IPGRI

Descriptors for

Mangosteen

Garcinia mangostana

ASIAN DEVELOPMENT BANK

List of Descriptors

Allium (E,S,F)	2001	Forage legumes * (E)	1984	Plum * (E)	1985
Almond (revised) * (E)	1985	Grapevine (E,S,F)	1997	Potato variety * (E)	1985
Apple (E)	1982	Groundnut (E,S,F)	1992	Quinua * (E)	1981
Apricot * (E)	1984	Jackfruit (E)	2000	Rambutan (E)	2003
Avocado (E,S)	1995	Kodo millet * (E)	1983	Rice * (E)	1980
Bambara groundnut (E,F)	2000	*Lathyrus* spp. (E)	2000	Rocket (E,I)	1999
Banana (E,S,F)	1996	Lentil * (E)	1985	Rye and Triticale * (E)	1985
Barley (E)	1994	Lima bean * (E,P)	1982	Safflower * (E)	1983
Beta (E)	1991	Litchi (E)	2002	Sesame * (E)	1981
Black pepper (E,S)	1995	Lupin * (E,S)	1981	*Setaria italica* and	
Brassica and *Raphanus* (E)	1990	Maize (E,S,F, P)	1991	*S. pumilia* (E)	1985
Brassica campestris L. (E)	1987	Mango (E)	1989	Sorghum (E,F)	1993
Buckwheat (E)	1994	Medicago (Annual) * (E,F)	1991	Soyabean * (E,C)	1984
Capsicum (E,S)	1995	Mung bean * (E)	1980	Strawberry (E)	1986
Cardamom (E)	1994	Oat * (E)	1985	Sunflower * (E)	1985
Carrot (E,S,F)	1999	Oca * (S)	2001	Sweet potato (E,S,F)	1991
Cashew (E)	1986	Oil palm (E)	1989	Taro (E,F,S)	1999
Cherry * (E)	1985	*Panicum miliaceum* and		Tea (E,S,F)	1997
Chickpea (E)	1993	*P. sumatrense* (E)	1985	Tomato (E, S, F)	1996
Citrus (E,F,S)	1999	Papaya (E)	1988	Tropical fruit * (E)	1980
Coconut (E)	1992	Peach * (E)	1985	*Vigna aconitifolia* and	
Coffee (E,S,F)	1996	Pear * (E)	1983	*V. trilobata* (E)	1985
Cotton (Revised) (E)	1985	Pearl millet (E,F)	1993	*Vigna mungo* and	
Cowpea (E)	1983	*Phaseolus acutifolius* (E)	1985	*V. radiata* (Revised) * (E)	1985
Cultivated potato * (E)	1977	*Phaseolus coccineus* * (E)	1983	Walnut (E)	1994
Echinochloa millet * (E)	1983	*Phaseolus vulgaris* * (E,P)	1982	Wheat (Revised) * (E)	1985
Eggplant (E,F)	1990	Pigeonpea (E)	1993	Wheat and *Aegilops* * (E)	1978
Faba bean * (E)	1985	Pineapple (E)	1991	White Clover (E)	1992
Finger millet (E)	1985	*Pistacia* (excluding *Pistacia*		Winged Bean * (E)	1979
Forage grass * (E)	1985	*vera*) (E)	1998	Xanthosoma (E)	1989
		Pistachio (A,R,E,F,)	1997	Yam (E,S,F)	1997

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Mangosteen

Garcinia mangostana

The International Plant Genetic Resources Institute (IPGRI) is an independent international scientific organization that seeks to advance the conservation and use of plant genetic diversity for the well-being of present and future generations. It is one of 16 Future Harvest Centres supported by the Consultative Group on International Agricultural Research (CGIAR), an association of public and private members who support efforts to mobilize cutting-edge science to reduce hunger and poverty, improve human nutrition and health, and protect the environment. IPGRI has its headquarters in Maccarese, near Rome, Italy, with offices in more than 20 other countries worldwide. The Institute 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).

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CONTENTS

PREFACE

Descriptors for Mangosteen (*Garcinia mangostana*) were developed by Drs Salma Idris, Felipe S. dela Cruz, Songpol Somsri and Bhag Mal. 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 their importance to the description of the crop. 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 into 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 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 and are listed in Annex I.

Multicrop passport descriptors 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 Mangosteen that will facilitate data collecting.

Any suggestions for improvement on the Descriptors for Mangosteen 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 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 descriptor 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;

(c) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Colour 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

All descriptors listed under Passport, belonging to the multicrop passport descriptors category, are indicated in the text as [MCPD]

1. Accession descriptors

1.1 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 a number. The current set of Institute Codes is available from the FAO website (http://apps3.fao.org/wiews/).

1.2 Accession number [MCPD]

This number serves as a unique identifier for accessions within a genebank collection, and is assigned when a sample is entered into the genebank 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 in Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system)

1.2.1 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

1.3 Donor name

Name of the institution or individual responsible for donating the germplasm

1.4 Donor institute code [MCPD]

Code for the donor institute. It follows the Institute code standard.

1.5 Donor accession number [MCPD]

Number assigned to an accession by the donor. It follows the Accession number standard.

1.6 Curator's name

Name of the officer responsible for maintaining the genetic resources material held at the institute specified in descriptor **1.1 Institute code**

1.7 Other identification (numbers) associated with the accession [MCPD]

Any other identification (numbers) known to exist in other collections for this accession. Use the following system: INSTCODE: ACCENUMB; INSTCODE: ACCENUMB;… INSTCODE and ACCENUMB follow the standard described above

and are separated by a colon. Pairs of INSTCODE and ACCENUMB are separated by a semicolon without space. When the institute is not known, the number should be preceded by a colon.

1.7.1 Genebank number

1.7.2 Collecting number

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 number is essential for identifying duplicates held in different collections.

1.8 Scientific name

1.8.1 Genus [MCPD]

Genus name for taxon. Initial uppercase letter required.

1.8.2 Species [MCPD]

Specific epithet portion of the scientific name in lowercase letters. Following abbreviation is allowed: 'sp.'

1.8.3 Species authority [MCPD]

Provide the authority for the species name.

