



Descriptors for

Jackfruit

Artocarpus heterophyllus



List of Descriptors

Almond (revised) * (E)	1985	<i>Phaseolus acutifolius</i> (E)	1985
Apple (E)	1982	<i>Phaseolus coccineus</i> * (E)	1983
Apricot * (E)	1984	<i>Phaseolus vulgaris</i> * (E)	1982
Avocado (E,S)	1995	Pigeonpea (E)	1993
Bambara groundnut (E)	1987	Pineapple (E)	1991
Banana (E,S,F)	1996	<i>Pistacia</i> (excluding <i>Pistacia vera</i>) (E)	1998
Barley (E)	1994	Pistachio (E,F)	1997
Beta (E)	1991	Plum * (E)	1985
Black pepper (E,S)	1995	Potato variety * (E)	1985
<i>Brassica</i> and <i>Raphanus</i> (E)	1990	Quinoa * (E)	1981
<i>Brassica campestris</i> L. (E)	1987	Rice * (E)	1980
Buckwheat (E)	1994	Rocket (<i>Eruca</i> spp.)	1999
Capsicum (E,S)	1995	Rye and Triticale * (E)	1985
Cardamom (E)	1994	Safflower * (E)	1983
Carrot (E,S,F)	1998	Sesame * (E)	1981
Cashew (E)	1986	<i>Setaria italica</i> and <i>S. pumilia</i> (E)	1985
Cherry * (E)	1985	Sorghum (E,F)	1993
Chickpea (E)	1993	Soyabean * (E,C)	1984
Citrus (E,F,S)	1988	Strawberry (E)	1986
Coconut (E)	1992	Sunflower * (E)	1985
Coffee (E,S,F)	1996	Sweet potato (E,S,F)	1991
Colocasia * (E)	1980	Taro (E,S,F)	1999
Cotton (Revised) (E)	1985	Tea (E,S,F)	1997
Cowpea (E)	1983	Tomato (E, S, F)	1996
Cultivated potato * (E)	1977	Tropical fruit * (E)	1980
Echinochloa millet * (E)	1983	<i>Vigna aconitifolia</i> and <i>V. trilobata</i> (E)	1985
Eggplant (E,F)	1990	<i>Vigna mungo</i>	
Faba bean * (E)	1985	and <i>V. radiata</i> (Revised) * (E)	1985
Finger millet (E)	1985	Walnut (E)	1994
Forage grass * (E)	1985	Wheat (Revised) * (E)	1985
Forage legumes * (E)	1984	Wheat and <i>Aegilops</i> * (E)	1978
Grapevine (E,S,F)	1997	White Clover (E)	1992
Groundnut (E,S,F)	1992	Winged Bean * (E)	1979
Kodo millet * (E)	1983	Xanthosoma (E)	1989
Lathyrus (E)	2000	Yam (E,S,F)	1997
Lentil * (E)	1985		
Lima bean * (E)	1982		
Lupin * (E,S)	1981		
Maize (E,S,F,P)	1991		
Mango (E)	1989		
Medicago (Annual) * (E,F)	1991		
Mung bean * (E)	1980		
Oat * (E)	1985		
Oca * (S)	1982		
Oil palm (E)	1989		
<i>Panicum miliaceum</i> and <i>P. sumatrense</i> (E)	1985		
Papaya (E)	1988		
Peach * (E)	1985		
Pear * (E)	1983		
Pearl millet (E,F)	1993		

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Jackfruit

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The International Plant Genetic Resources Institute (IPGRI) is an autonomous international scientific organization, supported by the Consultative Group on International Agricultural Research (CGIAR). IPGRI's mandate is to advance the conservation and use of genetic diversity for the well-being of present and future generations. IPGRI's headquarters is based in Rome, Italy, with offices in another 19 countries worldwide. It operates through three programmes: (1) the Plant Genetic Resources Programme, (2) the CGIAR Genetic Resources Support Programme, and (3) the International Network for the Improvement of Banana and Plantain (INIBAP). The international status of IPGRI is conferred under an Establishment Agreement which, by January 2000, had been signed and ratified by the Governments of Algeria, Australia, Belgium, Benin, Bolivia, Brazil, Burkina Faso, Cameroon, Chile, China, Congo, Costa Rica, Côte d'Ivoire, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, Greece, Guinea, Hungary, India, Indonesia, Iran, Israel, Italy, Jordan, Kenya, Malaysia, Mauritania, Morocco, Norway, Pakistan, Panama, Peru, Poland, Portugal, Romania, Russia, Senegal, Slovakia, Sudan, Switzerland, Syria, Tunisia, Turkey, Uganda and Ukraine.

Financial support for the Research Agenda of IPGRI is provided by the Governments of Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, F.R. Yugoslavia (Serbia and Montenegro), Finland, France, Germany, Greece, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Macedonia (F.Y.R.), Malta, Mexico, the Netherlands, Norway, Peru, the Philippines, Poland, Portugal, Romania, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, the UK, the USA and by the Asian Development Bank, Common Fund for Commodities, Technical Centre for Agricultural and Rural Cooperation (CTA), European Environment Agency (EEA), European Union, Food and Agriculture Organization of the United Nations (FAO), International Development Research Centre (IDRC), International Fund for Agricultural Development (IFAD), Interamerican Development Bank, Natural Resources Institute (NRI), Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), Nordic Genebank, Rockefeller Foundation, United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), Taiwan Banana Research Institute (TBRI) and the World Bank.

Citation:

IPGRI. 2000. Descriptors for Jackfruit (*Artocarpus heterophyllus*). International Plant Genetic Resources Institute, Rome, Italy.

ISBN 92-9043-450-3

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PREFACE

Descriptors for Jackfruit (*Artocarpus heterophyllus*) were developed by Drs Abul Quasem, Bhag Mal, Nazmul Haq, Mathura Rai, K. Joseph John and S.K. Mitra. Dr Bhag Mal coordinated the development of this descriptor list. A draft version prepared in the internationally accepted IPGRI format for descriptor lists was subsequently sent to a number of international experts for their comments and amendments. A full list of the names and addresses of those involved is given in 'Contributors'.

IPGRI encourages the collection of data for all five types of descriptors (see Definitions and Use of Descriptors), whereby data from the first four categories – *Passport, Management, Environment and site* and *Characterization* – should be available for any accession. The number of descriptors selected in each of the categories will depend on the crop and the importance of the crop's description. Descriptors listed under *Evaluation* allow for a more extensive description of accession, but generally require replicated trials over a period of time.

Although the suggested coding should not be regarded as the definitive scheme, this format represents an important tool for a standardized characterization system and it is promoted by IPGRI throughout the world.

This descriptor list provides an international format and thereby produces a universally understood 'language' for plant genetic resources data. The adoption of this scheme for data encoding, or at least the production of a transformation method to convert other schemes to the IPGRI format, will produce a rapid, reliable and efficient means for information storage, retrieval and communication, and will assist with the utilization of germplasm. It is recommended, therefore, that information should be produced by closely following the descriptor list with regard to ordering and numbering descriptors, using the descriptors specified, and using the descriptor states recommended.

This descriptor list is intended to be comprehensive for the descriptors that it contains. This approach assists with the standardization of descriptor definitions. IPGRI does not, however, assume that each curator will characterize accessions of their collection utilizing all descriptors given. Descriptors should be used when they are useful to the curator for the management and maintenance of the collection and/or to the users of the plant genetic resources. However, highly discriminating descriptors are marked as **highlighted text to facilitate selection of descriptors.**

Multi-crop passport descriptors (see Annex I) were developed jointly by IPGRI and FAO, to provide consistent coding schemes for common passport descriptors across crops. They are marked in the text as [MCPD]. Please note that owing to the generic nature of the multi-crop passport descriptors, not all descriptor states for a particular descriptor will be relevant to a specific crop. In Annex II, the reader will find a Collecting form for Jackfruit that will facilitate data collecting.

Any suggestions for improvement on the Descriptors for Jackfruit will be highly appreciated by IPGRI.

DEFINITIONS AND USE OF THE DESCRIPTORS

IPGRI uses the following definitions in genetic resources documentation:

Passport descriptors: These provide the basic information used for the general management of the accession (including the registration at the genebank and other identification information) and describe parameters that should be observed when the accession is originally collected.

Management descriptors: These provide the basis for the management of accessions in the genebank and assist with their multiplication and regeneration.

Environment and site descriptors: These describe the environmental and site-specific parameters that are important when characterization and evaluation trials are held. They can be important for the interpretation of the results of those trials. Site descriptors for germplasm collecting are also included here.

Characterization descriptors: These enable an easy and quick discrimination between phenotypes. They are generally highly heritable, can be easily seen by the eye and are equally expressed in all environments. In addition, these may include a limited number of additional traits thought desirable by a consensus of users of the particular crop.

Evaluation descriptors: The expression of many of the descriptors in this category will depend on the environment and, consequently, special environmental designs and techniques are needed to assess them. Their assessment may also require complex biochemical or molecular characterization methods. This type of descriptors includes characters such as yield, agronomic performance, stress susceptibilities and biochemical and cytological traits. They are generally the most interesting traits in crop improvement.

Characterization will normally be the responsibility of genebank curators, while evaluation will typically be carried out elsewhere (possibly by a multidisciplinary team of scientists). The evaluation data should be fed back to the genebank which will maintain a data file.

Highly discriminating descriptors are marked as **highlighted text**.

The following internationally accepted norms for the scoring, coding and recording of descriptor states should be followed:

- (a) the Système International d'Unités (SI) is used;
- (b) the units to be applied are given in square brackets following the descriptor name;

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- (c) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the section where it is used);
- (d) the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries* are used;
- (e) many quantitative characters, which are continuously variable, are recorded on a 1-9 scale, where:

1	Very low	6	Intermediate to high
2	Very low to low	7	High
3	Low	8	High to very high
4	Low to intermediate	9	Very high
5	Intermediate		

is the expression of a character. The authors of this list have sometimes described only a selection of the states, e.g. 3, 5 and 7, for such descriptors. Where this has occurred, the full range of codes is available for use by extension of the codes given or by interpolation between them, e.g. in Section 10 (Biotic stress susceptibility), 1 = very low susceptibility and 9 = very high susceptibility;

- (f) when a descriptor is scored using a 1-9 scale, such as in (e), '0' would be scored when (i) the character is not expressed, and (ii) a descriptor is inapplicable. In the following example, '0' will be recorded if an accession does not have a central leaf lobe:

Shape of central leaf lobe

- 1 Toothed
- 2 Elliptic
- 3 Linear

- (g) absence/presence of characters is scored as in the following example:

Terminal leaflet

- 0 Absent
- 1 Present

- (h) blanks are used for information not yet available;
- (i) for accessions which are not generally uniform for a descriptor (e.g. mixed collection, genetic segregation), the mean and standard deviation could be reported where the descriptor is continuous. Where the descriptor is discontinuous, several codes in the order of frequency could be recorded, or other publicized methods can be utilized, such as Rana *et al.* (1991), or van Hintum (1993), that clearly state a method for scoring heterogeneous accessions;

- (j) dates should be expressed numerically in the format YYYYMMDD, where
- YYYY - 4 digits to represent the year
 - MM - 2 digits to represent the month
 - DD - 2 digits to represent the day.

PASSPORT

1. Accession descriptors

1.1 Accession number [MCPD]

This number serves as a unique identifier for accessions and is assigned when an accession is entered into the collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number should never be re-used. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system)

1.1.1 Local plant number

This identifies a single plant within a population of plants having the same accession number. It may be any combination of plot identity, row number, or tree position within the row.

1.2 Donor name

Name of the institution or individual responsible for donating the germplasm

1.3 Donor number [MCPD]

Number assigned to an accession by the donor

1.4 Institute code [MCPD]

Code of the institute where the accession is maintained. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus number or an acronym as specified in the Institute database that will be made available by FAO. Preliminary codes (i.e. codes not yet incorporated in the FAO Institute database) start with an asterisk followed by a 3-letter ISO 3166 country code and an acronym.

1.5 Curator's name

Name of the officer responsible for maintaining the genetic resources material held at the institute specified in descriptor 1.4 **Institute code**

1.6 Other number(s) associated with the accession [MCPD]

Any other identification number known to exist in other collections for this accession, e.g. USDA Plant Inventory number (not Collecting number, see descriptor 2.3). Other numbers can be added as 1.6.3, etc.

