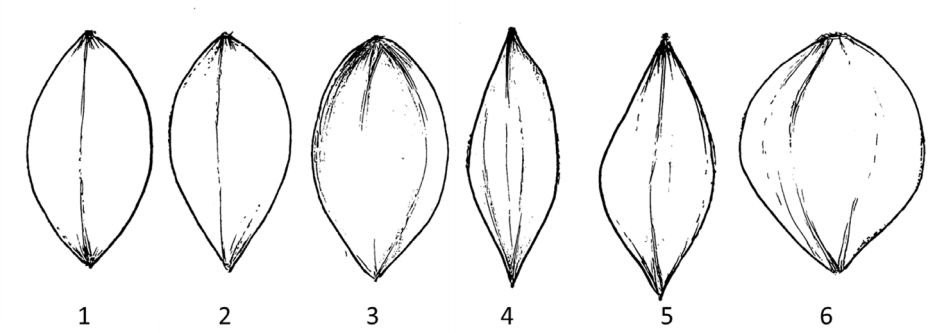

Figure 5. Nut shape

11. 100-Nut dry weight (g)

Record the mean of healthy dry nuts.

12. Uniformity of shell thickness

0 No (Not uniform)
1 Yes (Uniform)

13. Testa colour

1 Light brown
2 Brown
3 Dark brown
4 Red
99 Other (specify in the **Notes** descriptor)

14. Testa texture

1 Smooth
2 Intermediate
3 Rough

15. Seed shape

(See Figure 6).

1 Elliptic
2 Ovate
3 Obovate
4 Oblong
99 Other (specify in the descriptor)

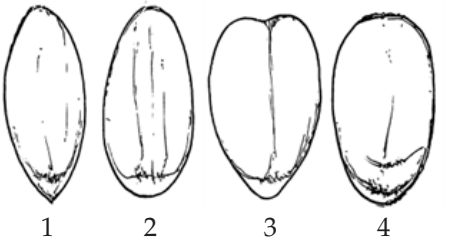

Figure 6. Seed shape

16. Seed length (cm)
Measured from the base (location of radicle) to the apex.

17. 100-Seed weight (g)
Record the average of healthy dry kernels.

18. Number of seeds per kilo
Recorded as the average of seeds per kilo extracted from newly harvested air-dried nuts replicated three times.

19. Kernel shrivel (%)
Record the average of 10 randomly selected nuts.

20. Kernel breakage percentage (%)
Percentage of kernels broken while processing.

3 Low
5 Intermediate
7 High

21. Kernel eating quality
Combined assessment of fibre content, aroma, creaminess, and turpentine flavour of kernel extracted from newly harvested mature fruits.

3 Poor
5 Intermediate
7 Good

21.1 Dry/raw kernel eating quality
Combined assessment of fibre content, aroma, creaminess, and turpentine flavour of oven dried (3–5% moisture content) kernel extracted from newly harvested mature fruits.

3 Poor
5 Intermediate
7 Good

EVALUATION

22. Estimated yield

Yield in relation to age and volume of the tree.

3 Low
5 Intermediate
7 High

23. Number of days to kernel rancidity (d)

Recorded using 100 raw samples extracted from air-dried freshly depulped nuts and 100 roasted samples extracted from air-dried freshly depulped nuts dried at 72 ºC for 10 hours. Specify if raw or roasted.

1 1–3
2 4–6
3 7–9
4 10–12
5 >13

24. Kernel chemical composition

24.1 Oil content

Recorded using 100 raw samples extracted from air-dried freshly depulped nuts and 100 roasted samples extracted from air-dried freshly depulped nuts dried at 72 ºC for 10 hours.

24.1.1 Oil colour

Specify if raw or roasted.

1 Light yellow
2 Yellow
3 Dark yellow

24.1.2 Oil yield (% DW)

Recorded using raw samples extracted from air-dried freshly depulped nuts and roasted samples extracted from air-dried freshly depulped nuts dried at 72 ºC for 10 hours. Specify if raw or roasted.

25. "Tayangaw" damage (%)

Recorded in 100 kernels per harvesting season for three consecutive years.

3 Low
5 Intermediate
7 High

26. Notes

Specify any additional information here.

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