1.8.4 Subtaxa [MCPD]

Subtaxa can be used to store any additional taxonomic identifier. Following abbreviations are allowed: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form).

1.8.5 Subtaxa authority [MCPD]

Provide the subtaxa authority at the most detailed taxonomic level.

1.9 Ancestral data

Information about either pedigree or other description of ancestral information (i.e. parent variety in case of mutant or selection). For example a pedigree 'Hanna/7*Atlas//Turk/8*Atlas' or a description 'mutation found in Hanna', 'selection from Irene' or 'cross involving amongst others Hanna and Irene'.

1.9.1 Female parent

1.9.2 Male parent

1.10 Cultivar origin

1 Open pollination
2 Artificial pollination
3 Clonal selection
4. Seedling selection

1.11 Accession

1.11.1 Accession name [MCPD]

Either a registered or other formal designation given to the accession. First letter uppercase. Multiple names separated with semicolon without space. For example: Rheinische Vorgebirgstrauben; Emma; Avlon

1.11.2 Synonyms

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

1.11.3 Common crop name [MCPD]

Name of the crop in colloquial language, preferably English (i.e. 'malting barley', 'cauliflower', or 'white cabbage')

1.11.4 Local language

Language in which the accession name is given

1.11.5 Translation/Transliteration

Provide translation of the local accession name into English

1.12 Acquisition date [YYYYMMDD] [MCPD]

Date on which the accession entered the collection where YYYY is the year MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens. Leading zeros are required.

1.13 Accession size

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

1.14 Type of material received

1 Fruit
2 Seed
3 Seedling/sapling
4 Shoot/budwood/stem cutting
5 *In vitro* plantlet
99 Other (specify in descriptor **1.16 Remarks**)

1.15 Previous locations

Register other known previous locations of the accession, from the most recent to the oldest known location

1.16 Remarks

The remarks field is used to add notes or to elaborate on descriptors with value 99 or 999 (=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 without space.

2. Collecting descriptors

2.1 Collecting institute code [MCPD]

Code of the Institute collecting the sample. If the holding institute has collected the material, the collecting institute code (COLLCODE) should be the same as the holding institute code (INSTCODE). It follows the Institute code standard.

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.

2.4 Collecting date of sample [YYYYMMDD] [MCPD]

Collecting date of the sample where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens. Leading zeros are required.

2.5 Country of origin [MCPD]

Code of the country in which the sample was originally collected. Use the three-letter ISO 3166-1 extended country codes.

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]

Location information below the country level that describes where the accession was collected. This might include the distance in kilometres and direction from the nearest town, village or map grid reference point, (e.g. 7 km south of Curitiba in the state of Parana).

2.9 Latitude of collecting site[1] [MCPD]

Degree (2 digits) minutes (2 digits), and seconds (2 digits) followed by N (North) or S (South) (e.g. 103020S). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 10----S; 011530N; 4531--S).

2.10 Longitude of collecting site[1] [MCPD]

Degree (3 digits), minutes (2 digits), and seconds (2 digits) followed by E (East) or W (West) (e.g. 0762510W). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 076----W).

2.11 Elevation of collecting site [m asl] [MCPD]

Elevation of collecting site expressed in meters above sea level. Negative values are allowed.

2.12 Collecting/acquisition source [MCPD]

The coding scheme proposed can be used at 2 different levels of detail: either by using the general codes (in boldface) such as 10, 20, 30, 40 or by using the more specific codes such as 11, 12, etc.

10 Wild habitat
- 11 Forest/woodland
- 12 Shrubland
- 13 Grassland
- 14 Desert/tundra
- 15 Aquatic habitat

20 Farm or cultivated habitat
- 21 Field
- 22 Orchard
- 23 Backyard, kitchen or home garden (urban, peri-urban or rural)
- 24 Fallow land
- 25 Pasture
- 26 Farm store
- 27 Threshing floor
- 28 Park

30 Market or shop

40 Institute, experimental station, research organization, genebank

50 Seed company

60 Weedy, disturbed or ruderal habitat
- 61 Roadside
- 62 Field margin

99 Other (Specify in descriptor **2.24 Collector's notes**)

[1] To convert from longitude and latitude in degrees (°) minutes (′), seconds (″) and a hemisphere (North or South and East or West) to decimal degrees, the following formula should be used:

d°m′ s″=h*(d+m/60 + s/3600)

where h=1 for Northern and Eastern hemisphere and -1 for the Southern and Western hemispheres, i.e., 30°30′0″S = –30.5 and 30°15′55″N=30.265.

2.13 Breeding institute code [MCPD]

Institute code of the institute that has bred the material. If the holding institute has bred the material, the breeding institute code (BREDCODE) should be the same as the holding institute code (INSTCODE). It follows the Institute standard.

2.14 Collecting source environment

Use descriptors **6.1.1. to 6.1.20.7** in section **6**

2.15 Type of sample

Type 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 Fruit
2 Seed
3 Seedling/sapling
4 Shoot/budwood/stem cutting
5 *In vitro* plantlet
99 Other (specify which part of the plant is used in descriptor **2.24 Collector's notes**)

2.16 Number of plants sampled

2.17 Biological status of accession [MCPD]

The coding scheme proposed can be used at three different levels of detail: either by using the general codes (in boldface) such as 100, 200, 300, 400 or by using the more specific codes such as 110, 120, etc.