1.6.1 Other number 1

1.6.2 Other number 2

1.7 Scientific name

1.7.1 Genus [MCPD]

1.7.2 Species [MCPD]

1.7.3 Subspecies [MCPD]

1.7.4 Variety [MCPD]

1.8 Pedigree

Parentage or nomenclature and designations assigned to breeders' material

1.9 Cultivar origin

- 1 Open pollination
- 2 Artificial pollination
- 3 Clonal selection

1.10 Accession

1.10.1 Accession name [MCPD]

Either a registered or other formal designation assigned to the accession

1.10.2 Synonyms

Include here any previous identification other than the current name. Collecting number or newly assigned station names are frequently used as identifiers

1.11 Acquisition date [YYYYMMDD]

Date on which the accession entered the collection

1.12 Accession size

Number or weight of seeds, seedlings, budsticks, *in vitro* plants, etc. of an accession in the genebank

1.13 Type of material received

- 1 Seed/seedling
- 2 Vegetative
- 3 Pollen
- 4 *In vitro* culture
- 99 Other (e.g. more than one type, specify in descriptor **1.14 Notes**)

1.14 Notes

Any additional information may be specified here

2. Collecting descriptors

2.1 Collecting institute (s)

Name and address of the institute(s) and individuals collecting/sponsoring the collection of the sample(s)

2.2 Site number

Number assigned to the physical site by the collector

2.3 Collecting number

[MCPD]

Original number assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number. This item is essential for identifying duplicates held in different collections and should be unique and always accompany subsamples wherever they are sent

2.4 Collecting date of original sample [YYYYMMDD]

[MCPD]

2.5 Country of origin

[MCPD]

Name of the country in which the sample was collected. Use the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries*, No. 3166, 4th Edition. Copies of these are available from DIN: Deutsche Institute für Normung e.V., D-10772 Berlin, Germany; Tel. 30-2601-2860; Fax 30-2601-1231, Tlx. 184 273-din-d; Web site URL: <http://www.din.de/set/de/DIN>.

2.6 Province/State

Name of the primary administrative subdivision of the country in which the sample was collected

2.7 Department/County

Name of the secondary administrative subdivision (within a Province/State) of the country in which the sample was collected

2.8 Location of collecting site

[MCPD]

Distance in kilometers and direction from the nearest town, village or map grid reference point (e.g. CURITIBA 7S means 7 km south of Curitiba) and the name of the farm or other location and the farmer or other individual on whose land the sample was collected

2.9 Latitude of collecting site

[MCPD]

Degrees and minutes followed by N (North) or S (South) (e.g. 1030S). Missing data (minutes) should be indicated with hyphen (e.g. 10-S)

2.10 Longitude of collecting site [MCPD]

Degrees and minutes followed by E (East) or W (West) (e.g. 07625 W). Missing data (minutes) should be indicated with hyphen (e.g. 076-W)

2.11 Elevation of collecting site [m asl] [MCPD]**2.12 Collecting source** [MCPD]

The coding scheme proposed can be used at two different levels of detail: either by using the global codes such as 1, 2, 3, 4, or by using the more detailed coding such as 1.1, 1.2, 1.3, etc.

- 0 Unknown
- 1 Wild habitat
 - 1.1 Forest/woodland
 - 1.2 Shrubland
 - 1.3 Grasslands
 - 1.4 Desert/tundra
- 2 Farm
 - 2.1 Field
 - 2.2 Orchard
 - 2.3 Homegarden
 - 2.4 Fallow
 - 2.5 Pasture
 - 2.6 Store
- 3 Market
 - 3.1 Town
 - 3.2 Village
 - 3.3 Urban area (around city)
 - 3.4 Other exchange system
- 4 Institute/Research organization
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.13 Collecting source environment

Use descriptors 6.1.1 to 6.1.26 in section 6

2.14 Number of plants sampled

2.15 Type of sample

Form of sample collected. If different types of material were collected from the same source, each sample type should be designated with a unique collecting number and a corresponding unique accession number

- 1 Vegetative
- 2 Seed/seedling
- 3 Pollen
- 4 Tissue culture (specify which part of the plant is used in descriptor **2.23 Collector's notes**)
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.16 Status of sample

[MCPD]

- 0 Unknown
- 1 Wild
- 2 Weedy
- 3 Traditional cultivar/landrace
- 4 Breeder's line
- 5 Advanced cultivar
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17 Ethnobotanical data

2.17.1 Ethnic group

Name of the ethnic group/community of the farmer donating the sample or of the people living in the area of collecting

2.17.2 Local/vernacular name

Name given by farmer to the crop and cultivar/landrace. State language and dialect if the ethnic group is not provided

2.17.3 Translation

Provide translation of the local name into English, if possible

2.17.4 Jackfruit varietal name meaning

Does the jackfruit name have a meaning? If yes, describe it briefly in descriptor **2.23 Collector's notes**

- 0 No
- 1 Yes

2.17.5 History of plant use

- 1 Ancestral/indigenous (Record association with the place and community)
- 2 Introduced (but in unknown distant past)
- 3 Introduced (Record time and details known about introduction)

2.17.6 Parts of the plant used

- 1 Seed
- 2 Root
- 3 Trunk
- 4 Leaf
- 5 Flower/inflorescence
- 6 Fruit
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17.7 Plant uses

- 1 Food
- 2 Forage
- 3 Fuel
- 4 Medicine
- 5 Wood/timber
- 6 Dye
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17.8 Frequency of use of the plant

- 1 Daily
- 2 Weekly
- 3 Occasional
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17.9 Cooking methods

- 1 Boiling
- 2 Baking
- 3 Frying
- 4 Preserving
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17.9.1 Cooking time [min]

Record the number of minutes for each descriptor state of **2.17.9** as available

2.17.10 Special uses

- 1 Children
- 2 Older persons
- 3 Feasts
- 4 Religious purpose
- 5 Chiefs
- 99 Other (specify in descriptor 2.23 Collector's notes)

2.17.11 Cultural characteristics

Is there folklore associated with the collected jackfruit type? (e.g. taboos, stories and/or superstitions). If so, describe it briefly in descriptor 2.23 Collector's notes

- 0 No
- 1 Yes

2.17.12 Jackfruit popularity

Is the variety popular and widely grown? If yes, describe briefly the reasons in descriptor 2.23 Collector's notes

- 0 No
- 1 Yes

2.17.13 Preferred growing conditions

If yes, describe farmer's perceptions on hardiness of the variety in relation to main stresses in descriptor 2.23 Collector's notes

- 0 No
- 1 Yes

2.17.14 Prevailing stresses

Information on main associated biotic (pests and diseases) and abiotic (drought) stresses

2.17.15 Cultural methods

2.17.15.1 Cropping system

- 1 Monoculture (specify spacing)
- 2 Intercropping (specify spacing and type of intercrop)
- 3 Agropastoralism (specify type of animals)
- 4 Natural cropping (i.e. wild types topworked with cultivar/self sown trees retained in homesteads)
- 99 Other (specify in descriptor 2.23 Collector's notes)

2.17.15.2 Propagation method

Method used to produce trees

- 1 Seed
- 2 Grafting (specify type of grafting and the species, hybrid and/or clone used as rootstock, in descriptor **2.23 Collector's notes**)
- 3 Cutting
- 4 Budding
- 5 Layering
- 6 Tissue culture (specify which part of plant used, in descriptor **2.23 Collector's notes**)
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17.15.3 Irrigation

- 1 Rain-fed
- 2 Irrigated (specify average annual amount of water supplied per hectare)
- 99 Other (specify in descriptor **2.23 Collector's notes**)

2.17.16 Associated flora

Other dominant crop/plant species, including other jackfruit species, found in and around the collecting site

2.17.17 Seasonality

- 1 Available only in season/at particular period
- 2 Available throughout the year

2.17.18 Market information

Specify if any premium price was assigned to the type of jackfruit

- 0 No
- 1 Yes

2.17.19 Type of market

- 1 Local
- 2 National
- 3 International

2.18 Collecting site population structure**2.18.1 Number of trees sampled**

2.18.2 Frequency of plants at collecting site

- 3 Low
- 5 Intermediate
- 7 High

2.19 Plant population density

Number of trees per unit area (specify orchard or homestead)

2.20 Genetic erosion

Estimate the rate of genetic erosion of the species occurring in the region of collection

- 1 Slow
- 2 Moderate
- 3 High
- 4 Very high

2.21 Herbarium specimen

Was a herbarium specimen collected? If so, provide an identification number and indicate in which place (Herbarium) the specimen was deposited, in descriptor **2.23 Collectors' notes**

- 0 No
- 1 Yes

2.22 Photograph

Was photograph(s) taken of the accession or habitat at the time of collecting? If so, provide an identification number(s) in descriptor **2.23 Collector's notes**.

- 0 No
- 1 Yes

2.23 Collector's notes

Additional information recorded by the collector or any specific information on any state in any of the above descriptors

MANAGEMENT

3. Management descriptors

3.1 Accession number

3.1.1 Local plant number

This identifies a single plant within a population of plants having the same accession number. It may be any combination of plot identity, row number, or tree position within the row

3.2 Population identification

Collecting number, pedigree, cultivar name etc., depending on the population type

3.3 Accession location in orchard

Enter separate block designations, row numbers and tree numbers within the row for each duplicate tree of each accession if each tree is not identified with a unique local plant number (see **descriptor 3.1.1**)

3.3.1 Block designation

3.3.2 Row number

3.3.3 Tree number within the row

3.4 Storage address

Building, room, shelf number(s)/field location where stored/maintained

3.5 Storage date [YYYYMMDD]

3.6 Sowing/planting date [YYYYMMDD]

Specify the date on which sowing/planting was done

3.7 Plants/propagules establishment [%]

3.8 Type of maintenance

- 1 Seed
- 2 Vegetative in the field (Field Genebank/Repository/Hortum)
- 3 Vegetative in tissue culture (*In vitro*)
- 4 Pollen
- 5 Cryopreservation
- 99 Other (e.g. more than one type, specify in descriptor **3.12 Notes**)

3.9 Duplicates at other location(s)

- 0 No
- 1 Yes

3.10 *In vitro* conservation

3.10.1 Type of explant

- 1 Seed
- 2 Zygotic embryo
- 3 Apical or axillary meristem
- 4 Apical or axillary shoot tip
- 5 Somatic embryo
- 6 Callus
- 7 Cell suspension
- 99 Other (specify in descriptor 3.12 Notes)

3.10.2 Date of introduction *in vitro* [YYYYMMDD]

3.10.3 Type of subcultured material

- 1 Seed
- 2 Zygotic embryo
- 3 Apical or axillary meristem
- 4 Apical or axillary shoot tip
- 5 Somatic embryo
- 6 Callus
- 7 Cell suspension
- 99 Other (specify in descriptor 3.12 Notes)

3.10.4 Regeneration process

- 1 Organogenesis
- 2 Somatic embryogenesis
- 99 Other (specify in descriptor 3.12 Notes)

3.10.5 Number of genotypes introduced *in vitro*

3.10.6 Number of replicates per genotype

3.10.7 Last subculture date [YYYYMMDD]

3.10.8 Medium used at the last subculture

3.10.9 Number of plants at the last subculture

3.10.10 Location after the last subculture

3.10.11 Next subculture date [YYYYMMDD]

3.11 Cryopreservation

3.11.1 Type of material for cryopreservation

- 1 Seed
- 2 Zygotic embryo
- 3 Apical or axillary meristem
- 4 Apical or axillary shoot tip
- 5 Somatic embryo
- 6 Callus
- 7 Cell suspension
- 8 Ovule
- 99 Other (specify in descriptor 3.12 Notes)

3.11.2 Introduction date in liquid nitrogen [YYYYMMDD]

3.11.3 Number of samples introduced in liquid nitrogen

3.11.4 End of storage period [YYYYMMDD]

3.11.5 Number of samples taken from liquid nitrogen

3.11.6 Type of subcultured material for recovery

(After liquid nitrogen)

- 1 Seed
- 2 Zygotic embryo
- 3 Apical or axillary meristem
- 4 Apical or axillary shoot tip
- 5 Somatic embryo
- 6 Callus
- 7 Cell suspension
- 8 Ovule
- 99 Other (specify in descriptor 3.12 Notes)

3.11.7 Regeneration process

- 1 Organogenesis
- 2 Somatic embryogenesis
- 99 Other (specify in descriptor 3.12 Notes)

3.11.8 **Number of recovered samples**

3.11.9 **Location after the last subculture**

3.12 **Notes**

Any additional information may be specified here

4. Multiplication/regeneration descriptors

4.1 **Accession number**

4.2 **Population identification**

Collecting numbers, pedigree, cultivar name etc., depending on the population type

4.3 **Field plot number**

4.4 **Multiplication/regeneration site locations**

4.5 **Collaborator**

4.6 **Regeneration year** [YYYY]

Year (estimated) when tree should be propagated for regeneration

4.7 **Propagation method**

Method used to produce trees

- 1 Seed
- 2 Budding
- 3 Grafting
- 4 Layering
- 5 Tissue culture
- 99 Other (specify in descriptor **4.12** **Notes**)

4.8 **Sowing/planting date** [YYYYMMDD]

4.9 **Cultural practices**

4.9.1 **Planting density**

Number of trees established per hectare

4.9.2 **Fertilizer application**

Specify type, doses, frequency of each and method of application

4.9.3 Irrigation

Specify amount, frequency and method of application

4.9 Previous multiplication and/or regeneration

4.10.1 Location

4.10.2 Plot number

4.10.3 Sowing/planting date [YYYYMMDD]

4.11 Number of times accession regenerated

Since the date of acquisition

4.12 Notes

Any additional information may be specified here

ENVIRONMENT AND SITE

5. Characterization and/or evaluation site descriptors

5.1 Country of characterization and/or evaluation

(See instructions in descriptor 2.5 Country of origin)

5.2 Site (Research Institute)

5.2.1 Latitude

Degrees and minutes followed by N (North) or S (South) (e.g. 1030S). Missing data (minutes) should be indicated with hyphen (e.g. 10-S).

