



Food and Agriculture
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The International Treaty
ON PLANT GENETIC RESOURCES
FOR FOOD AND AGRICULTURE

Key descriptors for
Docynia indica
(Wall.) Decne



INTERNATIONAL YEAR OF
FRUITS AND VEGETABLES

2021

Key descriptors for
Docynia indica
(Wall.) Decne

World Agroforestry (ICRAF) is a centre of science and development excellence that harnesses the benefits of trees for people and the environment.

Leveraging the world's largest repository of agroforestry science and information, we develop knowledge practices, from farmers' fields to the global sphere, to ensure food security and environmental sustainability.

ICRAF is the only institution that does globally significant agroforestry research in and for all of the developing tropics. Knowledge produced by ICRAF enables governments, development agencies and farmers to utilize the power of trees to make farming and livelihoods more environmentally, socially and economically sustainable at scales.

We are guided by the broad development challenges pursued by CGIAR, a global research partnership for a food-secure future, which include poverty reduction, increasing food and nutritional security and improved natural resource systems and environmental services. ICRAF's work also addresses many of the issues being tackled by the Sustainable Development Goals (SDGs), specifically those that aim to eradicate hunger, reduce poverty, provide affordable and clean energy, protect life on land, and combat climate change.

ICRAF's Vision is an equitable world where all people have viable livelihoods supported by healthy and productive landscapes.

The Centre's mission is to harness the multiple benefits trees provide for agriculture, livelihoods, resilience, and the future of our planet, from farmers' fields through to continental scales.

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.

Required citation

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Cover Photo: *Docynia indica* fruits

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PREFACE

The 'Key descriptors for *Docynia indica* (Wall.) Decne' consist of an initial minimum set of characterization and evaluation descriptors for this species. This strategic set aims at facilitating access to and utilization of these African indigenous fruit trees. It does not exclude the addition of other descriptors later.

This work has been done jointly with the World Agroforestry (ICRAF) and the FAO International Treaty on Plant Genetic Resources for Food and Agriculture. The list was based on a preliminary List developed by World Agroforestry. Subsequently, literature research was carried out looking for the most updated information on relevant characteristics and traits which resulted in the integration of new evaluation traits. Special attention was given to the inclusion of descriptors relevant to nutritional components and biotic stresses of particular importance in the context of emerging adverse weather events which are expected to intensify under current and future climate challenges. Those included in this Key set have been chosen because of their global impact since they have wide geographic occurrence and cause significant economic damage.

The key set of access and utilization descriptors was defined through an online survey, in which 16 experts from nine different organizations/universities from seven countries participated. Survey results were subsequently validated in consultation with a Core Advisory Group (see 'Contributors') led by Alice Muchugi from ILRI and Pham Huu Thuong from ICRAF.

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

Docynia indica (Wall.) Decne, also known locally as son tra or H'mong apple (Vietnam), dou-yi (China), pin-sein (Myanmar), Assam apple/wild apple (India), belongs to the family Rosaceae.

The species naturally occurs at altitudes between 1000 and 3000 msl in Central and East Asian countries such as China, India, Myanmar, Nepal, Pakistan, Thailand, and Vietnam. It can adapt well in areas typically characterized by sloping lands and degraded areas, where it grows quickly and well. In recent years its area of distribution has increased, as it started to be used in reforestation programs. *D. indica* trees are semievergreen or deciduous. They are resistant to forest fires and can withstand extreme weather conditions such as drought and frost. Fruiting requires elevations above 1000 msl and cold winters.

D. indica is an important multi-purpose fruit tree species in agroforestry systems in the highlands. Its fruit is appreciated for its nutrient and vitamin C content as well as antioxidant properties. It also contains substances with high biological activity, which are used as herbal medicine. Fruits are often processed into products such as juice, wine, vinegar, syrup, jam, and preserved by drying. Its wood is used to make household tools and is a source of fuelwood for households. This species is an important tree in the forest and agroforestry systems in the highlands. The trees provide material for mulching, and they are used for soil protection, improvement, and reforestation.

Today, *D. indica* is increasingly recognized as an important source of income. Especially for small holder farmers, it provides an important contribution to their livelihoods and household incomes. However, there remains a big gap in knowledge of how the trees are planted, how fruits are best harvested, processed, and marketed.

This priority 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 *Docynia indica*, 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, Alice Muchugi and Pham Huu Thuong and members of the Core Advisory Group namely Phi Hong Hai, Ann Degrande, Christopher Harwood, Heiplanmi Rymbai and Jiang Chen 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 the consultants working at different stages of the production process, namely: Selvaggia Cognetti de Martiis and Ana Laura Cerutti. 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.

Particular thanks go to Francisco Lopez, from the International Treaty of FAO for his valuable advice during the publication, promotion and dissemination processes.

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KEY SET OF CHARACTERIZATION AND EVALUATION DESCRIPTORS FOR *DOCYNIA INDICA*

This is an initial, minimum set of characterization and evaluation descriptors for *Docynia* 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 healthy trees of the same age, unless otherwise stated, growing as much as possible in the same environment.
- For fruit descriptors, record the average measurement, predominant shape, or colour of 30 ripe fruits randomly selected.

CHARACTERIZATION

1. Tree growth habit

- 1 Erect
- 2 Spreading
- 3 Drooping

2. Crown diameter [m]

Measured as the mean diameter using two directions [East-West, South-North].

3. Leaf pubescence

- 1 Glabrous
- 2 Sparsely pubescent
- 3 Woolly hairs

4. Leaf shape

- 1 Elliptic
- 2 Oblong
- 3 Lanceolate
- 4 Elongated
- 5 Ovate
- 99 Other (specify in the Notes descriptor)

5. Flowers arrangement

- 1 Solitary
- 2 Fascicled

6. Fruit colour

- 1 Yellow
- 2 Brown
- 99 Other (specify in the Notes descriptor)

7. Fruit shape

Record the predominant shape using 30 fruits randomly selected.

- 1 Round
- 2 Elliptic
- 3 Oblong
- 4 Ovate
- 5 Pyriform
- 99 Other (specify in the Notes descriptor)

8. Fruit skin texture

- 1 Smooth
- 2 Rough

9. Fruit length [cm]

Record the average length of 30 mature fruits randomly selected at the longest point.

10. Fruit diameter [cm]

Record the average length of 30 mature fruits randomly selected at the widest point.

11. Fruit weight [g]

Record the average fresh weight of 30 mature fruits randomly selected.

12. Fruit taste

- 1 Sweet
- 2 Acidic (bitter)
- 3 Astringent
- 4 Sour

13. Flesh weight [g]

14. Juice content

- 3 Low
- 7 High

15. Flowering time

- 3 Early
- 7 Late

EVALUATION**16. Fruiting seasonality**

3 Early

7 Late

17. Yield per tree [kg]**Fruit nutritional content****18. Flesh Ascorbic acid content (Vitamin C) [mg/100 g]****19. Total sugar content [mg/100 g]****20. Antioxidant activity [$\mu\text{g/ml}$ FW]****21. Flesh potassium content [mg/100 g DM]****22. Flesh calcium [mg/100 g]****Biotic stresses susceptibility**

	Causal organism	Common name
23.	<i>Aspergillus</i> spp.	Fruit rot
24.	<i>Astathes</i> spp.	Longhorn beetle
25.	<i>Xanthochelus superciliosus</i>	Weevil, Caterpillar, Fruit borer
26.	<i>Colletotrichum siamense</i>	Rot disease

27. NOTES

Specify any additional information here.

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