100 Wild
- 110 Natural
- 120 Semi-natural/wild

200 Weedy

300 Traditional cultivar/landrace

400 Breeding/research material
- 410 Breeder's line
  - 411 Synthetic population
  - 412 Hybrid
  - 413 Founder stock/base population
  - 414 Inbred line (parent of hybrid cultivar)
  - 415 Segregating population
- 420 Mutant/genetic stock

500 Advanced/improved cultivar

999 Other (Specify in descriptor **2.24 Collector's notes**)

2.18 Ethnobotanical data

2.18.1 Ethnic group

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

2.18.2 Local/vernacular name

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

2.18.3 Translation

Provide translation of the local name into English, if possible

2.18.4 Mangosteen varietal name meaning

Does the Mangosteen name have a meaning? If yes, describe it briefly in descriptor **2.24 Collector's notes**

0 No
1 Yes

2.18.5 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)

2.18.6 Parts of the plant used

1 Seed
2 Root
3 Trunk
4 Leaf
5 Flower
6 Fruit
7 Rind
8 Bark
9 Latex
10 Pericarp
99 Other (specify in descriptor **2.24 Collector's note**)

2.18.7 Plant uses

1 Food (fruit, juice)
2 Forage
3 Fuel
4 Medicine
5 Wood/timber
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.8 Special uses

1 Feasts
2 Religious purpose
3 Chiefs
4 Aesthetic
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.9 Frequency of use of the plant

1 Daily
2 Weekly
3 Occasional
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.10 Method of use

1 Table fruit
2 Mixed fruit
3 Preserved
4 Processed product
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.11 Cultural characteristics

Is there folklore associated with the collected mangosteen type? (e.g. taboos, stories and/or superstitions). If so, describe it briefly in descriptor **2.24 Collector's notes**

2.18.12 Mangosteen popularity

Is the variety popular and widely grown? If yes, describe briefly the reasons in descriptor **2.24 Collector's notes**

0 No
1 Yes

2.18.13 Preferred growing conditions

If yes, describe farmers' perceptions on hardiness of the variety in relation to main stresses in descriptor **2.24 Collector's notes**.

0 No
1 Yes

2.18.14 Prevailing stresses

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

2.18.15 Cultural methods

2.18.15.1 Cropping system/pattern

1 Monoculture (specify spacing)
2 Intercropping (specify spacing and type of intercrop)
3 Natural cropping (i.e. wild types topworked) with cultivar/self sown trees retained in homesteads)
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.15.2 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 **2.24 Collector's notes**)
3 Cutting
4 Layering
5 Inarching
6 Tissue culture (specify which part of plant used, in descriptor **2.24 Collector's notes**)
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.15.3 Irrigation

1 Rainfed
2 Irrigated (specify average annual amount of water supplied per hectare)
99 Other (specify in descriptor **2.24 Collector's notes**)

2.18.15.4 Cultural situation

2.18.15.4.1 Status of plantation

1 Backyard (indicate number of trees)
2 Smallholding (<5 ha)
3 Mid-size holding (5-10 ha)
4 Large plantation (>10 ha)

2.18.16 Associated flora

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

2.18.17 Seasonality

1 Available only in main season
2 Available in off-season
3 Available throughout the year

2.18.18 Market information

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

0 No
1 Yes

2.18.19 Type of market

1 Local (village, city, country, district, province)
2 National
3 Regional
4 International

2.19 Collecting site population structure

2.19.1 Number of trees sampled

2.19.2 Frequency of plants at collecting site

3 Low
5 Intermediate
7 High

2.20 Plant population density

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

2.21 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

2.22 Herbarium specimen

Was a herbarium specimen collected? If so, indicate the plant part used, provide an identification number and indicate in which place (Herbarium) the specimen was deposited, in descriptor **2.24 Collector's notes**

0 No
1 Yes

2.23 Photograph

Was photograph(s) taken of the accession or habitat at the time of collecting? If so, provide an identification number(s) in descriptor **2.24 Collector's notes**

0 No
1 Yes

2.24 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 [Passport 1.2]

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 [Passport 2.4]

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

3.2.1 Availability for exchange

0 No
1 Yes

3.2.2 Import procedures

3.2.2.1 Import permit needed

0 No
1 Yes

3.2.2.2 Phytosanitary certificate needed

0 No
1 Yes

3.2.2.3 Quarantine required

0 No
1 Yes

3.2.3 Export procedures

3.2.3.1 Import permit from receiving country needed

0 No
1 Yes

3.2.3.2 Export permit needed

0 No
1 Yes
99 Other (specify in descriptor **3.12 Notes**)

3.2.4 Pre- and post-movement activities

3.2.4.1 Treatment of sample during the transit

Note all relevant information on how the sample was treated between its collection and the deposit at its destination

3.2.4.2 Destination of the accession sample

Note where the sample is sent after it has been collected. Specify the institution, the name of the collection or station, the address and country

1 Final destination of sample
2 Intermediate holding station

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 Plant/propagule establishment [%]

3.8 Type of germplasm storage

If germplasm is maintained under different types of storage, multiple choices are allowed, separated by a semicolon (e.g. 20; 30). (Refer to FAO/IPGRI Genebank Standards 1994 for details on storage type.)

10 Seed collection
20 Field collection
30 *In vitro* collection (Slow growth)
40 Cryopreserved collection
99 Other (Specify in descriptor **3.12 Notes**)

3.9 Location of safety duplicates [MCPD]

Code of the institute where a safety duplicate of the accession is maintained. It follows the Institute code standard.

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 [Passport 1.2]

4.2 Population identification [Passport 2.4]
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 Grafting
3 Layering
4 Cutting
5 Tissue culture
99 Other (specify in descriptor **4.13 Notes**)

4.8 Sowing/grafting/planting date [YYYYMMDD]

4.9 Harvesting date [YYYYMMDD]

4.10 Cultural practices

4.10.1 Planting density
Number of trees established per hectare

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

4.10.3 Irrigation
Specify amount, frequency and method

4.11 Previous multiplication and/or regeneration

4.11.1 Location

4.11.2 Plot number

4.11.3 Sowing/planting date [YYYYMMDD]

4.12 Number of times accession regenerated

Since the date of acquisition

4.13 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
See instructions under **2.9**

5.2.2 Longitude
See instruction under **2.10**

5.2.3 Elevation [m asl]

5.2.4 Name and address of farm or institute/station/centre

5.2.5 Planting site in the field
Give block, strip and/or row/plot numbers as applicable, plants/plot, replication

5.3 Evaluator's name and address

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

5.4.1 Harvest date [DDMMYYYY]

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 **5.17 Notes**)