5.2.2 Longitude

Degrees and minutes followed by E (East) or W (West) (e.g. 07625W). Missing data (minutes) should be indicated with hyphen (e.g. 076-W)

5.2.3 Elevation [m asl]

5.2.4 Name and address of farm or institute

5.3 Evaluator's name and address

5.4 Sowing/grafting/budding/layering date [YYYYMMDD]

5.5 Evaluation environment

Environment in which characterization/evaluation was carried out

- 1 Field
- 2 Screenhouse
- 3 Glasshouse
- 4 Laboratory
- 5 Other (specify in descriptor 5.16 Notes)

5.6 Condition of tree

Record the condition of the tree at the time of characterization/evaluation

- | | |
|-------------------------|-----------------------------|
| 1 Dying | 5 Mature – vigorous |
| 2 Old – declining | 6 Young (not yet bearing) |
| 3 Mature – diseased | 7 Healthy – cropping poorly |
| 4 Mature – non-vigorous | 8 Healthy – cropping well |

5.7 Seed germination [%]

Specify number of days over which germination is measured

5.8 Grafting/budding/layering success percentage

Specify number of days over which the success is recorded. Indicate the rootstock.

5.9 Number of days to planting after budding/layering [d]**5.10 Field establishment [%]**

Specify number of days over which establishment is measured

5.11 Sowing/planting site in the field

Give block, strip and/or row/plot numbers as applicable, plants/plot, replication

5.12 Field spacing**5.12.1 Distance between trees in a row [m]****5.12.2 Distance between rows [m]****5.13 Fertilizer**

Specify types used, doses, frequency of each and method of application

5.14 Plant protection

Specify pesticides used, doses, frequency of each and method of application

5.15 Environmental characteristics of site

Use descriptors 6.1.1 to 6.1.26 in section 6

5.16 Notes

Any other site specific information

6. Collecting and/or characterization /evaluation site environment descriptors

6.1 Site environment

6.1.1 Topography

This refers to the profile in elevation of the land surface on a broad scale. The reference is FAO (1990)

1	Flat	0-0.5%
2	Almost flat	0.6- 2.9%
3	Gently undulating	3-5.9%
4	Undulating	6.0-10.9%
5	Rolling	11.0-15.9%
6	Hilly	16.0-30.0%
7	Steeply dissected	>30%, moderate elevation range
8	Mountainous	>30%, great elevation range (>300 m)
99	Other	(specify in the appropriate section's Notes)

6.1.2 Higher level landform (general physiographic features)

The landform refers to the shape of the land surface in the area in which the collecting site is located (adapted from FAO 1990)

1	Plain	5	Upland
2	Basin	6	Hill
3	Valley	7	Mountain
4	Plateau		

6.1.3 Land element and position

Description of the geomorphology of the immediate surroundings of the collecting site (adapted from FAO 1990; Fig. 1)

1	Plain level	17	Interdunal depression
2	Escarpment	18	Mangrove
3	Interfluvium	19	Upper slope
4	Valley	20	Midslope
5	Valley floor	21	Lower slope
6	Channel	22	Ridge
7	Levee	23	Beach
8	Terrace	24	Beach ridge
9	Floodplain	25	Rounded summit
10	Lagoon	26	Summit
11	Pan	27	Coral atoll
12	Caldera	28	Drainage line (bottom position in flat or almost-flat terrain)
13	Open depression	29	Coral reef
14	Closed depression	99	Other (specify in appropriate section's Notes)
15	Dune		
16	Longitudinal dune		

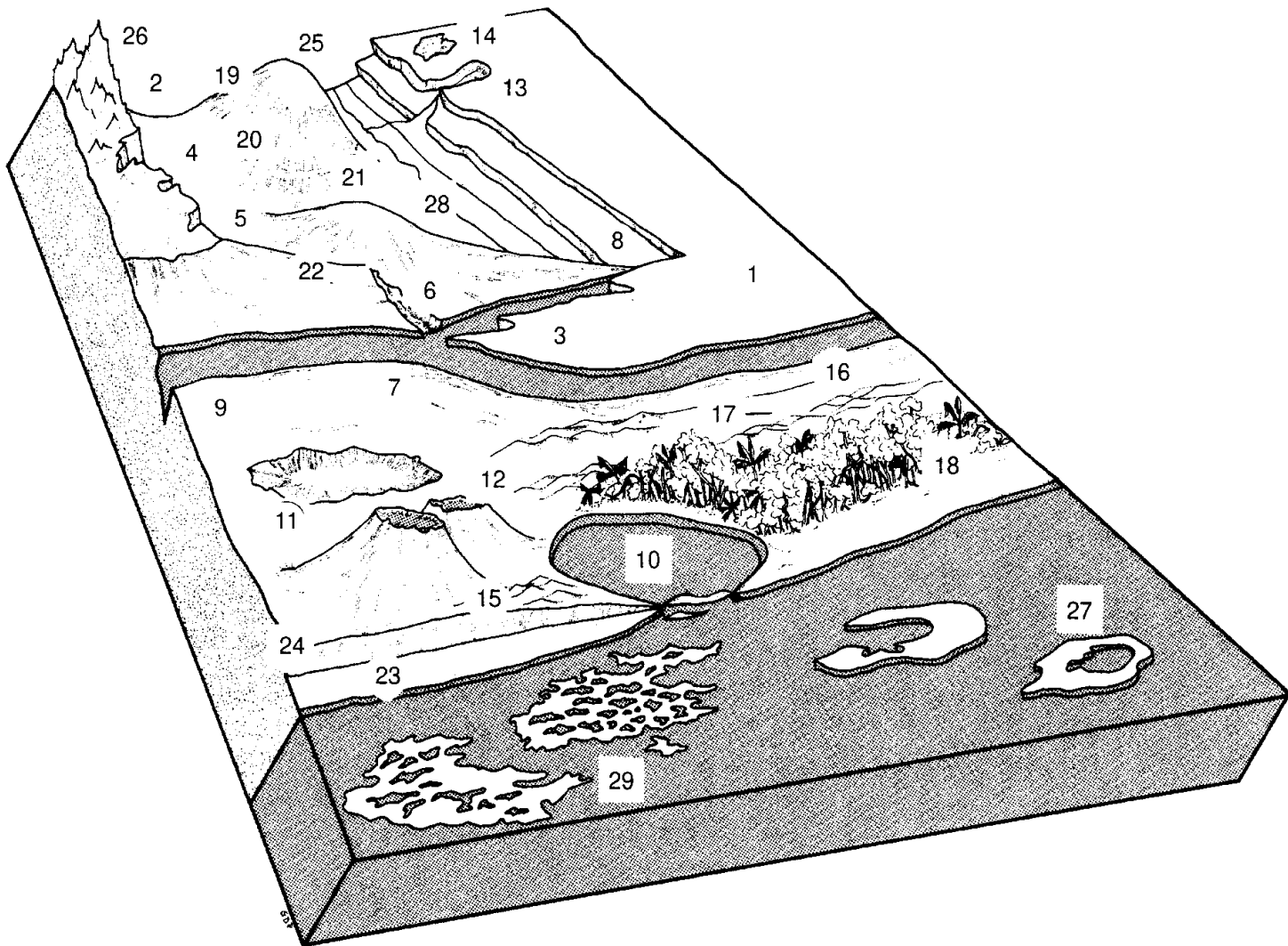


Fig. 1. Land element and position

6.1.4 Slope [°]

Estimated slope of the collecting site

6.1.5 Slope form

It refers to the general shape of the slope in both the vertical and horizontal directions (FAO 1990)

- 1 Straight
- 2 Concave
- 3 Convex
- 4 Terraced
- 5 Complex (irregular)

6.1.6 Slope aspect

The direction that the slope on which the accession was collected faces. Describe the direction with symbols N, S, E, W (e.g. a slope that faces a south-western direction has an aspect of SW)

6.1.7 Crop agriculture

(Adapted from FAO 1990)

6.1.7.1 Tree cropping

- 1 Non-irrigated tree crop cultivation
- 2 Irrigated tree crop cultivation

6.1.8 Overall vegetation surrounding and at the collecting site

(Adapted from FAO 1990)

- 1 Grassland (Grasses, subordinate forbs, no woody species)
- 2 Forbland (Herbaceous plants predominant)
- 3 Forest (Continuous tree layer, crowns overlapping, large number of tree and shrub species in distinct layers)
- 4 Woodland (Continuous tree layer, crowns usually not touching, understorey may be present)
- 5 Shrubland (Continuous layer of shrubs, crowns touching)
- 6 Savanna (Grasses with a discontinuous layer of trees or shrubs)
- 99 Other (Specify in appropriate section's Notes)

6.1.9 Soil parent material

(Adapted from FAO 1990)

Two lists of examples of parent material and rock are given below. The reliability of the geological information and the knowledge of the local lithology will determine whether a general or a specific definition of the parent material can be given. Saprolite is used if the *in situ* weathered material is thoroughly decomposed, clay-rich but still showing rock structure. Alluvial deposits and colluvium derived from a single rock type may be further specified by that rock type

6.1.9.1 Unconsolidated material

- 1 Aeolian deposits (unspecified)
- 2 Aeolian sand
- 3 Littoral deposits
- 4 Lagoonal deposits
- 5 Marine deposits
- 6 Lacustrine deposits
- 7 Fluvial deposits
- 8 Alluvial deposits
- 9 Unconsolidated (unspecified)
- 10 Volcanic ash
- 11 Loess
- 12 Pyroclastic deposits
- 13 Glacial deposits
- 14 Organic deposits
- 15 Colluvial deposits
- 16 *In situ* weathered
- 17 Saprolite
- 99 Other (specify in appropriate section's Notes)

6.1.9.2 Rock type

(Adapted from FAO 1990)

- | | |
|--------------------------------------|---|
| 1 Acid igneous/
metamorphic rock | 16 Limestone |
| 2 Granite | 17 Dolomite |
| 3 Gneiss | 18 Sandstone |
| 4 Granite/gneiss | 19 Quartzitic sandstone |
| 5 Quartzite | 20 Shale |
| 6 Schist | 21 Marl |
| 7 Andesite | 22 Travertine |
| 8 Diorite | 23 Conglomerate |
| 9 Basic igneous/
metamorphic rock | 24 Siltstone |
| 10 Ultra basic rock | 25 Tuff |
| 11 Gabbro | 26 Pyroclastic rock |
| 12 Basalt | 27 Evaporite |
| 13 Dolerite | 28 Gypsum rock |
| 14 Volcanic rock | 99 Other (specify in
appropriate section's
Notes) |
| 15 Sedimentary rock | 0 Not known |

6.1.10 Stoniness/rockiness/hardpan/cementation

- 1 Tillage unaffected
- 2 Tillage affected
- 3 Tillage difficult
- 4 Tillage impossible
- 5 Essentially paved

6.1.11 Soil drainage

(Adapted from FAO 1990)

- 3 Poorly drained
- 5 Moderately drained
- 7 Well drained

6.1.12 Soil salinity (dissolved salts)

- 1 <160 ppm
- 2 161-240 ppm
- 3 241-480 ppm
- 4 481-800 ppm
- 5 >800 ppm

6.1.13 Quality of the groundwater

- 1 Saline
- 2 Brackish
- 3 Fresh
- 4 Polluted
- 5 Oxygenated
- 6 Stagnating

6.1.14 Soil depth to groundwater table

(Adapted from FAO 1990)

The depth to the groundwater table, if present, as well as an estimate of the approximate annual fluctuation, should be given. The maximum rise of the groundwater table can be inferred approximately from changes in profile colour in many, but not all, soils.