5.6 Age of tree [Y]

5.7 Condition/status 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

5.8 Seed germination [%]

Specify number of days over which germination is measured

5.9 Grafting/budding/layering/Inarching/stooling success percentage

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

5.10 Number of days to planting after grafting/layering [d]

5.11 Field establishment [%]

5.12 Sowing/planting site in the field

5.13 Field spacing

5.13.1 Distance between trees in a row [m]

5.13.2 Distance between rows [m]

5.13.3 Cropping system/pattern

(see descriptor **2.18.15.1**)

5.14 Fertilizer

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

5.15 Plant protection

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

5.16 Environmental characteristics of site

Use descriptors **6.1.1.** to **6.1.20.7** in section **6**

5.17 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 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	Interfluve	19	Upper slope
4	Valley	20	Mid slope
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		
14	Closed depression		
15	Dune	29	Coral reef
16	Longitudinal dune	99	Other (specify in appropriate section's **notes**)

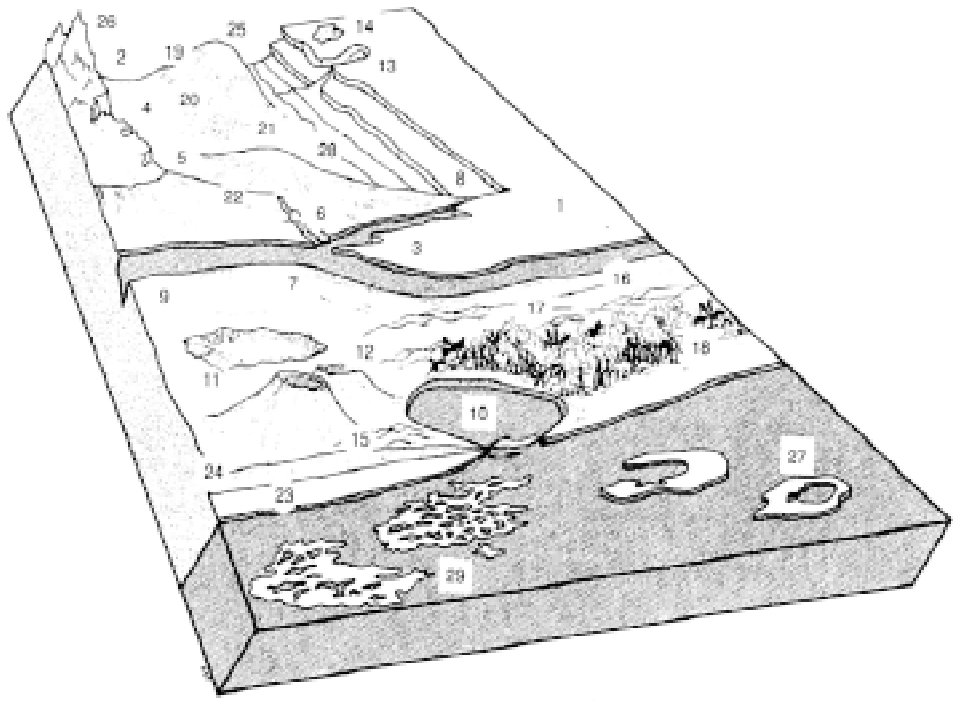


Fig. 1. Land element and position

6.1.3 Slope [°]

Estimated slope of the collecting site

6.1.4 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)

6.1.5 Overall vegetation surrounding the collecting site

(Adapted from FAO 1990)

1 Grassland (grasses, subordinate forbs, no woody species)
2 Forbs land (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 Shrub land (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**)

6.1.6 Stoniness/rockiness/hardpan/cementation

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

6.1.7 Soil drainage

(Adapted from FAO 1990)

3 Poorly drained
5 Moderately drained
7 Well drained

6.1.8 Soil salinity (dissolved salts)

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

6.1.9 Quality of the groundwater

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

6.1.10 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

6.1.11 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

6.1.12 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 Colour Charts (Munsell Colour 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
2 Red
3 Reddish
4 Yellowish red
5 Brown
6 Brownish
7 Reddish brown
8 Yellowish brown
9 Yellow
10 Reddish yellow
11 Greenish, green
12 Grey
13 Greyish
14 Blue
15 Bluish black
16 Black

6.1.13 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

6.1.14 Soil pH

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

1 pH at 0-10 cm
2 pH at 11-20 cm
3 pH at 21-30 cm
4 pH at 31-60 cm
5 pH at 61-90 cm

6.1.15 Soil erosion

3 Low
5 Intermediate
7 High

6.1.16 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 (see Fig. 2).

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

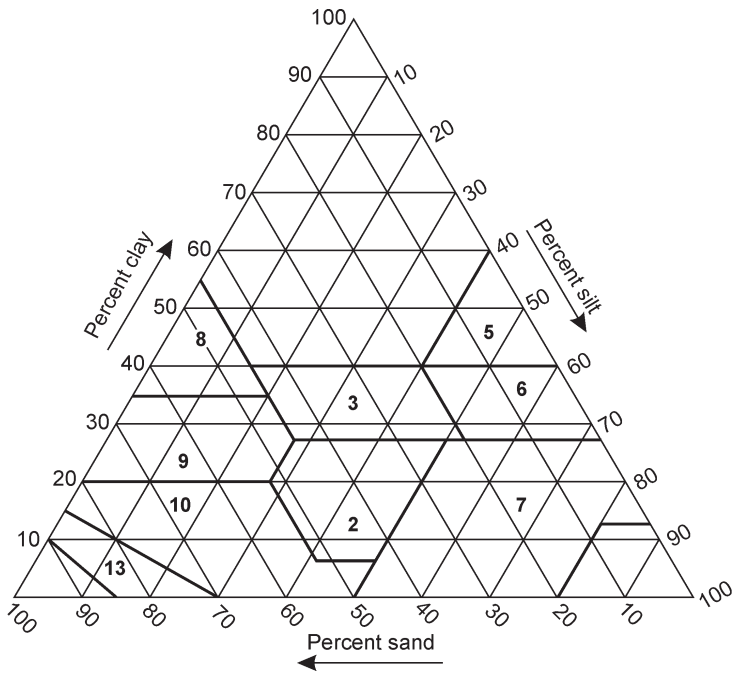


Fig. 2. Soil texture classes

6.1.17 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

6.1.18 Water availability

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

6.1.19 Soil fertility

General assessment of the soil fertility based on existing vegetation

3 Low
5 Moderate
7 High

6.1.20 Climate of the site

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

6.1.20.1 Temperature [°C]

Provide either the monthly or the annual mean

6.1.20.2 Rainfall [mm]

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

6.1.20.3 Wind

Annual average (state number of years recorded)