- 1 0-25 cm
- 2 25.1-50 cm
- 3 50.1-100 cm
- 4 100.1-150 cm
- 5 >150 cm

6.1.15 Soil moisture

Moisture conditions prevailing in the soil at the time of collecting should be given together with the depth. Attention should be paid to unusual moisture conditions caused by unseasonal weather, prolonged exposure of the profile, flooding, etc. (from FAO 1990)

- 1 Dry
- 5 Slightly moist
- 7 Moist
- 9 Wet

6.1.16 Soil matrix colour

(Adapted from FAO 1990)

The colour of the soil matrix material in the root zone around the accession is recorded in the moist condition (or both dry and moist condition, if possible) using the notation for hue, value and chroma as given in the Munsell Soil Color Charts (Munsell Color 1975). If there is no dominant soil matrix colour, the horizon is described as mottled and two or more colours are given and should be registered under uniform conditions. Early morning and late evening readings are not accurate. Provide depth of measurement [cm]. If colour chart is not available, the following states may be used:

- | | |
|-------------------|--------------------|
| 1 White | 9 Yellow |
| 2 Red | 10 Reddish yellow |
| 3 Reddish | 11 Greenish, green |
| 4 Yellowish red | 12 Grey |
| 5 Brown | 13 Greyish |
| 6 Brownish | 14 Blue |
| 7 Reddish brown | 15 Bluish black |
| 8 Yellowish brown | 16 Black |

6.1.17 Soil organic matter content

- 1 Nil (as in arid zones)
- 3 Low (as in long-term cultivation in a tropical setting)
- 5 Medium (as in recently cultivated but not yet much depleted)
- 7 High (as in never cultivated, and in recently cleared forest)
- 9 Peaty

6.1.18 Soil pH

Actual value of the soil within the following root depths around the accession, record only at one of the following depths:

6.1.18.1.1 pH at 0-10 cm

6.1.18.1.2 pH at 11-20 cm

6.1.18.1.3 pH at 21-30 cm

6.1.18.1.4 pH at 31-60 cm

6.1.18.1.5 pH at 61-90 cm

6.1.19 Soil erosion

- 3 Low
- 5 Intermediate
- 7 High

6.1.20 Rock fragments

(Adapted from FAO 1990)

Large rock and mineral fragments (>2 mm) are described according to abundance

- 1 0 - 2%
- 2 2.1 - 5%
- 3 5.1 - 15%
- 4 15.1 - 40%
- 5 40.1 - 80%
- 6 > 80%

6.1.21 Soil texture classes

(Adapted from FAO 1990)

For convenience in determining the texture classes of the following list, particle size classes are given for each of the fine earth fraction listed below (Fig. 2):

- | | |
|--------------------|-------------------------|
| 1 Clay | 12 Coarse sandy loam |
| 2 Loam | 13 Loamy sand |
| 3 Clay loam | 14 Loamy very fine sand |
| 4 Silt | 15 Loamy fine sand |
| 5 Silty clay | 16 Loamy coarse sand |
| 6 Silty clay loam | 17 Very fine sand |
| 7 Silt loam | 18 Fine sand |
| 8 Sandy clay | 19 Medium sand |
| 9 Sandy clay loam | 20 Coarse sand |
| 10 Sandy loam | 21 Sand, unsorted |
| 11 Fine sandy loam | 22 Sand, unspecified |

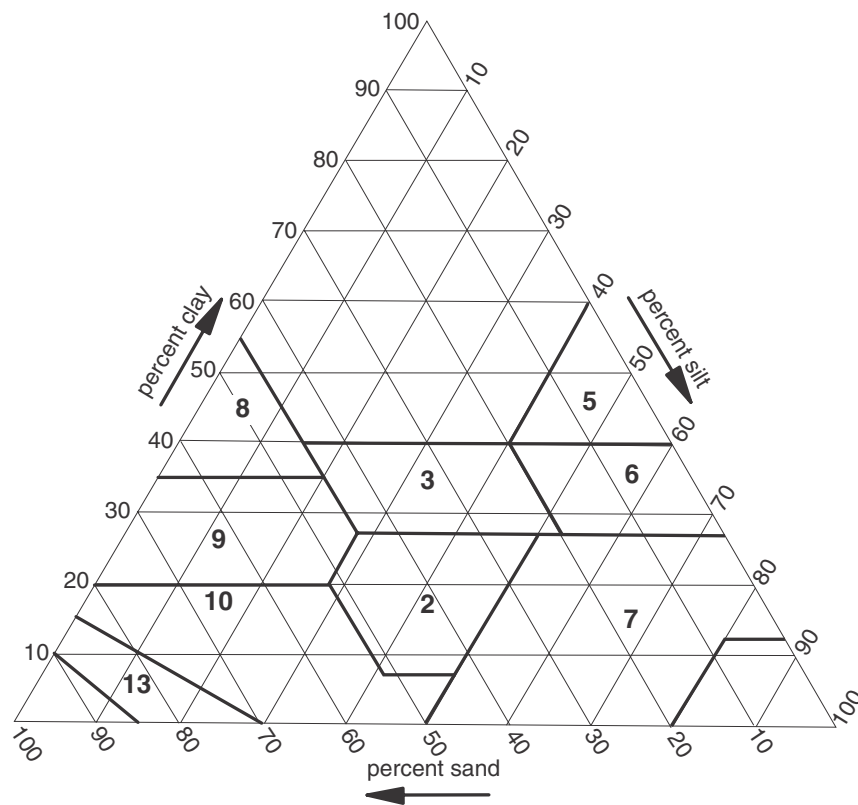


Fig. 2. Soil texture classes

6.1.22 Soil particle size classes

(Adapted from FAO 1990)

1	Clay	< 2 μm
2	Fine silt	3 - 20 μm
3	Coarse silt	21 - 63 μm
4	Very fine sand	64 - 125 μm
5	Fine sand	126 - 200 μm
6	Medium sand	201 - 630 μm
7	Coarse sand	631 - 1250 μm
8	Very coarse sand	1251 - 2000 μm

6.1.23 Soil taxonomic classification

As detailed a classification as possible should be given. This may be taken from a soil survey map. State class (e.g., Alfisols, Spodosols, Vertisols, etc.)

6.1.24 Water availability

- 1 Rain-fed
- 2 Irrigated
- 3 Flooded
- 4 River banks
- 5 Sea coast
- 99 Other (specify in appropriate section's Notes)

6.1.25 Soil fertility

General assessment of the soil fertility based on existing vegetation

- 3 Low
- 5 Moderate
- 7 High

6.1.26 Climate of the site

Should be assessed as close to the site as possible (state number of recorded years)

6.1.26.1 Temperature [°C]

Provide either the monthly or the annual mean

6.1.26.2 Rainfall [mm]

Provide either the monthly or the annual mean (state number of recorded years)

6.1.26.3 Wind

Annual average (state number of years recorded)

6.1.26.3.1 Frequency of typhoons or hurricane force winds

- 3 Low
- 5 Intermediate
- 7 High

6.1.26.3.2 Date of most recent typhoons or hurricane force winds [YYYYMMDD]

6.1.26.3.3 Annual maximum wind velocity [m/s]

6.1.26.4 Frost

6.1.26.4.1 Date of most recent frost [YYYYMMDD]

6.1.26.4.2 Minimum temperature [°C]

Specify seasonal average and minimum survival temperature

6.1.26.4.3 Duration of temperature below 0°C [d]

6.1.26.5 Relative humidity

6.1.26.5.1 Relative humidity diurnal range [%]

6.1.26.5.2 Relative humidity seasonal range [%]

6.1.26.6 Light

1 Shady

2 Sunny

6.1.26.7 Daylength [h]

Provide either the monthly (mean, maximum, minimum) or the seasonal (mean, maximum, minimum)

CHARACTERIZATION

7. Plant descriptors

Average of at least two 'on-years' (production years) data recorded on ten trees, unless otherwise stated

7.1 Growth descriptors

7.1.1 Tree age [y]

7.1.2 Tree vigour

- 3 Low
- 5 Medium
- 7 High

7.1.3 Tree height [m]

From ground level to the top of the tree (if grafted, record also height of graft union and rootstock name). Evaluate only unpruned trees

7.1.4 Trunk height [m]

Recorded from the base of the tree to the point of emergence of first branch

7.1.5 Trunk circumference [cm]

Recorded at 50 cm above ground level for trees raised through seedlings and above the grafted union for trees raised through grafting

7.1.6 Trunk surface

- 1 Smooth
- 2 Rough
- 3 Very rough

7.1.7 Crown diameter [m]

Measured as the mean diameter using two directions (North-South and East-West)

7.1.8 Crown shape

(See Fig. 3)

- 1 Pyramidal
- 2 Broadly pyramidal
- 3 Spherical
- 4 Oblong
- 5 Semicircular
- 6 Elliptical
- 7 Irregular
- 99 Other (specify in descriptor 7.6 Notes)

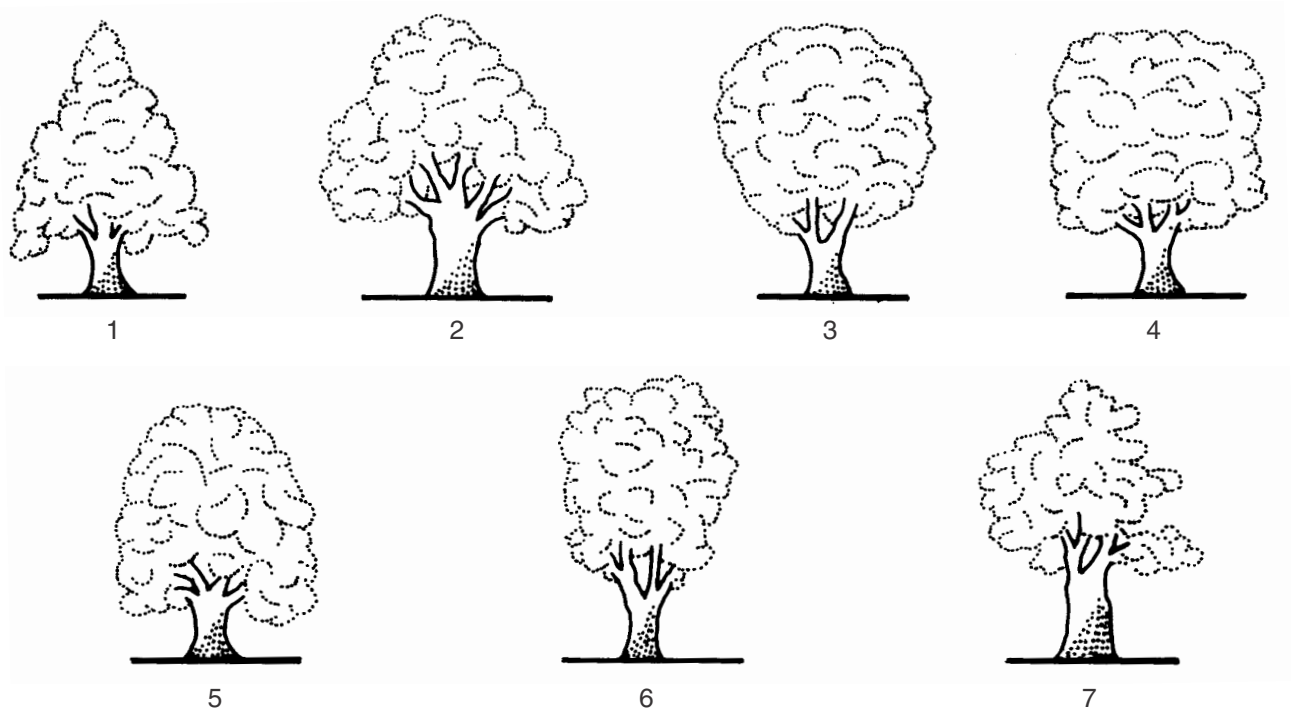


Fig. 3. Crown shape

7.1.9 Tree growth habit

- 1 Erect
- 2 Semi-erect
- 3 Spreading
- 99 Other (specify in descriptor 7.6 Notes)

7.1.10 Branching density

- 3 Sparse
- 5 Medium
- 7 Dense

7.1.11 Branching pattern

(See Fig. 4)

- 1 Erect
- 2 Opposite
- 3 Verticillate
- 4 Horizontal
- 5 Irregular

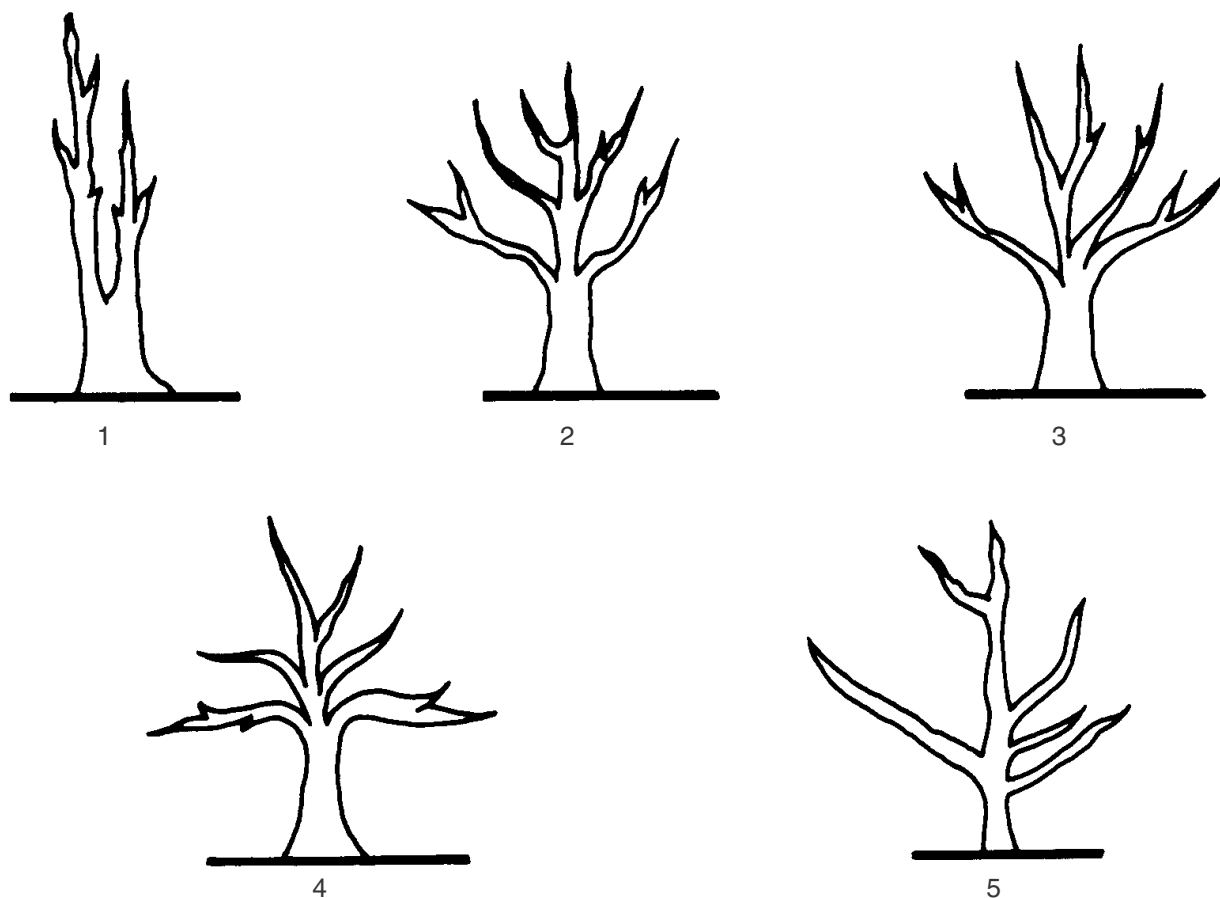


Fig. 4. Branching pattern

7.1.12 Apical dominance

Estimated as number of lateral branches on one- and two-year-old twig

- 3 Weak
- 5 Intermediate
- 7 Strong

7.2 Leaf descriptors

Average of 20 fully expanded representative leaves, collected from different trees when shoots are lignified. Do not select leaves that are abnormal due to disease, nutritional imbalances and excessive vigour. For qualitative characteristics, indicate the predominant one.