6.1.20.3.1 Frequency of typhoons or hurricane force winds

3 Low
5 Intermediate
7 High

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

6.1.20.3.3 Annual maximum wind velocity [m/s]

6.1.20.4 Frost

6.1.20.4.1 Date of most recent frost [YYYYMMDD]

6.1.20.4.2 Minimum temperature [°C]
Specify seasonal average and minimum survival temperature

6.1.20.4.3 Duration of temperature below 0°C [d]

6.1.20.5 Relative humidity

6.1.20.5.1 Relative humidity diurnal range [%]

6.1.20.5.2 Relative humidity seasonal range [%]

6.1.20.6 Light
1 Shady
2 Sunny

6.1.20.7 Day length [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 type

1 Seedling
2 Grafted
3 Clonal
4 Rootstock type

7.1.3 Tree vigour

3 Low
5 Medium
7 High

7.1.4 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

7.1.5 Trunk height [m]

Record from the base of the tree to the point of emergence of first branch.

7.1.6 Trunk circumference [cm]

Recorded at 50 cm above ground level for trees raised through seedlings/air layering/grafting

7.1.7 Trunk surface

1 Smooth
2 Rough
3 Very rough

7.1.8 Crown diameter [m]

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

7.1.9 Crown shape

(See Fig. 3)

1 Pyramidal
2 Spherical
3 Oblong
4 Elliptical
99 Other (specify in descriptor **7.6 Notes**)

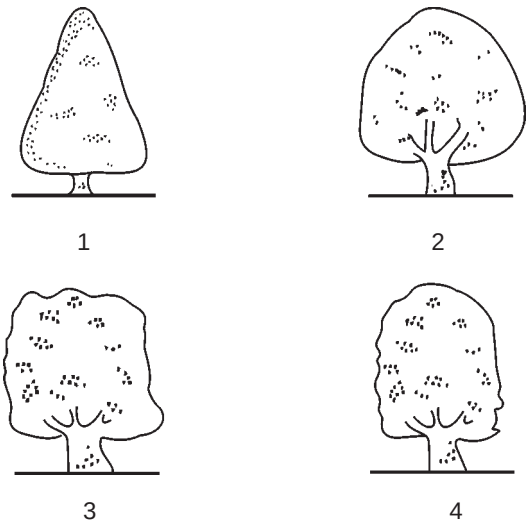


Fig 3. Crown shape

7.1.10 Tree growth habit

1 Erect
2 Intermediate
3 Spreading
99 Other (specify in descriptor **7.6 Notes**)

7.1.11 Branching density

3 Sparse
5 Medium
7 Dense

7.1.12 Branching pattern

(See Fig. 4)

1 Erect
2 Semi-erect
3 Horizontal
4 Irregular

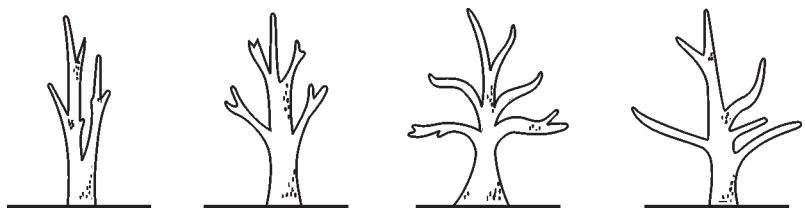


Fig. 4. Branching pattern

7.1.13 Young shoot pubescence

1 Glabrous
2 Pubescent

7.2 Leaf descriptors

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

7.2.1 Young leaf colour

Evaluated newly emerged leaf at fully expanded stage

1 Light green
2 Light green with brownish tinge
3 Light brick red
4 Red brown
5 Deep coppery tan
6 Variegated (combination of green and white colour)
99 Other (specify in descriptor **7.6 Notes**)

7.2.2 Mature leaf colour

Use standard colour charts

1 Light green
2 Green
3 Dark green
4 Variegated (combination of green and white colour)

7.2.3 Leaf density

1 Sparse
2 Medium
3 Dense

7.2.4 Arrangement of leaves (Phyllotaxy)

1 Alternate
2 Opposite

7.2.5 Petiole length [mm]

Measured from the rachis to the base of the leaf blade

7.2.6 Petiole width [mm]

Measured at the widest point

7.2.7 Leaf blade length [cm]

Measured from the base to the tip of the leaf blade

7.2.8 Leaf blade width [cm]

Measured at the widest point

7.2.9 Leaf blade shape

(See Fig. 5)

1 Ovate
2 Obovate
3 Elliptic
4 Oblong
5 Lanceolate
99 Other (specify in descriptor **7.6 Notes**)

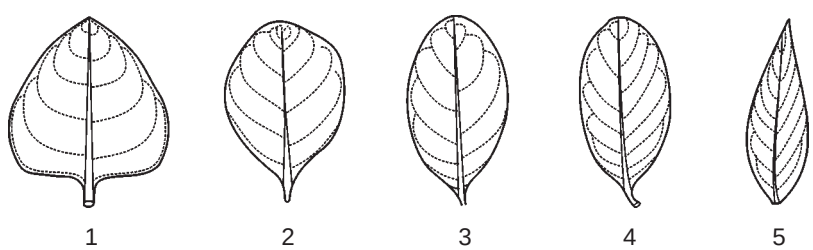


Fig. 5. Leaf blade shape

7.2.10 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

7.2.11 Leaf base shape

(See Fig. 7)

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

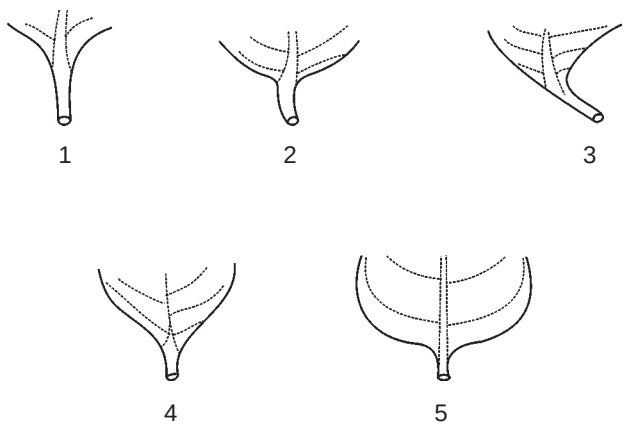


Fig. 7. Leaf base shape

7.2.12 Leaf blade margin

(See Fig. 8)

1 Entire
2 Undulate

1 2

Fig. 8. Leaf blade margin

7.2.13 Leaf upper surface pubescence

0 Not glossy
1 Glossy

7.2.14 Leaf lower surface pubescence

0 Not glossy
1 Glossy

7.2.15 Leaf midrib appearance

1 Prominent
2 Less Prominent
3 Not Prominent

7.2.16 Leaf venation appearance

1 Prominent
2 Less prominent
3 Not prominent

7.3 Inflorescence/flower descriptors

Record when the flower has fully opened. An average of at least two years data on ten flowers

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 first flowering [YYYYMMDD]

7.3.3 Date of last flowering [YYYYMMDD]

7.3.4 Flowering regularity

1 Regular (one or two regular seasons/year)
2 Irregular (occasional year round)
3 Peak flowering season (month)
4 Off-season flowering (month)

7.3.5 Duration of flowering [d]

Calculate from first flower opening to the last flower opening

7.3.6 Flower clustering habit

1 One flower per cluster
2 Combination of 1 and 2 flowers per cluster
3 Combination of 1,2,3 or more flowers per cluster
99 Other (specify in descriptor **7.6 Notes**)

7.3.7 Number of stigma lobes

7.3.8 Number of sepals

7.3.9 Sepal colour

1 Yellow
2 Yellow green
3 Green
4 Yellow with red margin
99 Other (Specify in descriptor **7.6 Notes**)

7.3.10 Petal colour

1 Yellow green
2 Yellow with red/pink margin
3 Green
4 Red
5 Red with green margin
99 Other (Specify in descriptor **7.6 Notes**)

7.3.11 Number of petals

7.3.12 Number of staminode rows

7.3.13 Staminode length [cm]

7.3.14 Pedicel length [cm]

7.3.15 Flower size

1 Small
2 Medium
3 Large

7.3.16 Abundance of flowers

1 Profuse
2 Moderate
3 Sparse

7.3.17 Position of flowers

1 Axillary
2 Terminal
3 Both

7.4 Fruit descriptors

Recorded on 20 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 Date of fruit setting [YYYYMMDD]

7.4.3 Date of harvesting [YYYYMMDD]

7.4.4 Number of days from fruit set to fruit maturity [d]

7.4.5 Fruit maturity

7.4.5.1 Start of fruit maturity [YYYYMMDD]

7.4.5.2 End of fruit maturity [YYYYMMDD]

7.4.6 Fruit ripening

1 Synchronous
2 Non-synchronous

7.4.7 Fruit bearing habit

1 Regular (annual)
2 Alternate years (biennial)
99 Other (specify in descriptor **7.6 Notes**)

7.4.8 Fruit bearing intensity

1 Poor
2 Medium
3 High

7.4.9 Fruit clustering habit

Specify number of trees evaluated per accession

1 One fruit per cluster
2 Combination of two fruits per cluster
3. Combination of 1, 2, 3, 4 up to 12 fruits per cluster
99 Other (specify in descriptor **7.6 Notes**)

7.4.10 Fruit shape

Specify number of fruits evaluated.
(See Fig. 9)

1 Spherical/ Round
2 Flattened
3 Ovoid
4 Oblong
99 Other (specify in descriptor **7.6 Notes**)

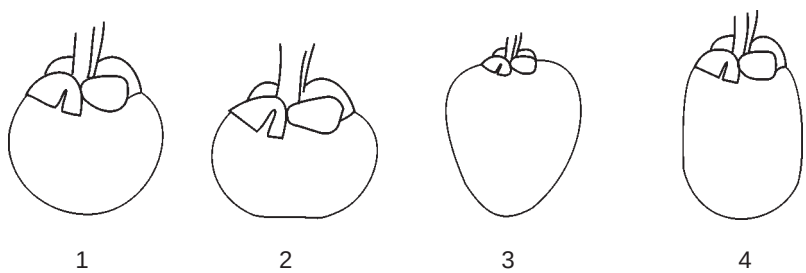


Fig. 9. Fruit shape

7.4.11 Stigma lobe persistence

0 Not persistent
1 Persistent

7.4.12 Persistent stigma lobe thickness
(See Fig. 10)

1 Thick (prominent)
2 Thin (not prominent)

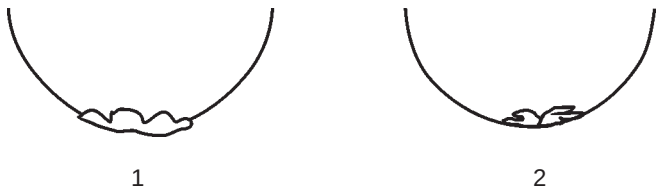


Fig. 10. Persistent stigma lobe thickness

7.4.13 Blotches surrounding stigma lobe

1 Without blotches
2 Small blotches
3 Large blotches

7.4.14 Colour of stigma lobe

1 Brown
2 Dark brown
3 Black
99 Other (specify in descriptor **7.6 Notes**)

7.4.15 Pedicel length [cm]
Measured from the base of the pedical to the base of fruit at maturity

7.4.16 Pedicel attachment

1 Weak
2 Strong

7.4.17 Pedical colour

1 Green
2 Greenish red
3 Red brown

7.4.18 Number of fruit segments

7.4.19 Fruit length [cm]
Average of 20 fruits

7.4.20 Fruit diameter [cm]
Measured at the widest point. Average of 20 fruits

7.4.21 Fruit weight [g]
Average of 20 fruits

7.4.22 Fruit size
Average of 20 fruits

1 Large > 140 g/fruit
2 Medium 90-140 g/fruit
3 Small < 90 g/fruit

7.4.23 Fruit skin thickness

1 Thin
2 Medium
3 Thick
4 Very thick

7.4.24 Mature fruit colour
Recorded at maturity

1 Green
2 Greenish yellow
3 Bright yellow
4 Orange yellow
5 Orange
6 Violet
7 Purple
8 Deep purple
9 Pink
10 Red
99 Other (specify in descriptor **7.6 Notes**)