7.2.1 Leaf blade length [cm]

Measured from the base to the tip of the leaf blade

7.2.2 Leaf blade width [cm]

Measured at the widest point

7.2.3 Leaf blade shape

(See Fig. 5)

- 1 Obovate
- 2 Elliptic
- 3 Broadly elliptic
- 4 Narrowly elliptic
- 5 Oblong
- 6 Lyrate (wavy)
- 99 Other (specify in descriptor 7.6 Notes)

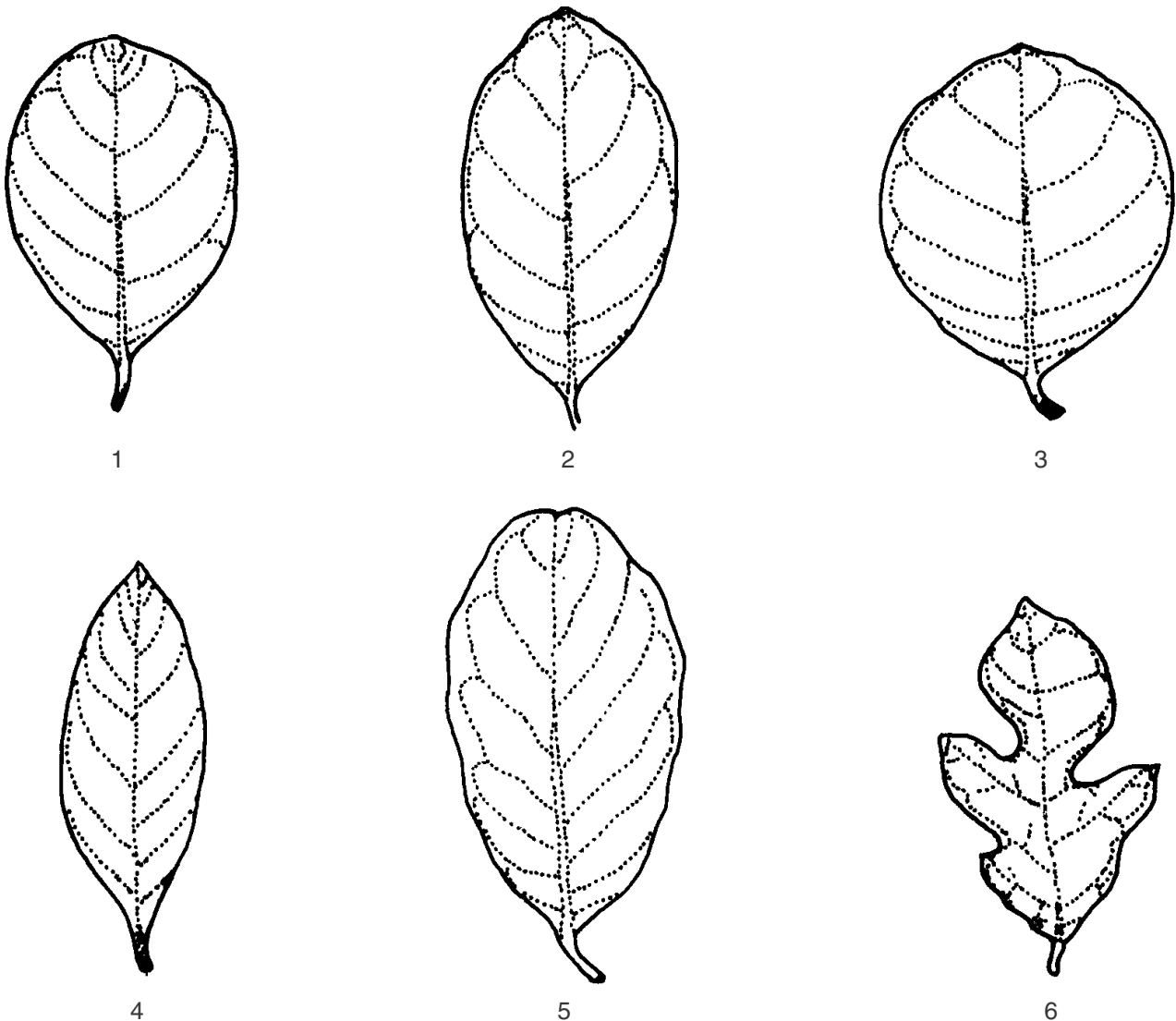


Fig. 5. Leaf blade shape

7.2.4 Leaf apex shape

(See Fig. 6)

- 1 Acute
- 2 Acuminate
- 3 Retuse
- 4 Obtuse
- 99 Other (specify in descriptor 7.6 Notes)

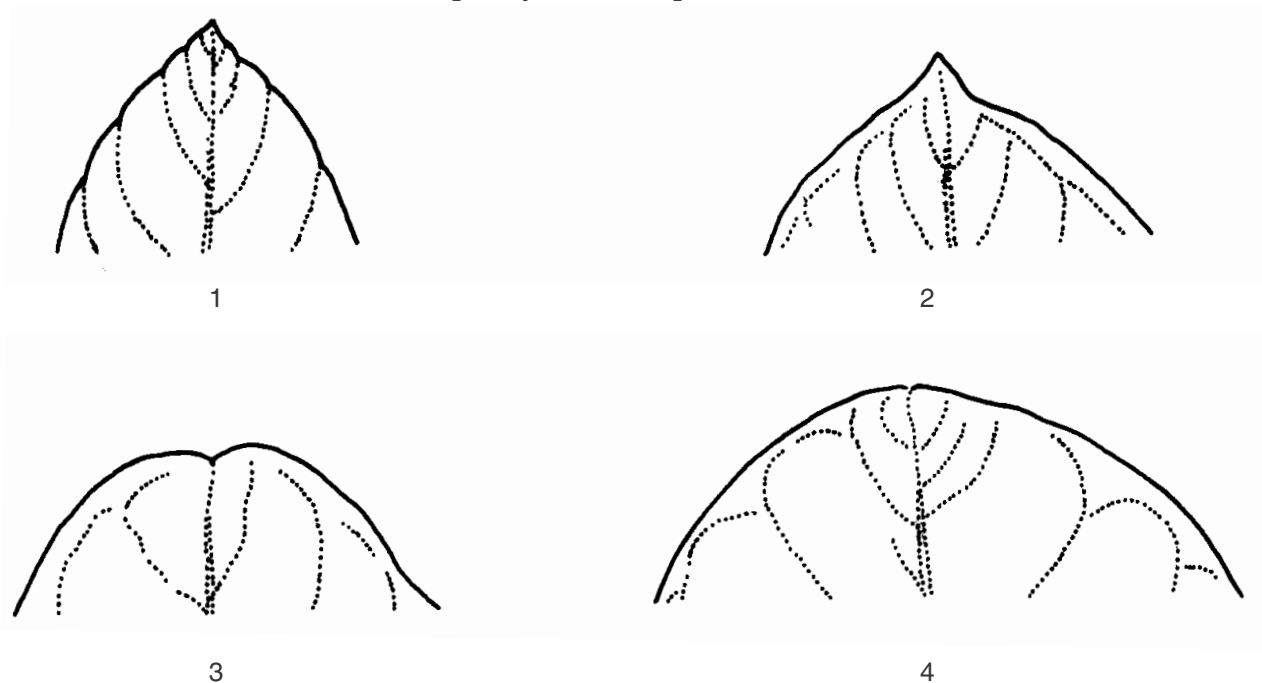


Fig. 6. Leaf apex shape

7.2.5 Leaf base shape

(See Fig. 7)

- 1 Oblique
- 2 Rounded
- 3 Cuneate
- 4 Shortly attenuate
- 99 Other (specify in descriptor 7.6 Notes)

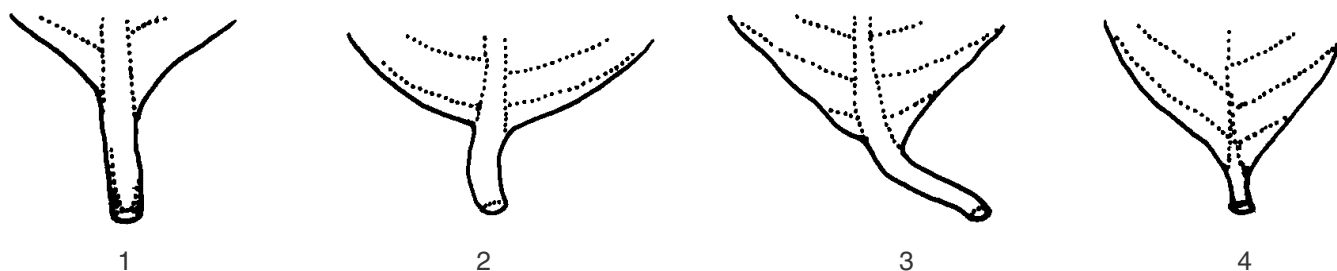


Fig. 7. Leaf base shape

7.2.6 Leaf blade margin

- 1 Entire
- 2 Undulate
- 99 Other (specify in descriptor 7.6 Notes)

7.2.7 Leaf colour

Evaluated at adaxial side, at fully mature stage

- 1 Light green
- 2 Green
- 3 Dark green
- 4 Pinkish green

7.2.8 Leaf upper surface pubescence

- 1 Glabrous
- 2 Sparse
- 3 Intermediate
- 4 Dense

7.2.9 Leaf lower surface pubescence

- 1 Glabrous
- 2 Sparse
- 3 Intermediate
- 4 Dense

7.2.10 Leaf midrib pubescence

- 1 Glabrous
- 2 Sparsely puberulent

7.2.11 Petiole shape

- 1 Flattened
- 2 Rounded
- 3 Rounded straight adaxially

7.2.12 Petiole length [mm]

Measured from the base of petiole to the base of leaf blade in mature leaf

7.2.13 Grooves on petiole

- 0 Absent
- 1 Present

7.2.14 Crotch angle of petiole

- 1 Acute ($<90^\circ$)
- 2 Obtuse ($\geq 90^\circ$)

7.3 Inflorescence descriptors

Average of at least two 'on-years' data. Recorded at peak bloom period

7.3.1 Flowering precocity [y]

Specify number of years from budding/layering/grafting/seed sowing to first flower (i.e. 4 B/L/G/S indicates first flower produced 4 years after field establishment from the date of budding/layering/grafting/seed sowing, respectively)

7.3.2 Date of appearance of first male inflorescence [YYYYMMDD]

7.3.3 Date of appearance of 75% male inflorescences [YYYYMMDD]

7.3.4 Date of appearance of first female inflorescence [YYYYMMDD]

7.3.5 Date of appearance of 75% female inflorescences [YYYYMMDD]

7.3.6 Female flower aroma

Recorded during opening

- 1 Mild
- 2 Intermediate
- 3 Strong

7.3.7 Inflorescence colour

- 1 Light green
- 2 Light yellow
- 3 Dark yellow
- 4 Crimson

7.3.8 Secondary flowering

- 0 Absent
- 1 Present

7.3.9 Female inflorescence density

- 3 Sparse
- 5 Intermediate
- 7 Dense

7.3.10 Female inflorescence position

- 1 Mainly on trunk
- 2 Mainly on trunk and primary branches
- 3 Mainly on trunk, primary and secondary branches
- 4 On the whole stem including primary, secondary and tertiary branches

7.3.11 Male inflorescence position

- 1 Mainly on tertiary branches
- 2 Mainly on secondary branches
- 3 Mainly on primary branches
- 4 Mainly on trunk
- 5 All positions equally