7.4.25 Fruit attractiveness
Combined assessment of shape, size and appearance, etc.

1 Poor
2 Intermediate
3 Good
4 Excellent

7.4.26 Aril thickness [mm]
Recorded at the mid-dorsal side of the segment

7.4.27 Aril texture
Recorded on fully ripe fruits

1 Soft
2 Intermediate
3 Firm
99 Other (specify in descriptor **7.6 Notes**)

7.4.28 Aril nutritive value

Recorded on fully ripe fruits

7.4.28.1 **Total sugars** [%]

7.4.28.2 **Total soluble solids** [°Brix]

7.4.28.3 **Vitamin C** [mg/100 g pulp]

7.4.28.4 **Acidity** [%]

7.4.28.5 **TSS/acidity ratio**

7.4.29 Aril quality

Combined assessment of taste, flavour, juiciness and eye appeal

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

7.4.30 Aril flavour

Assessed at the time of opening ripe fruit

1 Weak/ mild
2 Intermediate
3 Strong

7.4.31 Aril taste

1 Acid
2 Acid Sweet
3 Sweet
99 Other (specify in descriptor **7.6 Notes**)

7.4.32 Aril juiciness

0 Not juicy
1 Juicy
2 Very juicy

7.4.33 Aril colour

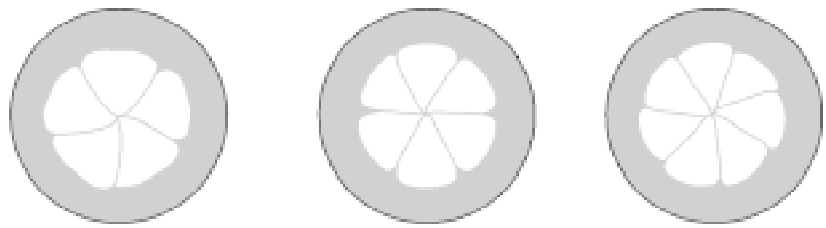
Recorded at the ripe stage

1 Snowy White
2 Creamy White
3 Lemon Yellow
4 Deep Yellow
5 Orange
6 Deep Orange
99 Other (specify in descriptor **7.6 Notes**)

7.4.34 Number of arils per fruit

(See Fig. 11)

1 Five arils
2 Six arils
3 Seven arils
99 other specify in description **7.6 Notes**)



1 2 3

Fig. 11. Number of arils per fruit

7.4.35 Edible portion/aril content [% fw]

7.4.36 Yellow latex exudation

Average of 100 fruits

0 Absent
1 Present

7.5 Seed descriptors

Recorded on 20 healthy seeds

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 Seed thickness [cm]

7.5.4 Number of mature seeds per fruit

7.5.5 Number of aborted seeds per fruit

7.5.6 100-seed weight [g]

7.5.7 Seed shape

(See Fig. 12)

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

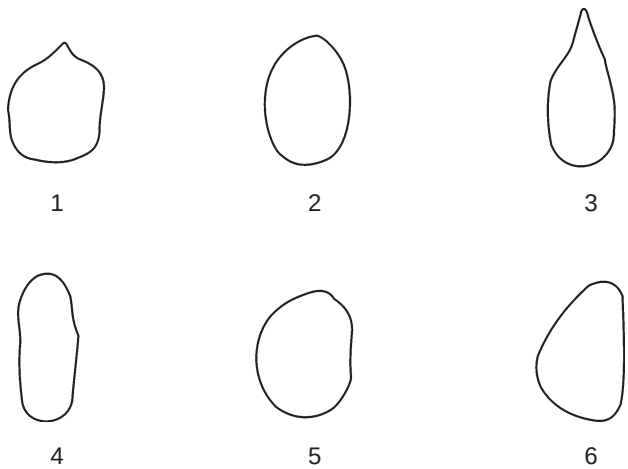


Fig 12. Seed shape

7.5.8 Seed coat colour

1 Light brown
2 Brown
3 Dark brown
4 Black
99 Other (specify in descriptor **7.6 Notes**)

7.6 Notes

Any additional information may be specified here

EVALUATION

8. Plant descriptors

8.1 Fruit

8.1.1 Yield per tree [kg/year]
Average of 10 trees per accession

8.1.2 Number of fruits per tree
Average of 10 trees per accession

8.1.3 Fruit availability [d]
Number of days from the first to the last harvest date

8.1.4 Maturity period
1 Early
2 Intermediate
3 Late

8.1.5 Fruit bearing
3 Poor
5 Medium
7 High

8.1.6 Fruit quality at storage [d]
Number of days of storage under ambient conditions

8.1.7 Fruit productivity [kg/m^2]
Average of 10 trees per accession. Yield relative to tree canopy size calculated from length and width

8.2 Aril

8.2.1 Chemical composition

8.2.1.1 Aril sugar content [%]

8.2.1.2 Aril acidity content [%]

8.2.1.3 Vitamin C content [mg/100 g pulp]

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 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 Low
5 Medium
7 High
9 Very high

9.2 Reaction to salinity

1 Soil salinity
2 Water salinity

9.3 Reaction to mineral toxicity

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

9.4 Reaction to waterlogging

9.5 Reaction to drought

9.6 Reaction to constant winds

9.7 Observation on gamboges (physiological disorder)

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	*Eupterote favia*	Tussock caterpillar
10.1.2	*Aspidiotus destructor*	Coconut scale
10.1.3	*Stictotoptera* sp.	Leaf eater
10.1.4	*Curculio* sp.	Fruit borer
10.1.5	*Phyllocnistis citrella*	Leaf miner
10.1.6	*Selenothrips cuculliodes*	Thrips
10.1.7	*Panonychus citri*	Mite
10.1.8	*Taxoptera* sp.	Aphid
10.1.9	*Planococcus* sp.	Mealy bug
10.1.10	*Pseudococcus* sp.	Mealy bug