7.3.12 Number of primary lateral inflorescence branches

Average of 20 inflorescences at peak bloom period

7.3.13 Alternate bearing

Estimated as percentage of inflorescence bud drop in on-years

- | | | |
|---|-----------|---------|
| 1 | Slight | ≤25% |
| 2 | Moderate | 26 -50% |
| 3 | High | 51 -75% |
| 4 | Very high | >75% |

7.4 Fruit descriptors

Recorded on well-developed fruits at harvest time, unless otherwise specified

7.4.1 Number of years to first fruiting after sowing/planting [y]**7.4.2 Number of days from flowering to fruit maturity [d]****7.4.3 Fruiting season**

- 1 Early
- 2 Mid-season
- 3 Late

7.4.4 Fruiting season dates

7.4.4.1 Start of fruiting season [YYYYMMDD]

7.4.4.2 End of fruiting season [YYYYMMDD]

7.4.5 Fruit bearing

7.4.5.1 Fruit bearing habit

- 1 Regular
- 2 Alternate years
- 99 Other (specify in descriptor 7.6 Notes)

7.4.5.2 Fruit bearing position

- 1 Main trunk
- 2 Primary branch
- 3 Secondary branch
- 99 Other (specify in descriptor 7.6 Notes)

7.4.6 Fruit clustering habit

Specify number of trees evaluated per accession

- 1 Solitary
- 2 Clusters
- 99 Other (specify in descriptor 7.6 Notes)

7.4.7 Fruit shape

Specify number of fruits evaluated. (See Fig. 8)

- 1 Obloid
- 2 Spheroid
- 3 Ellipsoid
- 4 Clavate
- 5 Oblong
- 6 Irregular
- 99 Other (specify in descriptor 7.6 Notes)

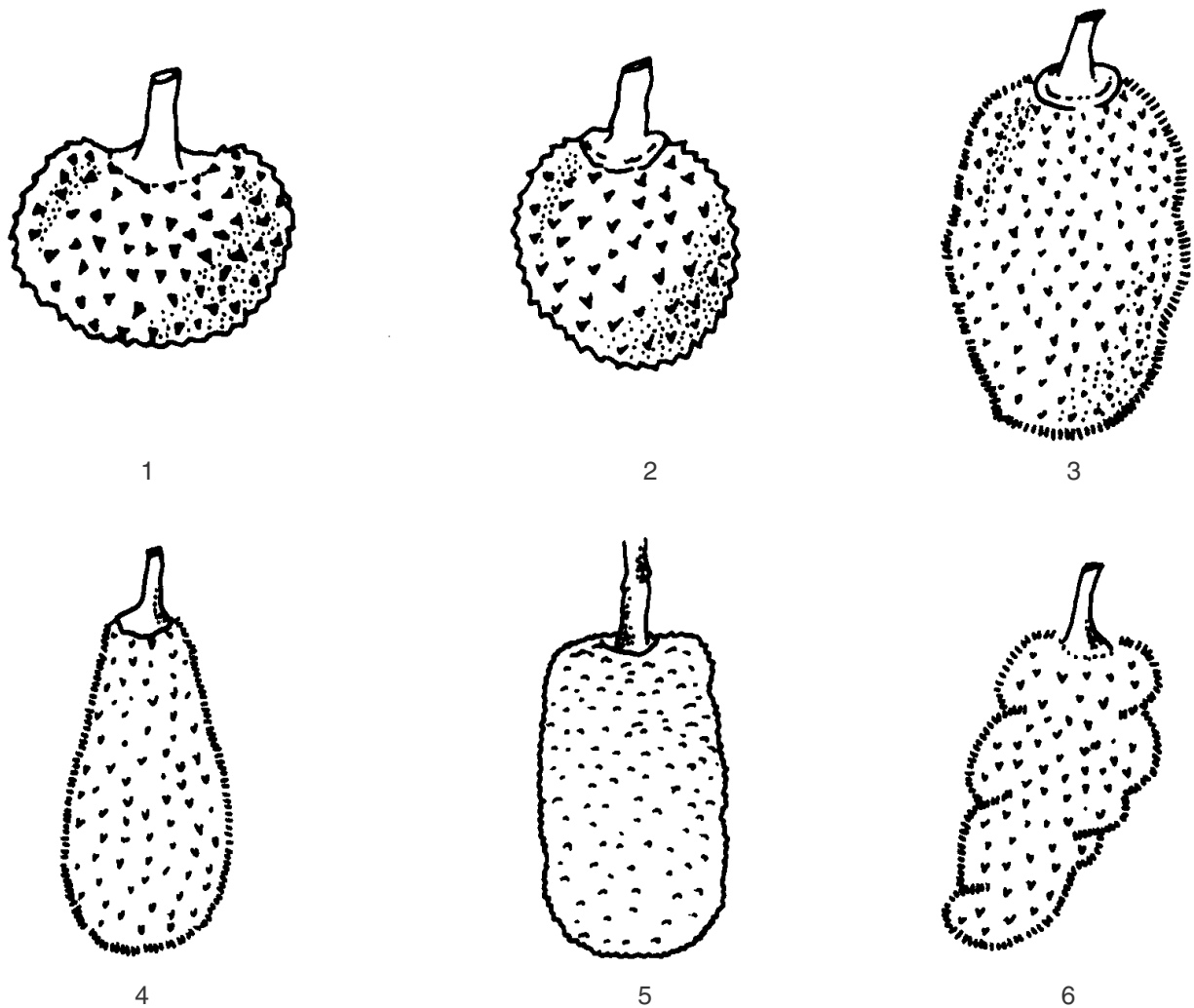


Fig. 8. Fruit shape

7.4.8 Stalk length [mm]

Measured from the base of the peduncle to the base of fruit at maturity. Average of 10 fruit stalks

7.4.9 Stalk diameter [mm]

Measured at 5 cm from the base of fruits. Average of 10 fruit stalks

7.4.10 Stalk attachment to fruit

(See Fig. 9)

- 1 Depressed
- 2 Flattened
- 3 Inflated
- 99 Other (specify in descriptor 7.6 Notes)

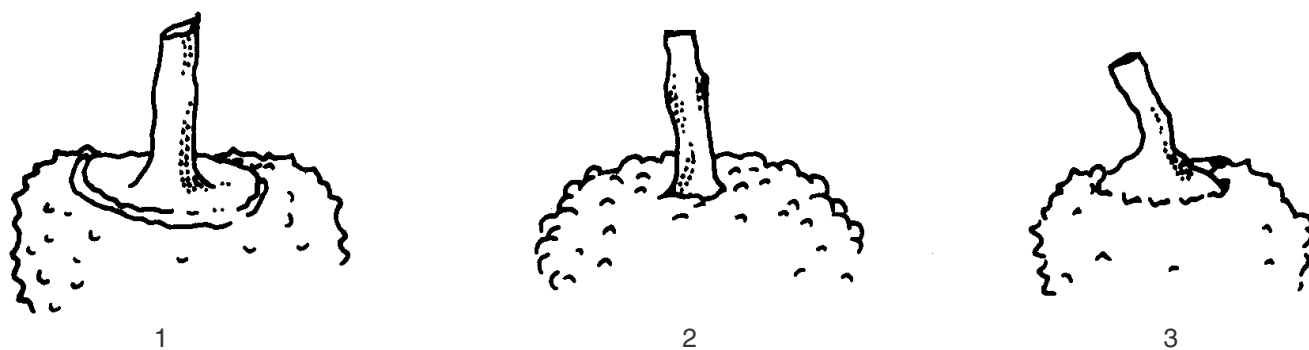


Fig. 9. Stalk attachment to fruit

7.4.11 Fruit length [cm]

Average of ten fruits

7.4.12 Fruit diameter [cm]

Measured at the widest point. Average of ten fruits

7.4.13 Fruit weight [kg]

Average of ten fruits

7.4.14 Fruit rind weight [kg]

Average of ten fruits

7.4.15 Fruit rind thickness

- 1 Thin
- 2 Medium
- 3 Thick
- 4 Very Thick

7.4.16 Fruit rind colour

Recorded at maturity

- 1 Green
- 2 Greenish yellow
- 3 Yellow
- 5 Reddish yellow
- 99 Other (specify in descriptor 7.6 Notes)

7.4.17 Fruit surface

- 1 Smooth
- 2 Spiny

7.4.18 Shape of spine

Observed on mature fruit rind at the basal region

- 1 Sharp pointed
- 2 Intermediate
- 3 Flat

7.4.19 Spine density

Observed in 5x5 cm² area at the base of fruit at mature rind stage

- 3 Sparse
- 7 Dense

7.4.20 Latex exudation

Latex exudation determined at the time of detaching mature fruits and fully developed leaves

- 1 Low
- 2 Medium
- 3 High

7.4.21 Fruit quality

Combined assessment of taste, flavour, pulp sliminess and eye appeal

- 1 Poor
- 2 Moderate
- 3 Good
- 4 Excellent

7.4.22 Fruit attractiveness

Combined assessment of shape, size, colour, spine structure, etc.

- 1 Poor
- 2 Intermediate
- 3 Good
- 4 Excellent

7.4.23 Shelf life [d]

Number of days fruit remains in good condition under storage at room temperature

7.4.24 Number of flakes (bulbs) per kg fruit

Total number of flakes divided by the total weight of 10 fruits

7.4.25 Weight of flakes per kg fruit [g]

Measured on ten fruits

7.4.26 Weight of fresh flake with seed [g]

Average of 20 flakes

7.4.27 Weight of fresh flake without seed [g]

Average of 20 flakes

7.4.28 Flake/fruit ratio

Average of 10 fruits (weight of flakes divided by weight of fruits)

7.4.29 Flake length [cm]

Average of 20 flakes

7.4.30 Flake width [cm]

Average of 20 flakes at the widest point

7.4.31 Flake thickness

- 1 Thin
- 2 Medium
- 3 Thick

7.4.32 Flake shape

Observed near mid region of fruit. (See Fig. 10)

- 1 Spheroid
- 2 Cordate
- 3 Twisted
- 4 Obovate
- 5 Rectangular
- 6 Oblong with curved tip
- 7 Irregular
- 99 Other (specify in descriptor 7.6 Notes)

7.4.33 Flake fibre content

Recorded on fully ripe flakes

- 1 Low
- 2 Medium
- 3 High

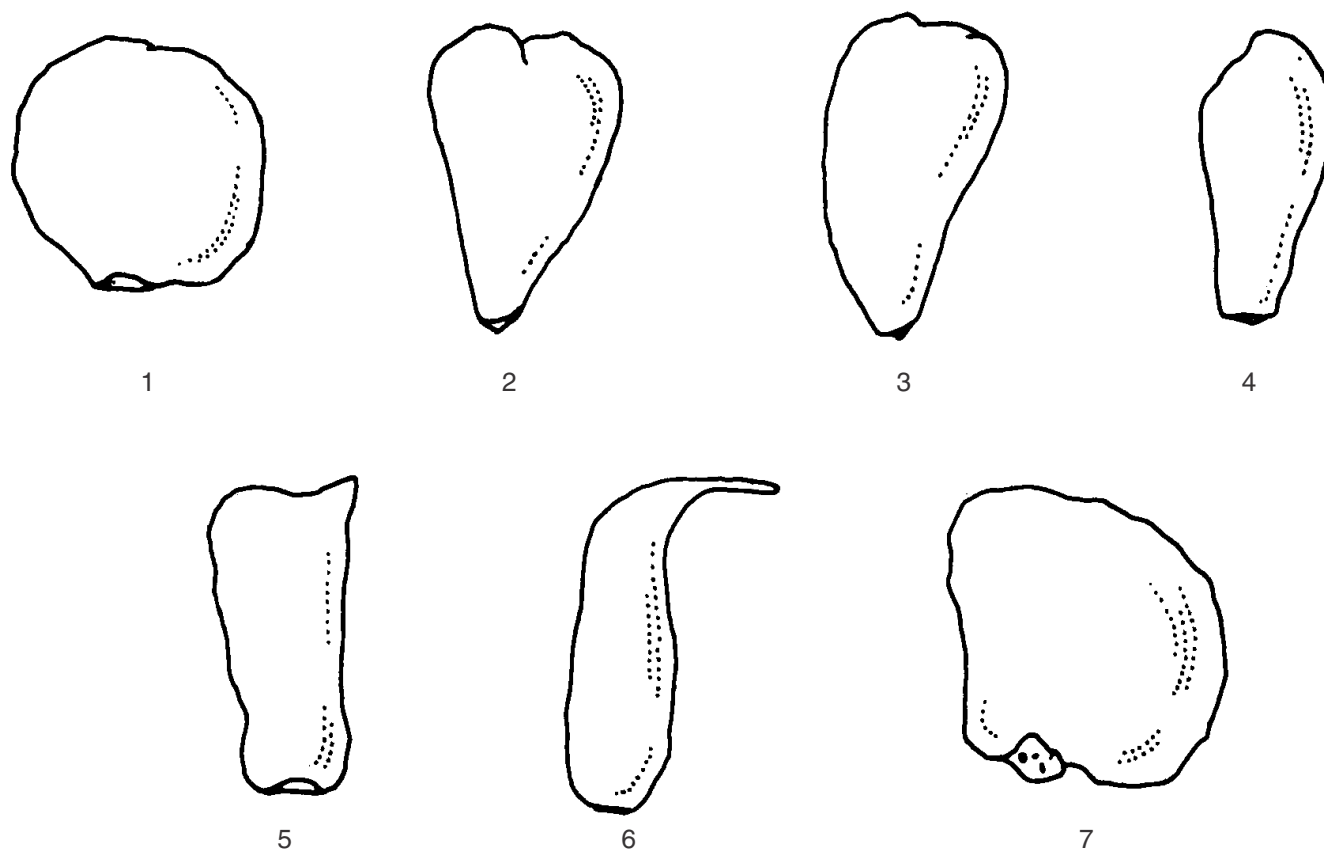


Fig. 10. Flake shape

7.4.34 Flake texture

Recorded on fully ripe fruits

- 1 Soft
- 2 Firm
- 3 Coarse
- 4 Fibrous
- 5 Melting
- 99 Other (specify in descriptor 7.6 Notes)

7.4.35 Flake nutritive value

Recorded on fully ripe fruits

- 7.4.35.1 Total sugars [%]
- 7.4.35.2 Total soluble solids [°Brix]
- 7.4.35.3 Vitamin A [I.U.]