10.2 Fungi

10.2.1	*Colletotrichum gloeosporioides*	Anthracnose
10.2.2	*Corticum salmonicolor*	Pink disease
10.2.3	*Zignoella garcineae*	Canker disease
10.2.4	*Cephaleuros virescens*	Green algae disease/algae spot
10.2.5	*Pestalotiopsis* sp.	Leaf spot

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 analysed and the zymorgram type. A particular enzyme can be recorded as 11.1.1; 11.1.2, etc. Examples include: acid phosphate (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. flavonoid and polyphenol profile)

12. Molecular markers

Describe any specific discriminating or useful trait for this accession. Report probeenzyme combination analysed. 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)

12.2.1 Random Amplified Polymorphic DNA (RAPD)

12.2.2 Specific Amplicon Polymorphism (SAP)

12.2.3 Microsatellites

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 microscope 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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Annex I. Basic list of minimum discriminating descriptors for mangosteen

Mangosteen	IPGRI Descriptor Number	Name
Garcinia mangostana	**7.1.10**	Tree growth habit
	7.2.1	Young leaf colour
	7.2.9	Leaf blade shape
	7.2.10	Leaf apex shape
	7.2.11	Leaf base shape
	7.2.12	Leaf blade margin
	7.2.13	Leaf upper surface pubescence
	7.2.14	Leaf lower surface pubescence
	7.3.1	Flowering precocity [y]
	7.4.7	Fruit bearing habit
	7.4.10	Fruit shape
	7.4.27	Aril texture
	7.4.33	Aril colour
	7.4.34	Number of arils per fruit
	7.5.7	Seed shape
	7.5.8	Seed coat colour

Annex II. COLLECTING FORM for Mangosteen (*Garcinia mangostana*)

SAMPLE IDENTIFICATION

COLLECTING INSTITUTE CODE (2.1):

COLLECTING No. (2.3): PHOTOGRAPH (2.23):

COLLECTING DATE OF SAMPLE (2.4):

GENUS (1.8.1): SPECIES (1.8.2):

COLLECTING SITE LOCATION

COUNTRY OF ORIGIN (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/AQUISITION SOURCE (2.12):
10. Wild habitat
20. Farm or cultivated habitat
30. Market or shop
40. Institute, experimental station, research organization, genebank
50. Seed company
60. Weedy, disturbed or ruderal habitat
99. Other (specify):

SLOPE [°] (6.1.3): SLOPE ASPECT (6.1.4): (code N,S,E,W)

SOIL FERTILITY (6.1.19): (code: 3 - Low; 5 - Moderate; 7 - High)

SOIL TEXTURE CLASSES (6.1.16): State class (e.g. Clay, Loam, Silt)

WATER AVAILABILITY (6.1.18):
1. Rainfed
2. Irrigated
3. Flooded
4. River banks
5. Sea coast
99. Other (specify):

RAINFALL (6.1.20.2): Annual mean: mm

Monthly mean (mm):	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

TEMPERATURE (6.1.20.1): Annual mean: °C

Monthly mean (°C):	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

SAMPLE

BIOLOGICAL STATUS OF ACCESSION (2.17):
100. Wild
200. Weedy
300. Traditional cultivar/landrace
400. Breeding/research material
500. Advanced/improved cultivar
999. Other (specify)

TYPE OF SAMPLE (2.15):
1. Fruit
2. Seed
3. Seedling/sapling
4. Shoot/budwood/stem cutting
5. *In vitro* plantlet
99. Other (specify which part of the plant is used in descriptor **2.24 Collector's notes**)

PREVAILING STRESSES (2.18.14):
Mention the types of major stresses, i.e. abiotic (drought), biotic (pests, diseases, etc.)

ETHNOBOTANICAL DATA

LOCAL/VERNACULAR NAME (2.18.2):

ETHNIC GROUP (2.18.1)

PARTS OF PLANTS USED (2.18.6)

1. Seed	2. Root	3. Trunk	4. Leaf
5. Flower	6. Fruit	7. Rind	8. Bark
9. Latex	10. Pericarp	99. Other (specify)	

PLANT USES (2.18.7)

1. Food (fruit, juice)	2. Forage	3. Fuel
4. Medicine	5. Wood/timber	99. Other (specify)

ASSOCIATED FLORA (2.18.16)

MANAGEMENT

ACCESSION No. (3.1)
TYPE OF MAINTENANCE (3.8)

1. Seed collection	2. Field collection	3. *In vitro* collection
4. Crypreserved collection	99. Other (specify)	

CHARACTERIZATION

GROWTH

Tree growth habit (7.1.10)	Branching density (7.1.11)	Branching pattern (7.1.12)

LEAF

Leaf blade shape (7.2.9)	Leaf blade length (7.2.7)	Leaf blade width (7.2.8)
Leaf lower surface pubescence (7.2.14)	Young leaf colour (7.2.1)	Leaf apex shape (7.2.10)
Leaf base shape (7.2.11)	Leaf bade margin (7.2.12)	

INFLORESCENCE

Flowering precocity (7.3.1)	Flower clustering habit (7.3.6)
Position of flowers (7.3.17)	

FRUIT

Fruit shape (7.4.10)	Fruit length (7.4.19)	Fruit diameter (7.4.20)
Aril texture (7.4.27)	Aril colour (7.4.33)	Number of arils per fruit (7.4.34)

SEED

Seed shape (7.5.7)	Seed coat colour (7.5.8)
Seed length (7.5.1)	Seed width (7.5.2)

EVALUATION

MATURITY PERIOD (8.1.4):

1. Early	2. Intermediate	3. Late

FRUIT BEARING (8.1.5):

3. Poor	5. Medium	7. High

COLLECTOR'S NOTES

FUTURE HARVEST
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