7.4.36 Pulp taste

According to local preference

- 1 Insipid
- 2 Acid
- 3 Bitter
- 4 Sweet
- 99 Other (specify in descriptor 7.6 Notes)

7.4.37 Pulp consistency

- 1 Slimy
- 2 Soft
- 3 Medium
- 4 Firm

7.4.38 Pulp flavour

Assessed at the time of opening ripe fruit

- 1 Weak
- 2 Intermediate
- 3 Strong

7.4.39 Pulp juiciness

- 0 Not juicy
- 1 Juicy
- 2 Very juicy

7.4.40 Pulp (flake flesh) colour

Recorded at the ripe stage

- 1 Coppery red
- 2 Deep yellow
- 3 Yellow
- 4 Light yellow
- 5 Creamy white
- 6 White
- 99 Other (specify in descriptor 7.6 Notes)

7.4.41 Rachis (fruit core) length [cm]

Average of ten rachides at fully ripe stage

7.4.42 Rachis (fruit core) diameter [cm]

Measured at the widest point. Average of ten rachides at fully ripe stage

7.4.43 Rachis cooking quality

Recorded at mature stage

- 1 Poor
- 2 Good

7.4.44 Vivipary

- 0 Absent
- 1 Present

7.5 Seed descriptors

7.5.1 Seed length [cm]

Average of 20 seeds

7.5.2 Seed width [cm]

Average of 20 seeds at the widest point

7.5.3 Number of seeds per kg fruit

7.5.4 100-Seed weight [g]

7.5.5 Seed shape

(See Fig. 11)

- | | |
|-------------|--|
| 1 Spheroid | 5 Reniform |
| 2 Ellipsoid | 6 Irregular |
| 3 Elongate | 99 Other (specify in descriptor 7.6 Notes) |
| 4 Oblong | |

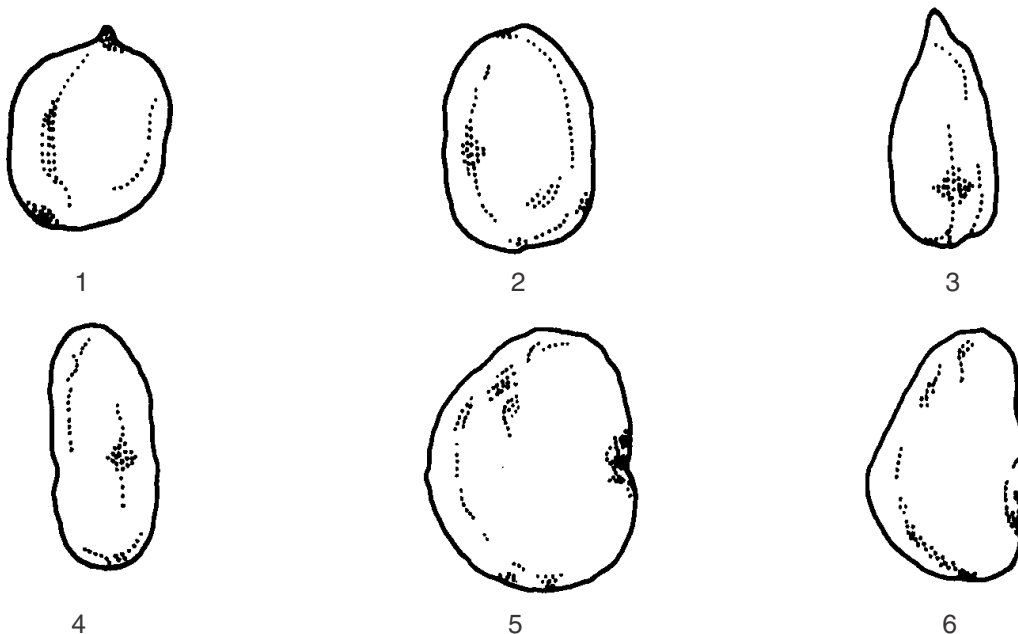


Fig. 11. Seed shape

7.5.6 Seed surface sliminess (ripe fruits)

- 1 Slightly slimy
- 2 Intermediate
- 3 Highly slimy

7.5.7 Seed coat thickness

- 1 Thin
- 2 Intermediate
- 3 Thick

7.5.8 Seed surface pattern

- 1 Uniform
- 2 Regular striations
- 3 Patches
- 99 Other (specify in descriptor 7.6 Notes)

7.5.9 Seed coat colour

- 1 Off-white
- 2 Creamish
- 3 Dull brown
- 4 Brown
- 99 Other (specify in descriptor 7.6 Notes)

7.5.10 Adherence of seed coat to kernel

- 1 Easily separable
- 2 Intermediate
- 3 Difficult to separate

7.5.11 Flake/seed ratio

Weight of flakes divided by weight of seeds. Average of 20 seeds

7.5.12 Seed cooking quality

(Steam boiled)

- 1 Poor
- 2 Medium
- 3 Good
- 4 Very good

7.5.12.1 Seed consistency after boiling

- 1 Waxy
- 2 Intermediate
- 3 Floury

7.5.12.2 Seed flavour after boiling

- 1 Weak
- 2 Intermediate
- 3 Strong

7.6 Notes

Any additional information may be specified here

EVALUATION

8. Plant descriptors

8.1 Fruit

8.1.1 Yield per tree [kg per year]

8.1.2 Number of fruits per tree

Average of ten trees per accession

8.1.3 Fruit productivity [kg/m²]

Average of ten trees per accession. Yield relative to tree canopy size calculated from length and width

8.1.4 Fruit availability [d]

Number of days from the first to the last harvest date

8.1.5 Maturity period

- 1 Early
- 2 Intermediate
- 3 Late

8.1.6 Fruit bearing

- 3 Poor
- 5 Medium
- 7 Heavy

8.1.7 Fruit quality at storage [d]

Number of days of storage under ambient conditions

8.2 Kernel

8.2.1 Chemical composition

8.2.1.1 Kernel protein content [%]

8.2.1.2 Kernel carbohydrate content [%]

8.3 Notes

Specify here any other additional information

9. Abiotic stress susceptibility

Scored under artificial and/or natural conditions, which should be clearly specified. These are coded on a susceptibility scale from 1 to 9, viz.:

- 1 Very low or no visible sign of susceptibility
- 3 Low
- 5 Intermediate
- 7 High
- 9 Very high

9.1 Reaction to higher temperature

9.1.1 Sunburn susceptibility of fruit

- 0 Not susceptible
- 3 Poor
- 5 Medium
- 7 High
- 9 Very high

9.2 Reaction to soil salinity

9.3 Reaction to mineral deficiency

- 1 Nitrogen
- 2 Phosphorus
- 3 Potassium
- 4 Boron
- 5 Zinc
- 6 Copper
- 7 Molybdenum
- 99 Other (specify in descriptor 9.8 Notes)

9.4 Reaction to mineral toxicity

- 1 Boron
- 2 Zinc
- 3 Chloride
- 4 Copper
- 5 Calcium
- 99 Other (specify in descriptor 9.8 Notes)

9.5 Reaction to waterlogging**9.6 Reaction to drought****9.7 Reaction to constant winds****9.8 Notes**

Specify here any additional information

10. Biotic stress susceptibility

In each case, it is important to state the origin of the infestation or infection, i.e. natural, field inoculation, and laboratory. Also specify the causal organism and the corresponding symptoms. Record such information in descriptor **10.3 Notes**. These are coded on a susceptibility scale from 1 to 9, viz.:

- 1 Very low or no visible sign of susceptibility
- 3 Low
- 5 Intermediate
- 7 High
- 9 Very high

10.1 Pests

	Causal organism	Common name
10.1.1	<i>Morganella longispina</i>	Plumose scale
10.1.2	<i>Lepropuss</i> sp.	Leaf eating beetle
10.1.3	<i>Batocera rufomaculata</i>	Bark borer
10.1.4	<i>Bactrocera dorsalis</i>	Fruit fly
10.1.5	<i>Bactrocera umbrosa</i>	Oriental fruit fly
10.1.6	<i>Ceroplastes rubens</i>	Jack scale
10.1.7	<i>Chionaspis</i> sp.	Scale
10.1.8	<i>Conogethes punctiferalis</i>	Shoot borer
10.1.9	<i>Glyphodes caesalis</i>	Shoot and fruit borer
10.1.10	<i>Ferrisia virgata</i>	Striped mealy bug
10.1.11	<i>Greenidea artocarp</i>	Jackfruit aphid
10.1.12	<i>Homona coffearia</i> , <i>Asota</i> sp., <i>Lymantria</i> sp.	Leaf eating caterpillar
10.1.13	<i>Icerya aegyptiaca</i>	Mealybug
10.1.14	<i>Indarbela tetraonis</i>	Bark eating caterpillar
10.1.15	<i>Lecanium psidii</i>	Scale insect
10.1.16	<i>Glyphodes caesalis</i>	Jackfruit borer
10.1.17	<i>Perina nuda</i>	Jackfruit leaf-webber
10.1.18	<i>Platypus</i> sp.	Shoot and trunk borer
10.1.19	<i>Pulvinaria psidii</i>	Mealy scale
10.1.20	<i>Toxoptera auranti</i>	Citrus aphid

10.2 Diseases

10.2.1	<i>Botryodiplodia theobromae</i> , <i>Cercospora</i> sp., <i>Colletotrichum orbiculare</i> , <i>Gleosporium</i> sp., <i>Phomopsis</i> sp., <i>Septoria</i> sp.	Leaf spot
10.2.2	<i>Botrytis cinerea</i>	Blossom and fruit blight
10.2.3	<i>Cephaleuros parasiticus</i>	Red rust – algal
10.2.4	<i>Colletotrichum</i> sp.	Anthracnose
10.2.5	<i>Corticium salmonicolor</i>	Pink stem disease
10.2.6	<i>Fomes</i> sp., <i>Hoplolaimus</i> sp.	Root diseases
10.2.7	<i>Phellinus</i> sp.	Dry rot
10.2.8	<i>Phyllosticta</i> sp., <i>Phytophthora</i> sp., <i>Rhizopus artocarp</i> , <i>Rhizoctonia solani</i>	Fruit rot
10.2.9	<i>Rhizopus stolonifer</i>	Pink disease
10.2.10	<i>Macrophomina phaseolina</i> , <i>Rosellinia arcuata</i> , <i>Rosellinia bunodes</i>	Root rot
10.2.11	<i>Sphaerostilbe repens</i>	Stinking root disease
10.2.12	<i>Uredo artocarp</i>	Rust
10.2.13	<i>Erwinia carotovora</i>	Bacterial disease

10.3 Notes

Specify here any additional information

11. Biochemical markers [specify methods used and cite reference(s)]**11.1 Isozymes**

For each enzyme, indicate the tissue analyzed and the zymogram type. A particular enzyme can be recorded as 11.1.1; 11.1.2, etc. Examples include: Acid phosphatase (ACPH); Esterases α and β (EST A and B); Isocitrate dehydrogenase (ICD); Malate dehydrogenase (MDH); Phosphogluconate dehydrogenase (PGD); Phosphoglucose isomerase (PGI); Phosphoglucose mutase (PGM); Peroxidases

11.2 Other biochemical markers

(e.g. Polyphenol profile)

12. Molecular markers

Describe any specific discriminating or useful trait for this accession. Report probe-enzyme combination analyzed. Below are listed some of the basic methods most commonly used

12.1 Restriction fragment length polymorphism (RFLP)

Report probe/enzyme combination (approach can be for nuclear, chloroplast or mitochondrial genomes)

12.2 Amplified fragment length polymorphism (AFLP)

Report primer pair combinations and accurate molecular size of products (used for nuclear genomes)

12.3 DNA amplification fingerprinting (DAF); random amplified polymorphic DNA (RAPD); AP-PCR

Accurately report experimental conditions and molecular size of products (used for nuclear genomes)

12.4 Sequence-tagged microsatellites (STMS)

Report primer sequences, and accurate product sizes (can be used for nuclear or chloroplast genomes)

12.5 PCR-sequencing

Report PCR primer sequences, and derived nucleotide sequence (can be used for single copy nuclear, chloroplast or mitochondrial genomes)

12.6 Other molecular markers

13. Cytological characters

13.1 Chromosome number

13.2 Ploidy level

(2x, 3x, 4x, etc. and aneuploidy)

13.3 Meiosis chromosome associations

Average of 50 microspore mother cells, observed during metaphase 1

13.4 Other cytological characters

14. Identified genes

Describe any known specific mutant present in the accession

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ACKNOWLEDGEMENTS

IPGRI wishes to place on record their sincere thanks to the numerous jackfruit workers around the world who have contributed directly or indirectly to the development of the Descriptors for Jackfruit (*Artocarpus heterophyllus*).

Dr Bhag Mal of IPGRI-APO coordinated the development and review of this publication. Ms Adriana Alercia supervised the production of the text up to the publication stage and provided scientific and technical expertise. Ms Linda Sears edited the text and Ms Patrizia Tazza prepared the cover and the layout. Drs Mathura Rai and K. Joseph Johan provided the figures shown in the text.

Technical and scientific advice provided by Drs V. Ramanatha Rao, R.K. Arora, F. Morales, T. Hodgkin and F. Engelmann are gratefully acknowledged.

ANNEX I. Multicrop Passport Descriptors

This list of multicrop passport descriptors has been developed jointly by IPGRI and FAO to provide consistent coding schemes for common passport descriptors across crops. These descriptors aim to be compatible with future IPGRI crop descriptor lists and with the descriptors to be used for the FAO World Information and Early Warning System (WIEWS) on plant genetic resources.

The list should NOT be regarded as a minimum descriptor list, since many additional passport descriptors are essential for the description of crops and need to be recorded. This document lists an initial set of common passport descriptors at the multicrop level. At a later stage the list could be expanded with additional multicrop descriptors. For example, descriptors dealing with the use of germplasm are currently not included, but their suitability for inclusion at the multicrop level will be investigated. Future expansion could even result in the development of more specialized lists of common descriptors at the crop group level.

Printed here is the latest version of the list (1997) which contains two sections. The latter one (FAO WIEWS DESCRIPTORS) lists a number of optional descriptors used in the FAO WIEWS. The list provides descriptions of content and coding schemes, but also provides *suggested* fieldnames (in parentheses) that can assist in the computerized exchange of this type of data.

Please forward your feedback on the use of this list to:

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MULTICROP PASSPORT DESCRIPTORS	
1. Institute code	(INSTCODE)
Code of the institute where the accession is maintained. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus number or an acronym as specified in the Institute database that will be made available by FAO. Preliminary codes (i.e. codes not yet incorporated in the FAO Institute database) start with an asterisk followed by a 3-letter ISO 3166 country code and an acronym.	
2. Accession number	(ACCENUMB)
This number serves as a unique identifier for accessions and is assigned when an accession is entered into the collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number should never be reused. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system).	
3. Collecting number	(COLLNUMB)
Original number assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number. This item is essential for identifying duplicates held in different collections. It should be unique and always accompany subsamples wherever they are sent.	
4. Genus	(GENUS)
Genus name for taxon. Initial uppercase letter required.	
5. Species	(SPECIES)
Specific epithet portion of the scientific name in lowercase letters plus authority ¹ . Following abbreviation is allowed: "sp."	
6. Subtaxa	(SUBTAXA)
Subtaxa can be used to store any additional taxonomic identifier plus authority ¹ . Following abbreviations are allowed: "ssp." (for subspecies); "var." (for variety); "convar." (for convariety); "f." (for form).	
7. Accession name	(ACCNAME)
Either a registered or other formal designation given to the accession. First letter uppercase. Multiple names separated with semicolon.	
8. Country of origin	(ORIGCTY)
Name of the country in which the sample was originally collected or derived. Use the ISO 3166 extended codes, (i.e. current and old 3 letter ISO 3166 country codes)	
9. Location of collecting site	(COLLSITE)
Location information below the country level that describes where the accession was collected starting with the most detailed information. Might include the distance in kilometers and direction from the nearest town, village or map grid reference point, (e.g. CURITIBA 7S, PARANA means 7 km south of Curitiba in the state of Parana)	
10. Latitude of collecting site	(LATITUDE)
Degrees and minutes followed by N (North) or S (South) (e.g. 1030S). Missing data (minutes) should be indicated with hyphen (e.g. 10-S).	

¹ Authority is only provided at the most detailed taxonomic level

11. Longitude of collecting site	(LONGITUDE)
Degrees and minutes followed by E (East) or W (West) (e.g. 07625W). Missing data (minutes) should be indicated with hyphen (e.g. 076–W).	
12. Elevation of collecting site [m asl]	(ELEVATION)
Elevation of collecting site expressed in meters above sea level. Negative values allowed.	
13. Collecting date of original sample [YYYYMMDD]	(COLLDATE)
Collecting date of the original sample where YYYY is the year, MM is the month and DD is the day.	
14. Status of sample	(SAMPSTAT)
1 Wild	0 Unknown
2 Weedy	
3 Traditional cultivar/Landrace	99 Other (Elaborate in REMARKS field)
4 Breeder's line	
5 Advanced cultivar	
15. Collecting source	(COLLSRC)
The coding scheme proposed can be used at 2 different levels of detail: Either by using the global codes such as 1, 2, 3, 4 or by using the more detailed coding such as 1.1, 1.2, 1.3 etc.	
1 Wild habitat	2 Farm
1.1 Forest/woodland	2.1 Field
1.2 Shrubland	2.2 Orchard
1.3 Grassland	2.3 Garden
1.4 Desert/tundra	2.4 Fallow
	2.5 Pasture
	2.6 Store
3 Market	4 Institute/Research organization
3.1 Town	
3.2 Village	
3.3 Urban	0 Unknown
3.4 Other exchange system	99 Other (Elaborate in REMARKS field)
16. Donor institute code	(DONORCODE)
Code for the donor institute. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus number or an acronym as specified in the Institute database that will be made available by FAO. Preliminary codes (i.e. codes not yet incorporated in the FAO Institute database) start with an asterisk followed by a 3-letter ISO 3166 country code and an acronym.	
17. Donor number	(DONORNUMB)
Number assigned to an accession by the donor. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system)	
18. Other number(s) associated with the accession	(OTHERNUMB)
Any other identification number known to exist in other collections for this accession. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system). Multiple numbers can be added and should be separated with a semicolon	
19. Remarks	(REMARKS)
The remarks field is used to add notes or to elaborate on descriptors with value "99" (=Other). Prefix remarks with the field name they refer to and a colon (e.g. COLLSRC: roadside). Separate remarks referring to different fields are separated by semicolons.	

FAO WIEWS DESCRIPTORS	
<p>1. Location of safety duplicates (DUPLSITE)</p> <p>Code of the institute where a safety duplicate of the accession is maintained. The codes consist of 3-letter ISO 3166 country code of the country where the institute is located plus number or an acronym as specified in the Institute database that will be made available by FAO. Preliminary codes (i.e. codes not yet incorporated in the FAO Institute database) start with an asterisk followed by a 3-letter ISO 3166 country code and an acronym. Multiple numbers can be added and should be separated with a semicolon.</p>	
<p>2. Availability of passport data (PASSAVAIL)</p> <p>(i.e. in addition to what has been provided)</p> <p>0 Not available 1 Available</p>	
<p>3. Availability of characterization data (CHARAVAIL)</p> <p>0 Not available 1 Available</p>	
<p>4. Availability of evaluation data (EVALAVAIL)</p> <p>0 Not available 1 Available</p>	
<p>5. Acquisition type of the accession (ACQTYPE)</p> <p>1 Collected/bred originally by the institute 2 Collected/bred originally by joint mission/institution 3 Received as a secondary repository</p>	
<p>6. Type of storage (STORATYPE)</p> <p>Maintenance type of germplasm. If germplasm is maintained under different types of storage, multiple choices are allowed, separated by a semicolon (e.g. 2;3). (Refer to FAO/IPGRI Genebank Standards 1994 for details on storage type)</p> <p>1 Short-term 2 Medium-term 3 Long-term 4 <i>In vitro</i> collection 5 Field genebank collection 6 Cryopreserved</p> <p style="text-align: right;">99 Other (elaborate in REMARKS field)</p>	

COLLECTING FORM for jackfruit (*Artocarpus heterophyllus*)=====
SAMPLE IDENTIFICATION
=====

COLLECTING NAME(S)/INSTITUTE(S) (2.1):

COLLECTING No. (2.3):

PHOTOGRAPH No. (2.22):

COLLECTING DATE [YYYYMMDD] (2.4):

GENUS (1.7.1):

SPECIES (1.7.2):

=====
COLLECTING SITE LOCATION
=====

COUNTRY (2.5):

PROVINCE/STATE (2.6):

DEPARTMENT/COUNTY (2.7):

LOCATION (2.8):

km:

direction:

from:

LATITUDE (2.9):

LONGITUDE (2.10):

ELEVATION (2.11): m asl

=====
COLLECTING SITE ENVIRONMENT
=====

COLLECTING SOURCE (2.12):

0. Unknown

1. Wild habitat

2. Farm

3. Market

4. Institute/Research organization

99. Other (specify):

HIGHER LEVEL LANDFORM (6.1.2):

1. Plain

2. Basin

3. Valley

4. Plateau

5. Upland

6. Hill

7. Mountain

SLOPE [°] (6.1.4):

SLOPE ASPECT (6.1.6):

(code N,S,E,W)

SOIL FERTILITY (6.1.25):

(code: 3Low; 5Moderate; 7High)

SOIL TEXTURE CLASSES (6.1.21):

State class (e.g. Clay, Loam, Silt)

SOIL TAXONOMIC CLASSIFICATION (6.1.23):

State class (e.g. Alfisols, Spodosols, Vertisols)

WATER AVAILABILITY (6.1.24):

1. Rain-fed

2. Irrigated

3. Flooded

4. River banks

5. Sea coast

99. Other (specify):

TEMPERATURE (6.1.26.1):

Annual mean: mm

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Monthly mean [°C]:

RAINFALL (6.1.26.2):

Annual mean: mm

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Monthly mean [°C]:

 =====
SAMPLE
=====

STATUS OF SAMPLE (2.1.6):

0. Unknown

1. Wild

2. Weedy

3. Traditional cultivar/Landrace

4. Breeder's line

5. Advanced cultivar

99. Other (specify):

TYPE OF SAMPLE (2.15):

1. Vegetative

2. Seed/seedling

3. Pollen

4. Tissue culture

99. Other (specify)

NUMBER OF PLANTS SAMPLED (2.14):

64 Jackfruit

PREVAILING STRESSES (2.17.14):

Mention the types of major stresses, i.e. abiotic (drought), biotic (pests, diseases, etc.)

ETHNOBOTANICAL DATA

LOCAL/VERNACULAR NAME (2.17.2):

ETHNIC GROUP (2.17.1):

PARTS OF PLANT USED (2.17.6)

1. Seed	2. Root	3. Trunk	4. Leaf
5. Flower/inflorescence	6. Fruit	99. Other (specify):	

PLANT USES (2.17.7)

1. Food	2. Forage	3. Fuel	4. Medicine	5. Wood/timber
6. Dye	99. Other (specify):			

ASSOCIATED FLORA (2.17.16):

MANAGEMENT

ACCESSION NO. (3.1)

TYPE OF MAINTENANCE (3.8):

1. Seed	2. Vegetative in field	3. Vegetative in tissue culture
4. Pollen	5. Cryopreservation	99. Other (specify):

CHARACTERIZATION

Growth

Tree growth habit (7.1.9):	1. Erect	2. Semi-erect	3. Spreading	99. Other (specify):
Branching density (7.1.10):	3. Sparse	5. Medium	7. Dense	
Branching pattern (7.1.11):	1. Erect	2. Opposite	3. Verticillate	4. Horizontal
	5. Irregular			

Leaf

Leaf blade shape (7.2.3)	Leaf colour (7.2.7)
Leaf apex shape (7.2.4)	Leaf upper surface pubescence (7.2.8)
Leaf base shape (7.2.5)	Leaf lower surface pubescence (7.2.9)

Inflorescence

Flowering precocity (7.3.1)	Female inflorescence position (7.3.10)
Inflorescence colour (7.3.7)	Male inflorescence position (7.3.11)
Female inflorescence density (7.3.9)	

Fruit

Fruit bearing habit (7.4.5.1)	Flake/fruit ratio (7.4.28)
Fruit bearing position (7.4.5.2)	Flake shape (7.4.32)
Fruit shape (7.4.7)	Flake texture (7.4.34)
Shape of spine (7.4.18)	Pulp (flake flesh) colour (7.4.40)
Spine density (7.4.19)	

Seed

Seed shape (7.5.5)	Adherence of seed coat to kernel (7.5.10)
Seed surface pattern (7.5.8)	Flake/seed ratio (7.5.11)
Seed coat colour (7.5.9)	

Collector's Notes:

