IPGRI

Descriptors for Mango (*Mangifera indica*)

List of Descriptors

Allium (E,S)	2001
Almond (Revised) * (E)	1985
Apple (E)	1982
Apricot * (E)	1984
Avocado (E/S)	1995
Bambara groundnut (E,F)	2000
Banana (E,S,F)	1996
Barley (E)	1994
Beta (E)	1991
Black pepper (E/S)	1995
Brassica and *Raphanus* (E)	1990
Brassica campestris L. (E)	1987
Buckwheat (E)	1994
Capsicum (E/S)	1995
Cardamom (E)	1994
Carrot (E,S,F)	1998
Cashew (E)	1986
Chenopodium (S)	2005
Cherry * (E)	1985
Chickpea (E)	1993
Citrus (E,F,S)	1999
Coconut (E)	1995
Coffee (E,S,F)	1996
Cotton (Revised) (E)	1985
Cowpea (E)	1983
Cultivated potato * (E)	1977
Date palm (F)	2005
Echinochloa millet * (E)	1983
Eggplant (E/F)	1990
Faba bean * (E)	1985
Fig (E)	2003
Finger millet (E)	1985
Forage grass * (E)	1985
Forage legume * (E)	1984
Grapevine (E,S,F)	1997
Groundnut (E/S/F)	1992
Jackfruit (E)	2000
Kodo millet * (E)	1983
Lathyrus spp. (E)	2000
Lentil * (E)	1985
Lima bean * (E)	1982
Litchi (E)	2002
Lupin * (E/S)	1981
Maize (E/S/F, P)	1991
Mango (E)	1989
Mangosteen (E)	2003
Medicago (Annual) * (E/F)	1991
Melon (E)	2003
Mung bean * (E)	1980
Oat * (E)	1985
Oca * (S)	2001
Oil palm (E)	1989
Panicum miliaceum and *P. sumatrense* (E)	1985
Papaya (E)	1988
Peach * (E)	1985
Pear * (E)	1983
Pearl millet (E/F)	1993
Pepino (E)	2004
Phaseolus acutifolius (E)	1985
Phaseolus coccineus * (E)	1983
Phaseolus lunatus (P)	2001
Phaseolus vulgaris * (E,P)	1982
Pigeonpea (E)	1993
Pineapple (E)	1991
Pistachio (A,R,E,F)	1997
Pistacia (excluding *Pistacia vera*) (E)	1998
Plum * (E)	1985
Potato variety * (E)	1985
Quinua * (E)	1981
Rambutan (E)	2003
Rice * (E)	1980
Rocket (E,I)	1999
Rye and Triticale * (E)	1985
Safflower * (E)	1983
Sesame (Revised) (E)	2004
Setaria italica and *S. pumilla* (E)	1985
Shea tree (E)\	2006
Sorghum (E/F)	1993
Soybean * (E/C)	1984
Strawberry (E)	1986
Sunflower * (E)	1985
Sweet potato (E/S/F)	1991
Taro (E,F,S)	1999
Tea (E,S,F)	1997
Tomato (E,S,F)	1996
Tropical fruits * (E)	1980
Ulluco (S)	2003
Vigna aconitifolia and *V. trilobata* (E)	1985
Vigna mungo and *V. radiata* (Revised)*(E)	1985
Walnut (E)	1994
Wheat (Revised) * (E)	1985
Wheat and *Aegilops* * (E)	1978
White Clover (E)	1992
Winged Bean * (E)	1979
Xanthosoma (E)	1989
Yam (E,S,F)	1997

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Descriptors for

Mango

Mangifera indica L.

The International Plant Genetic Resources Institute (IPGRI) is an independent international scientific organization that seeks to improve the well-being of present and future generations of people by enhancing conservation and the deployment of agricultural biodiversity on farms and in forests. It is one of 15 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 four programmes: Diversity for Livelihoods, Understanding and Managing Biodiversity, Global Partnerships, and Commodities for Livelihoods.

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CONTENTS

PREFACE

Descriptors for Mango (*Mangifera indica L.***)** is a revision of the original publication of the International Board for Plant Genetic Resources (IBPGR 1989). The descriptors' numbers given in the original descriptors list are given in parentheses in the present descriptors list against respective descriptors for cross referencing purposes. The revised Descriptors for Mango is based on the work of a team of experts consisting of Dr Alberto Carlos de Queiroz Pinto, Dr Richard J. Campbell, Dr (Ms) Rachel Soto, Dr S. Rajan, Dr M.R. Dinesh and Dr Bhag Mal. The development of this descriptor list was coordinated by Dr Bhag Mal. 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, however, does not 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 indicated 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 multicrop passport descriptors, not all descriptor states for a particular descriptor will be relevant to a specific crop. In Annex II, the reader will find the 'Collecting form for Mango' that will facilitate data collecting.

Any suggestions for improvement on the Descriptors for Mango 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. These types of descriptors include 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 indicated 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 Lanceolate
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/). If new Institutes Codes are required, they can be generated online by national WIEWS administrators.

1.2 Accession number (1.1) [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 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 (1.2)

Name of the institution or individual responsible for donating the germplasm

1.4 Donor institute code [MCPD]

Code for the donor institute. (See instructions under Institute Code, **1.1**).

1.5 Donor accession number (1.3) [MCPD]

Number assigned to an accession by the donor. (See instructions under Accession Number, **1.2**).

1.6 Other number(s) associated with the accession (1.4) [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 Scientific name

1.7.1 Genus (1.5.1) [MCPD]

Genus name for taxon. Initial uppercase letter required.

1.7.2 Species (1.5.2) [MCPD]

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

1.7.2.1 Species authority [MCPD]

Provide the authority for the species name.

1.7.3 Subtaxa [MCPD]

Subtaxa can be used to store any additional taxonomic identifier.

1.7.3.1 Rank name

The rank of the subtaxon name. The following abbreviations are allowed: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form).

1.7.3.2 Subtaxon name [MCPD]

The infraspecific epithet of the scientific name, i.e. the epithet following the indication of the infraspecific rank in the name string (trinomial)

1.7.3.3 Subtaxon authority [MCPD]

Provide the subtaxon authority at the most detailed taxonomic level.

1.8 Ancestral data (1.6) [MCPD]

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'.

1.8.1 Female parent

1.8.2 Male parent

1.9 Cultivar origin

1 Open pollination
2 Artificial pollination
3 Clonal selection
4 Seedling selection
5 Induced mutation
6 Bud sports
99 Other (specify in descriptor **1.13 Remarks**)

1.10 Accession

1.10.1 Accession name (1.6) [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

1.10.2 Synonyms

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

1.10.3 Common crop name [MCPD]

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

1.10.4 Local language

Language in which the accession name is given

1.10.5 Translation/Transliteration

Provide translation of the local accession name into English

1.11 Acquisition date [YYYYMMDD] (1.7) [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.

1.12 Accession size (1.8)

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

1.13 Remarks

The remarks field is used to add notes or to elaborate on descriptors with value '99' or '999' (= Other).

2. Collecting descriptors

2.1 Collecting institute code (2.2) [MCPD]

Code of the institute collecting the sample. If the holding institute has collected the material, the collecting institute code should be the same as the holding institute code. (See instructions under Institute Code, **1.1**).

2.2 Site number

Number assigned to the physical site by the collector

2.3 Collecting number (2.1) [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] (2.3) [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 (2.4) [MCPD]

Code of the country in which the sample was originally collected. Use the three-letter abbreviation from the International Standard (ISO) Codes for the representation of names of countries. The ISO 3166-1: Code list can be obtained from IPGRI (ipgri-mcpd@cgiar.org).

2.6 Province/State (2.5)

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 (2.6) [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] (2.7) [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] (2.8) [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] (2.9) [MCPD]

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

2.12 Collecting/acquisition source (2.10) [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
- 15 Aquatic habitat

20 Farm or cultivated habitat
- 21 Field
- 22 Orchard
- 23 Backyard, home garden (urban, peri-urban or rural)
- 24 Fallow land
- 25 Pasture

30 Market or shop

40 Institute/research organization, experimental station, genebank

50 Seed company

60 Disturbed or ruderal habitat
- 61 Roadside
- 62 Field margin

99 Other (specify in descriptor **2.24 Remarks**)

---

[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 hemispheres 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]

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

2.14 Collecting source environment

Use descriptors **6.1 to 6.2** in section **6**

2.15 Type of sample (2.15)

Type of plant material collected. If different types of material were collected from the same source, each sample type should be designated with a collecting number and a corresponding 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 Remarks**)

2.16 Number of plants sampled (2.13)

2.17 Biological status of accession (2.11) [MCPD]

The coding scheme proposed can be used at three different levels of detail: either by using the general codes (in bold face) 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

200 Weedy

300 Traditional cultivar/landrace

400 Breeding/research material
- 410 Breeder's line
  - 411 Synthetic population
  - 412 Hybrid
  - 413 Foundation 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 Remarks**)

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 (2.12)
Name given by farmer to the crop and cultivar/landrace/clone/wild form. State language and/or 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 Mango varietal name meaning
Does the mango name have a meaning? If yes, describe it briefly in descriptor **2.24 Remarks**

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 Root
2 Trunk
3 Bark
4 Leaf
5 Flower
6 Fruit
7 Peel
8 Pericarp
9 Seed
99 Other (specify in descriptor **2.24 Remarks**)

2.18.7 Plant uses

1 Food (fruit, juice, pickle)
2 Fuel
3 Wood/timber
4 Medicine
5 Seed for starch extraction
99 Other (specify in descriptor **2.24 Remarks**)

2.18.8 Special uses, if any

1 Feasts
2 Religious purpose
3 Chiefs
4 Aesthetic
99 Other (specify in descriptor **2.24 Remarks**)

2.18.9 Frequency of use of the plant

1 Daily
2 Weekly
3 Occasional
99 Other (specify in descriptor **2.24 Remarks**)

2.18.10 Method of use

1 Table fruit
2 Preserved
3 Processed product
99 Other (specify in descriptor **2.24 Remarks**)

2.18.11 Cultural characteristics

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

2.18.12 Mango popularity

Is the variety popular and widely grown? If yes, describe briefly the reasons in descriptor **2.24 Remarks**

0 No
1 Yes

2.18.13 Preferred growing conditions

Is the variety adaptable? If yes, describe farmers' perceptions of the variety (hardiness adaptability to water logging, etc.) in relation to main stresses in descriptor **2.24 Remarks**

0 No
1 Yes

2.18.14 Prevailing stresses

Information on major associated stresses

1 Biotic (pests, diseases, weeds, parasitic plants)
2 Abiotic (drought, flood, salinity, calcareousness)

2.18.15 Cultural methods

2.18.15.1 Cropping system/pattern

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

2.18.15.2 Propagation method

Method used to produce trees/planting material

1 Seed (monoembryonic/polyembryonic)
2 Grafting (specify type of grafting and the species, hybrid and/or clone used as rootstock, in descriptor **2.24 Remarks**)
3 Cutting
4 Layering
5 *In vitro* (specify which part of plant used, in descriptor **2.24 Remarks**)
99 Other (specify in descriptor **2.24 Remarks**)

2.18.15.3 Water requirement

1 Rainfed
2 Irrigated (drip, basin or flooding-specify average annual amount of water supplied per tree per year for drip and basin and per hectare for flooding)
99 Other (specify in descriptor **2.24 Remarks**)

2.18.15.4 Fertilizer application

1 Organic
2 Inorganic
99 Other (specify in descriptor **2.24 Remarks**)

2.18.15.5 Cultural situation status of plantation

1 Backyard (indicate number of trees)
2 Small orchard (<5 ha)
3 Mid-size orchard (5-10 ha)
4 Large plantation (>10 ha)
99 Other (specify in descriptor **2.24 Remarks**)

2.18.16 Associated flora

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

2.18.17 Seasonality/fruit availability

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

2.18.18 Market information

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

0 No
1 Yes

2.18.19 Type of market

1 Local (village, city, district, province/state)
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

Number of trees per ha (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 Remarks**

0 No
1 Yes

2.23 Photograph (2.14)

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 Remarks**

0 No
1 Yes

2.24 Remarks (2.16)

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 [Passport 1.2]

3.1.1 Local plant number [Passport 1.2.1]

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 2.3]

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

3.3 Availability for exchange

0 No
1 Yes

3.4 Import/export and related activities

3.4.1 Import procedures

3.4.1.1 Import permit needed

0 No
1 Yes

3.4.1.2 Phytosanitary certificate needed

0 No
1 Yes

3.4.1.3 Quarantine required

0 No
1 Yes

3.4.2 Export procedures

3.4.2.1 Import permit from receiving country needed

0 No
1 Yes

3.4.2.2 Export permit needed

0 No
1 Yes

3.4.3 Pre- and post-movement activities

3.4.3.1 Treatment of sample during the transit

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

3.4.3.2 Destination of the accession

Indicate where the sample is sent after it has been collected. Specify the institution, the name of the collection or station, the address and country in descriptor **3.12 Notes**

1 Final destination of sample
2 Intermediate holding station

3.5 Storage address

Building, room, shelf/rack number (tissue culture material), field location where material is stored/maintained. Enter separate block designations, row numbers and tree numbers within the row for each accession

3.5.1 Block designation

3.5.2 Row number

3.5.3 Tree number within the row

3.6 Sowing/planting date [YYYYMMDD] (3.4)

Specify the date on which sowing/planting was done

3.7 Plant/propagule establishment [%]

Per cent plants/propagules established from the date of sowing/planting

3.8 Type of germplasm storage [MCPD]

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
11 Short-term
12 Medium-term
13 Long-term
20 Field collection
30 *In vitro* collection
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 subculture 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 (monoembryonic/polyembryonic)
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 Method of cryopreservation
1 Slow freezing
2 Rapid freezing
3 Encapsulation

3.11.7 Regeneration process
1 Organogenesis
2 Somatic embryogenesis
99 Other (specify in descriptor **3.12 Notes**)

3.11.8 Medium used for regeneration/recovery

3.11.9 Recovery of samples
1 Number of samples recovered
2 Per cent recovery

3.11.10 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 2.3]
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 Propagation method (4.1.1)
1 Seed (monoembryonic/polyembryonic)
2 Budding
3 Grafting
4 Layering
5 Cutting
6 Tissue culture
99 Other (specify in descriptor **4.11 Notes**)

4.7 Sowing/grafting/planting date [YYYYMMDD] (3.4/5.4)
Specify which of the above in descriptor **4.11 Notes**

4.8 Cultural practices

4.8.1 Planting density
Number of trees established per hectare

4.8.2 Irrigation
Specify amount, frequency and method used

4.8.3 Fertilizer application
Specify type, dose, frequency and method of application

4.9 Previous multiplication and/or regeneration

4.9.1 Location

4.9.2 Plot number

4.9.3 Sowing/planting date [YYYYMMDD]

4.10 Number of times accession regenerated
Since the date of acquisition

4.11 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 (3.1, 5.1)
(See instructions in descriptor **2.5 Country of origin**)

5.2 Site (Research Institute) (3.2, 5.2)

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 (3.3, 5.3)

5.4 Sowing/grafting/budding/layering/stooling date [YYYYMMDD] (3.4, 5.4)

5.5 Harvest date [YYYYMMDD]

5.6 Evaluation environment
Environment in which characterization/evaluation/screening was carried out

1 Field
2 Screenhouse/Greenhouse
3 Glasshouse
4 Laboratory
99 Other (specify in descriptor **5.16 Notes**)

5.7 Age of tree [y]

5.8 Seed germination [%]

5.8.1 Number of days to germination [d]
Specify number of days over which germination is measured

5.9 Number of days to planting after seed/asexual propagation [d]

5.10 Field establishment [%]
Percentage of plants established

5.11 Sowing/planting site in the field
Indicate 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]

5.12.3 Planting system/pattern
(See descriptor **2.18.15.1**)

5.13 Fertilizer
Specify fertilizer used, doses, frequency and method of application

5.14 Plant protection
Specify pesticides used, doses, frequency and method of application

5.15 Environmental characteristics of site
Use descriptors **6.1** to **6.2** 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	3.0 – 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	29	Coral reef
15	Dune	99	Other (specify in appropriate section's **Notes**)
16	Longitudinal dune		

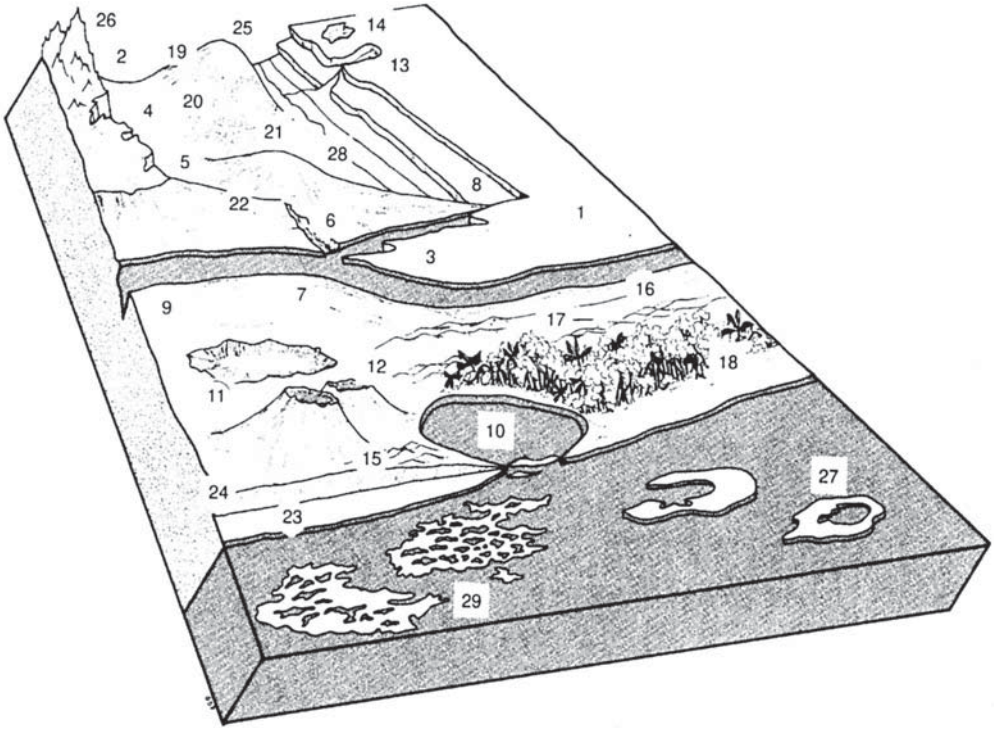

Fig. 1. Land element and position

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 Type of 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
7 Heavy metal containing

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

(Adapted from FAO 1990)

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.

1 Dry
3 Slightly moist
5 Moist
7 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)
2 Low (as in long-term cultivation in a tropical setting)
3 Medium (as in recently cultivated but not yet much depleted)
4 High (as in never cultivated, and in recently cleared forest)
5 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:

6.1.14.1 Soil pH value

6.1.14.2 Soil depth [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

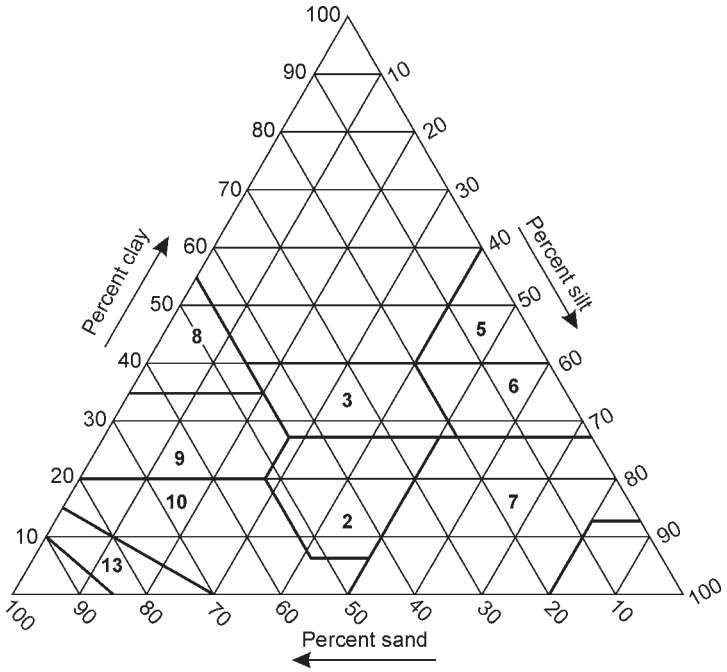

Fig. 2. Soil texture classes

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 at the site

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

6.1.20.1 Temperature [°C]

Provide either monthly or annual mean

6.1.20.2 Rainfall [mm]

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

6.1.20.3 Wind velocity

Annual average (state number of years of observations)

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)

6.2 Notes

Indicate here, any other site and environment-specific information

CHARACTERIZATION

7. Plant descriptors

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

7.1 Tree descriptors

7.1.1 **Tree age** [y]

7.1.2 **Tree type** (4.1.1)

1 Seedling (monoembryonic/polyembryonic)
2 Grafted
99 Other (specify in descriptor **7.6 Notes**)

7.1.3 **Height of mature tree** [m] (4.1.4)

Measured from ground level to the top of the tree

1 Short (≤ 6.0)
2 Medium (6.1 – 9.0)
3 Tall (9.1 – 12.0)
4 Very tall (> 12.0)

7.1.4 **Trunk circumference** [cm]

Measured at 50 cm above ground level in the mature tree

7.1.5 **Crown diameter** [m]

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

7.1.6 **Crown shape**

(See Fig. 3)

1 Oblong
2 Broadly pyramidal
3 Semi-circular
4 Spherical
99 Other (specify in descriptor **7.6 Notes**)

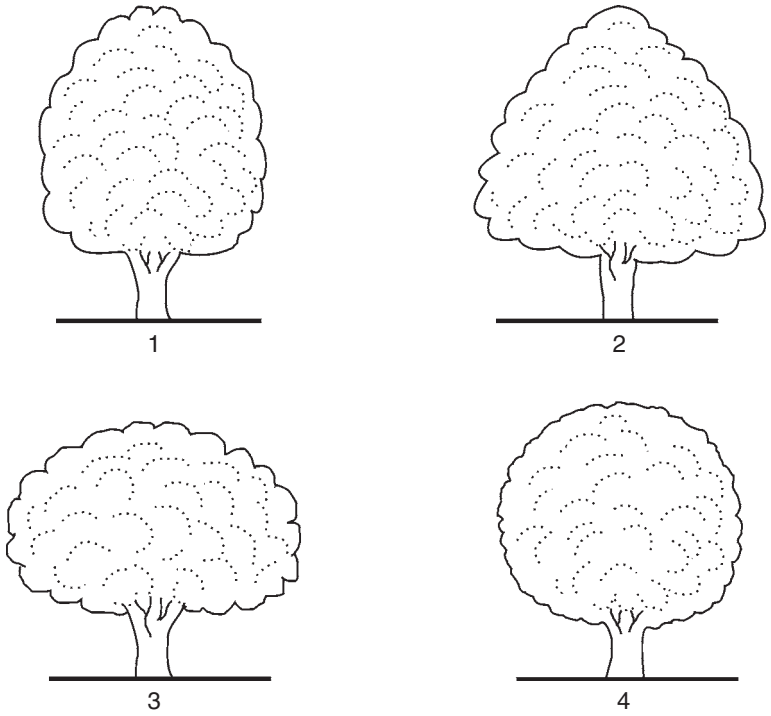

Fig. 3. Crown shape

7.1.7 Tree growth habit (4.1.3)

(See Fig. 4)

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

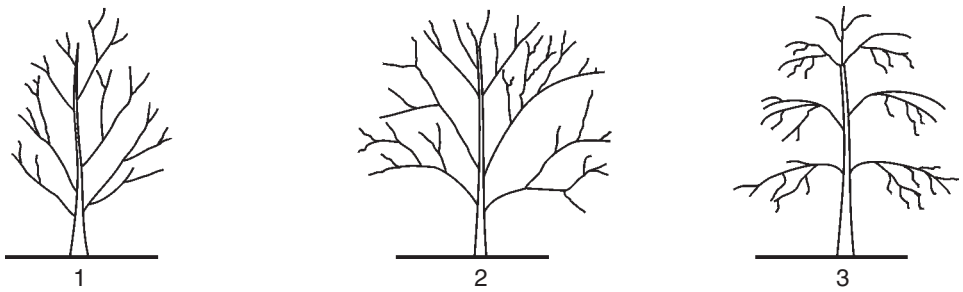

Fig. 4. Tree growth habit

7.1.8 Foliage density

3 Sparse
5 Intermediate
7 Dense

7.2 Leaf descriptors

7.2.1 Leaf blade shape (4.1.5)

(See Fig. 5)

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

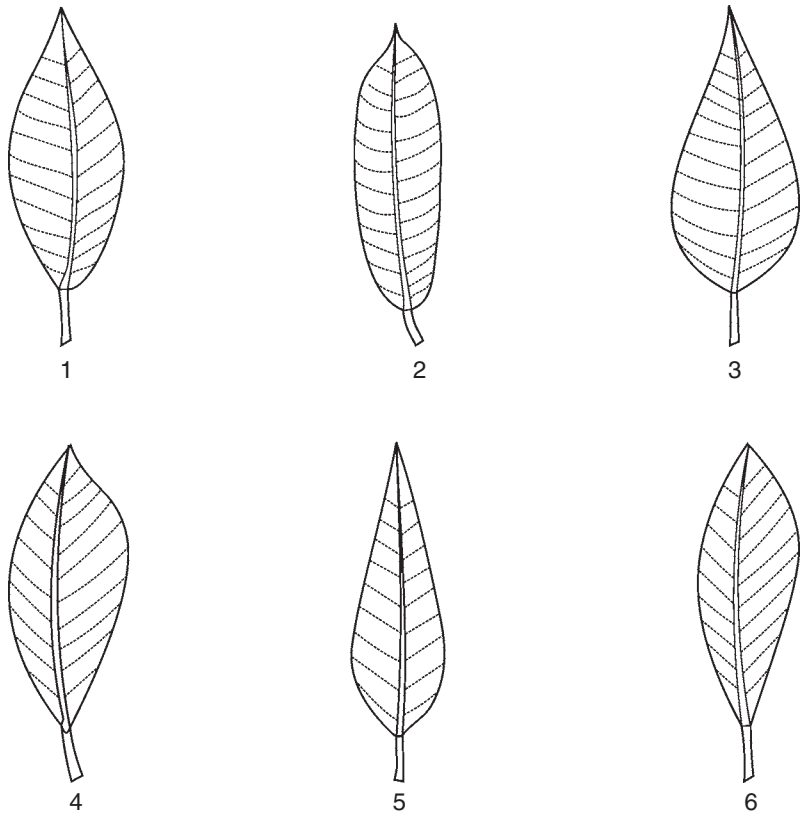

Fig. 5. Leaf blade shape

7.2.2 Leaf attitude in relation to branch

(See Fig. 6)

1 Semi-erect
2 Horizontal
3 Semi-drooping
99 Other (specify in descriptor **7.6 Notes**)

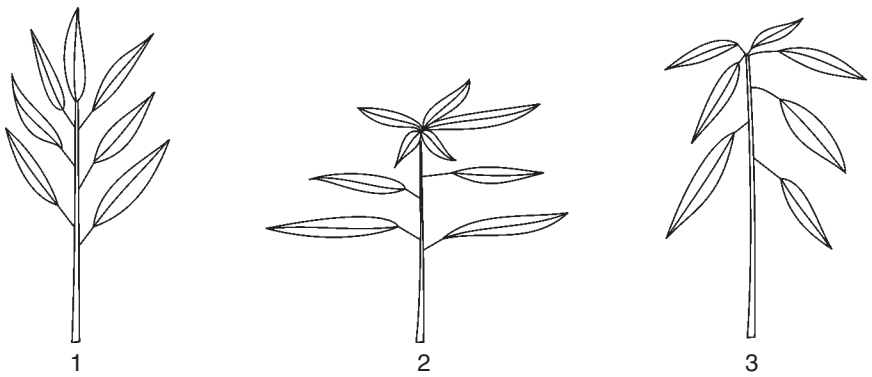

Fig. 6. Leaf attitude in relation to branch

7.2.3 Leaf blade length [cm] (4.1.6)

Average of 10 mature leaves measured from the base to the tip of the leaf blade

7.2.4 Leaf blade width [cm] (4.1.7)

Average of 10 mature leaves measured at the widest point

7.2.5 Petiole length [cm] (6.1.4)

Average length of 10 mature leaves measured from the stem to the base of leaf blade

7.2.6 Thickness of pelvinus

1 Thin
2 Thick and tapering

7.2.7 Leaf venation

7.2.7.1 Angle of secondary veins to the midrib

1 Narrow (< 45°)
2 Medium (45 – 60°)
3 Wide (> 60°)

7.2.7.2 Curvature of secondary veins

0 Absent
1 Present

7.2.8 Leaf texture (6.1.1)

1 Coriaceous
2 Chartaceous
3 Membranous

7.2.9 Leaf apex shape (6.1.2)

(See Fig. 7)

1 Obtuse
2 Acute
3 Acuminate

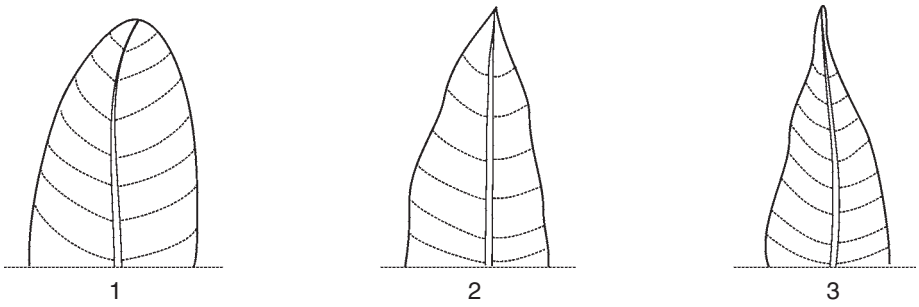

Fig. 7. Leaf apex shape

7.2.10 Leaf base shape

(See Fig. 8)

1 Acute
2 Obtuse
3 Round

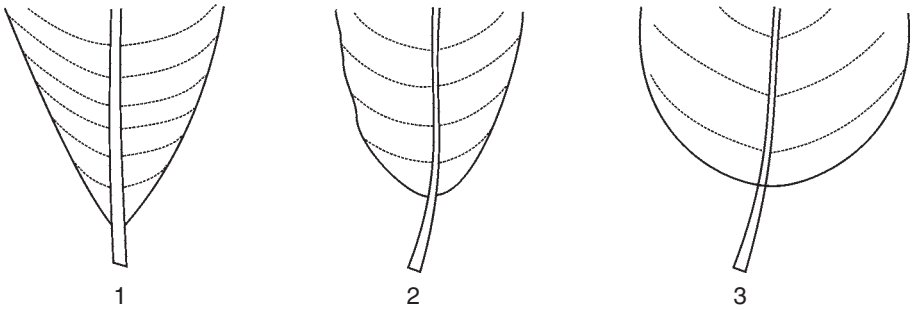

Fig. 8. Leaf base shape

7.2.11 Leaf margin (6.1.3)

(See Fig. 9)

1 Entire
2 Wavy

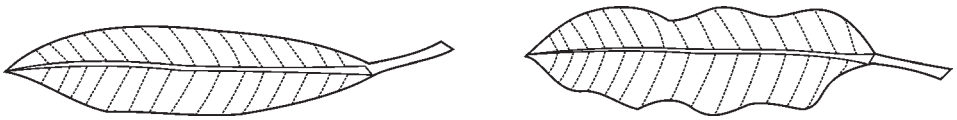

Fig. 9. Leaf margin

7.2.12 Leaf pubescence

0 Absent
1 Present

7.2.13 Colour of young leaf (4.1.8)

Recorded on 5-10 days old leaves

1 Light green
2 Light green with brownish tinge
3 Light brick red
4 Reddish brown
5 Deep coppery tan
99 Other (specify in descriptor **7.6 Notes**)

7.2.14 Intensity of anthocyanin pigmentation of juvenile leaf

Measured at juvenile stage

3 Low
5 Medium
7 High

7.2.15 Colour of fully developed leaf

1 Pale green
2 Green
3 Dark green
99 Other (specify in descriptor **7.6 Notes**)

7.2.16 Leaf fragrance

Recorded in fully developed mature leaf when crushed

0 Absent
1 Mild
2 Strong

7.3 Inflorescence/flower descriptors

7.3.1 Number of years to first flowering [y]

7.3.2 Flowering duration [d] (6.2.2)

Number of days from first flower opening until end of flowering. Record the average of at least four years.

7.3.3 Secondary/off-season flowering (6.2.4)

0 Absent
1 Rare
2 Intermediate
3 Frequent

7.3.4 Regularity of flowering (6.2.3)

1 Regular
2 Biennial (alternate years)
3 Irregular

7.3.5 Inflorescence position (4.2.1)

1 Terminal
2 Axillary
99 Other (specify in descriptor **7.6 Notes**)

7.3.6 Inflorescence axis growth habit

1 Semi-erect
2 Horizontal
3 Drooping

7.3.7 Inflorescence shape (4.2.2)

(See Fig. 10)

1 Conical (narrowly pyramidal)
2 Pyramidal
3 Broadly pyramidal

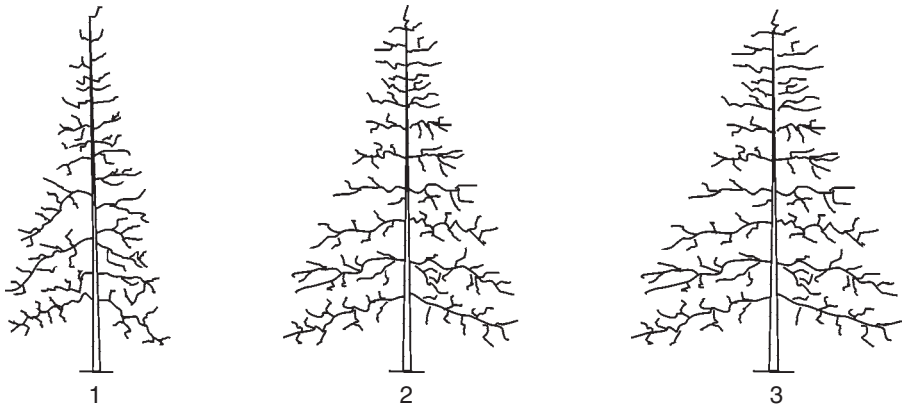

Fig. 10. Inflorescence shape

7.3.8 Inflorescence length [cm] (4.2.4)
Average of 10 inflorescences

7.3.9 Inflorescence width [cm]
Average of 10 inflorescences

7.3.10 Peduncle length [cm]
Average of 10 inflorescences

7.3.11 Peduncle width [cm]
Average of 10 inflorescences

7.3.12 Pubescence of inflorescence rachis (4.2.6)
Recorded on rachis of 10 inflorescences
0 Absent
1 Puberulous
2 Pubescent

7.3.13 Hermaphrodite flowers in the inflorescence [%] (4.2.8)
Average of 10 inflorescences taken from all directions and centre of tree

7.3.14 Presence of leafy bracts (4.2.7)
0 Absent
1 Present

7.3.15 Density of flowers in inflorescence (4.2.3)
3 Sparse
5 Medium
7 Dense

7.3.16 Type of flower (4.3.2)

1 Pentamerous
2 Tetramerous
3 Both

7.3.17 Inflorescence colour (4.2.5)

Recorded on main and secondary axes

1 Whitish
2 Yellowish green
3 Yellow
4 Light green
5 Green with red patches
6 Light orange
7 Pink
8 Dark pink
9 Purple
10 Light red
11 Red
12 Dark red
13 Crimson
99 Other (specify in descriptor **7.6 Notes**)

7.3.18 Length of the stamen in relation to pistil

1 Shorter
2 Equal
3 Longer

7.3.19 Nature of disc (4.3.3)

1 Swollen, broader than ovary
2 Narrow, reduced or absent

7.3.20 Number of stamens/staminodes (4.3.4)

1 10-12 (5-6 fertile)
2 5 (all fertile)
3 5 (2-3 fertile)
4 5 (1 fertile)

7.3.21 Intensity of anthocyanin colouration in mature flowers

3 Low
5 Medium
7 High

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 [y] (6.3.1)

7.4.2 Fruiting duration

7.4.2.1 Starting date [YYYYMMDD]

7.4.2.2 Ending date [YYYYMMDD]

7.4.3 Fruit bearing intensity

1 Low
2 Medium
3 High

7.4.4 Fruit length [cm] (4.4.1)

Average of 20 fruits measured from the base to the tip of the fruit

7.4.5 Fruit diameter [cm] (4.4.2)

Average of 20 fruits measured at the widest point

7.4.6 Fruit weight [g] (4.4.4)

Average of 20 fruits

7.4.7 Fruit shape (4.4.5)

(See Fig. 11)

1 Oblong
2 Elliptic
3 Roundish
4 Ovoid
5 Obovoid
99 Other (specify in descriptor **7.6 Notes**)

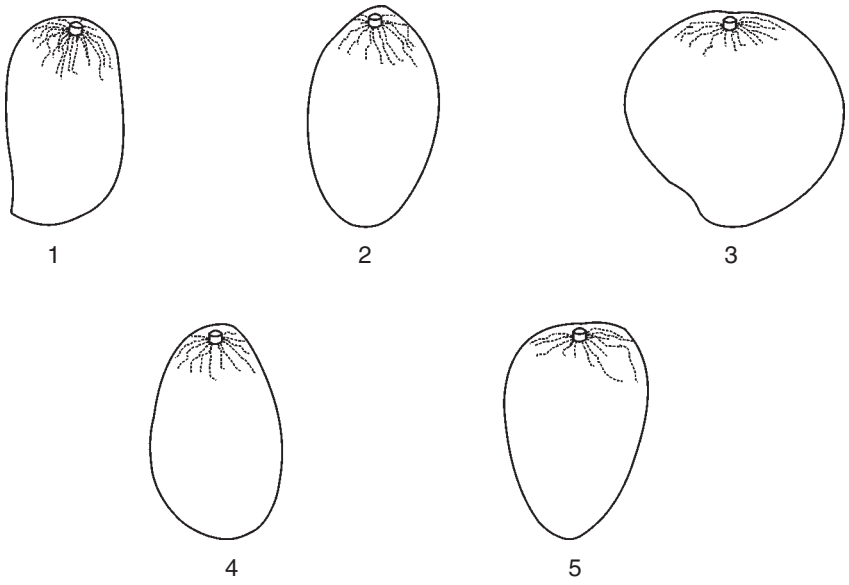

Fig. 11. Fruit shape

7.4.8 Shape of fruit apex

(See Fig. 12)

1 Acute
2 Obtuse
3 Round
99 Other (specify in descriptor **7.6 Notes**)

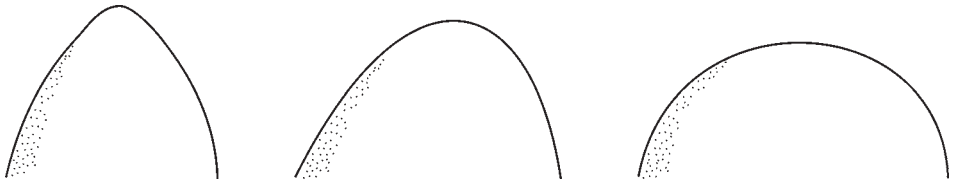

Fig. 12. Shape of fruit apex

7.4.9 Fruit attractiveness (6.3.5)

Combined assessment of shape, size and appearance, colouration, etc.

1 Poor
2 Average
3 Good
4 Excellent

7.4.10 Skin colour of ripe fruit (4.4.6)

7.4.10.1 Fruit ground colour

1 Green
2 Yellow
3 Orange
4 Purple
5 Red
99 Other (specify in descriptor **7.6 Notes**)

7.4.10.2 Fruit blush

1 Orange
2 Purple
3 Red
99 Other (specify in descriptor **7.6 Notes**)

7.4.11 Fruit skin thickness [mm] (4.4.7)

Average of 10 ripe fruits

7.4.12 Fruit skin surface texture (4.4.8)

1 Smooth
2 Rough

7.4.13 Density of lenticels on fruit skin

3 Sparse
5 Medium
7 Dense

7.4.14 Fruit stalk insertion (4.4.15)

1 Vertical
2 Oblique

7.4.15 Depth of fruit stalk cavity

(See Fig. 13)

0 Absent
1 Shallow
2 Medium
3 Deep
4 Very deep

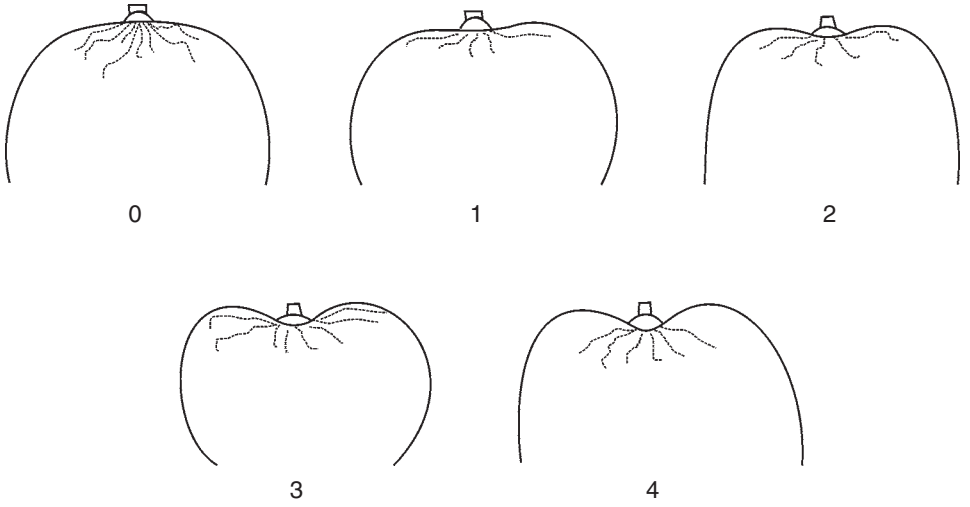

Fig. 13. Depth of fruit stalk cavity

7.4.16 Fruit stalk attachment

3 Weak
5 Intermediate
7 Strong

7.4.17 Fruit neck prominence

(See Fig. 14)

0 Absent
1 Slightly prominent
2 Prominent
3 Very prominent

Fig. 14. Fruit neck prominence

7.4.18 Slope of fruit ventral shoulder (6.3.14)

(See Fig. 15)

1 Slopping abruptly
2 Ending in a long curve
3 Rising and then rounded

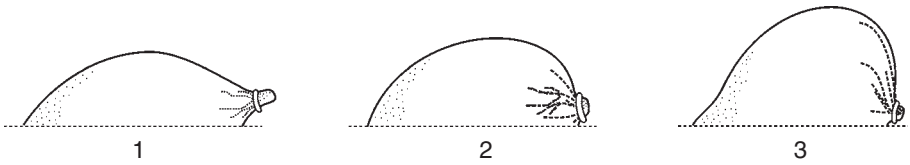

Fig. 15. Slope of fruit ventral shoulder

7.4.19 Fruit beak type (6.3.9)

(See Fig. 16)

1 Perceptible
2 Pointed
3 Prominent
4 Mammiform

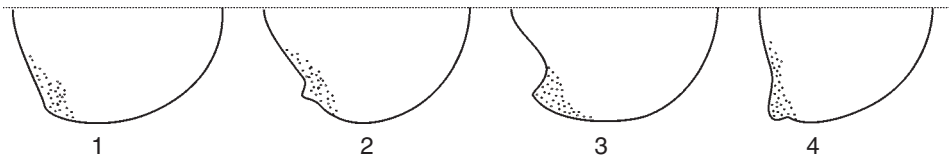

Fig. 16. Fruit beak type

7.4.20 Fruit sinus type (6.3.11)

(See Fig. 17)

0 Absent
1 Shallow
2 Deep

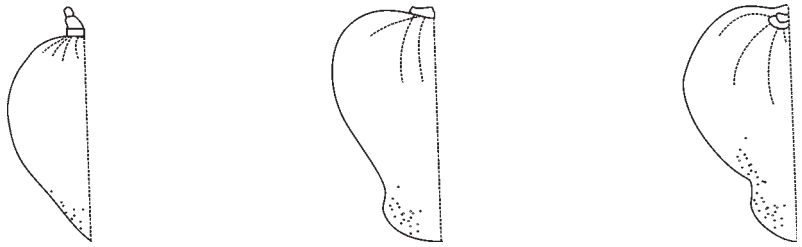

Fig. 17. Fruit sinus type

7.4.21 Fruit skin waxiness

1 Waxy
2 Non-waxy

7.4.22 Skin colour of ripe fruit

1 Green
2 Greenish yellow
3 Yellow
4 Green with red blush
5 Green with purple patches

7.4.23 Pulp colour of ripe fruit

1 Light yellow
2 Golden yellow
3 Yellow orange
4 Orange
5 Greenish yellow
6 Yellow
7 Light orange
8 Dark orange
99 Other (specify in descriptor **7.6 Notes**)

7.4.24 Pulp texture of ripe fruit (4.4.10)

Recorded on fully ripe fruits

3 Soft
5 Intermediate
7 Firm

7.4.25 Adherence of fruit skin to pulp (4.4.11)

0 Absent (free)
3 Weak
5 Intermediate
7 Strong

7.4.26 Quantity of latex oozing from peduncle

0 Absent
3 Low
5 Medium
7 High

7.4.27 Fruit pulp thickness [cm]

Recorded as mean of three measurements per fruit taken at basal, middle and apical portion of fruit. Average of 20 fruits.

7.4.28 Quantity of fibre in pulp (4.4.12)

0 Absent
3 Low
5 Intermediate
7 High

7.4.29 Adherence of fibre to fruit skin

3 Low
5 Medium
7 High

7.4.30 Fibre length in the pulp (4.4.14)

3 Short
5 Medium
7 Long

7.4.31 Pulp content (4.4.9)

Ratio of pulp to skin plus stone

7.4.32 Pulp juiciness

1 Slightly juicy
2 Juicy
3 Very juicy

7.4.33 Pulp aroma

1 Mild
2 Intermediate
3 Strong

7.4.34 Presence of turpentine flavour

0 Absent
1 Mild
2 Intermediate
3 Strong

7.5 Stone

Recorded on 20 healthy stones

7.5.1 Stone length [cm] (4.5.1)

7.5.2 Stone width [cm]

7.5.3 Stone thickness [cm]

7.5.4 Stone weight [g] (4.5.2)

7.5.5 Veins on stone (4.5.3)

1 Level with surface
2 Depressed
3 Elevated

7.5.6 Pattern of stone venation (4.5.4)

1 Parallel
2 Forked

7.5.7 Quantity of fibre on stone (4.5.5)

3 Low
5 Intermediate
7 High

7.5.8 Length of stone fibre [cm] (4.5.6)

1 Short (< 1.0)
2 Medium (1.0 – 1.5)
3 Long (> 1.5)

7.5.9 Adherence of fibre to stone

3 Weak
5 Intermediate
7 Strong

7.5.10 Texture of stone fibre (4.5.5)

1 Soft
2 Coarse

7.5.11 Space occupied by seed inside the stone [%]

1 ≤ 25
2 26 – 50
3 51 – 75
4 76 – 100

7.5.12 Seed length [cm]

Average of 20 seeds

7.5.13 Seed width [cm]

Average of 20 seeds at the widest point

7.5.14 Seed weight [g]

Average of 20 well developed/healthy seeds

7.5.15 Seed shape

(See Fig. 18)

1 Ellipsoid
2 Oblong
3 Reniform
99 Other (specify in descriptor **7.6 Notes**)

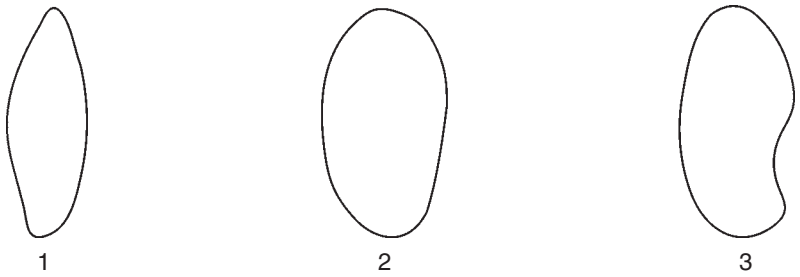

Fig. 18. Seed shape

7.5.16 Type of embryony

1 Monoembryony
2 Polyembryony

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] (6.3.3)
Average of 3 trees per accession

8.1.2 Fruit maturity period
3 Early
5 Medium
7 Late

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

8.1.4 Fruit storage life [d] (6.3.6)
Number of days of storage of ripe fruits under ambient conditions after harvest

8.1.5 Eating quality (6.3.4)
Combined assessment of flavour, acidity, sweetness, aroma and astringency when ripe; quantitative measurement of TSS, acidity and sugars to be made
3 Poor
5 Good
7 Very good
9 Excellent

8.1.6 Pulp total soluble solids [°Brix]

1	Very low	(< 10.0)
2	Low	(10.1 – 14.0)
3	Medium	(14.1 – 18.0)
4	High	(18.1 – 22.0)
5	Very high	(> 22.0)

8.1.7 Pulp titratable acidity [%]

1	Low	(< 0.20)
2	Medium	(0.21 – 0.30)
3	High	(0.31 – 0.40)
4	Very high	(> 0.40)

8.2 Notes
Specify here any 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 Medium
7 High
9 Very high

9.1 Reaction to physiological disorders

1 Susceptibility to spongy tissue
2 Susceptibility to malformation - floral and vegetative
99 Other (specify in descriptor **9.8 Notes**)

9.2 Reaction to salinity

1 Soil salinity
2 Water salinity

9.3 Reaction to soil calcareousness

0 Not susceptible
1 Low susceptibility
2 High susceptibility

9.4 Reaction to mineral toxicity

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

9.5 Reaction to water logging (7.3)

9.6 Reaction to drought (7.1)

9.7 Reaction to wind (7.2)

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 **10.5 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 Medium
7 High
9 Very high

10.1 Pests

	Causal organism	Common name	
10.1.1	*Idioscopus* spp.	Mango hopper	(8.1.1)
10.1.2	*Drosicha mangiferae*	Mealy bug	(8.1.2)
10.1.3	*Bactrocera dorsalis*	Fruit fly	(8.1.3)
10.1.4	*Bactrocera rufomaculata*	Stem/shoot borer	(8.1.4)
10.1.5	*Chulmetia transversa*	Stem/shoot borer	(8.1.4)
10.1.6	*Apsylla cistellata*	Mango psyllid	(8.1.5)
10.1.7	*Sternochetus mangiferae*	Stone weevil	(8.1.6)
10.1.8	*Niphonoclea albata* and *N. capito*	Twig cutter	
10.1.9	*Noorda albizonalis*	Mango seed borer	
10.1.10	*Orthaga endrusalis*	Leaf webber	
10.1.11	*Scirtothrips dorsalis*	Thrips	
10.1.12	*Megalurothrips kellyanus*	Thrips	
10.1.13	*Plocaderus ruficornis*	Trunk borer	
10.1.14	*Alcides* sp.	Shoot borer	
10.1.15	*Deporaus marginatus*	Leaf-cutting weevil	

10.2 Fungi

10.2.1	*Colletotrichum gloeosporioides*	Anthracnose	(8.2.1)
10.2.2	*Glomerella cingulata*	Anthracnose	(8.2.1)
10.2.3	*Oidium mangiferae*	Powdery mildew	(8.2.2)
10.2.4	*Botrydiplodia theobromae*	Stem-end rot	(8.2.3)
10.2.5	*Capnodium mangiferae*	Sooty mould	
10.2.6	*Elsinoe mangiferae*	Scab	
10.2.7	*Alternaria alternata*	Fruit rot	
10.2.8	*Fusarium* spp.	Mango malformation	(8.2.4)

10.3 Mites

10.3.1	*Aceria* spp.	Mango malformation	(8.2.4)
10.3.2	*Oligonychus* spp.	Spider mites	
10.3.3	*Tetranychus* spp.	Web forming mites/ spider mites	

10.4 Bacteria

10.4.1	*Xanthomonas campestris*	Bacterial canker	(8.3.1)

10.5 Notes

Specify here any other additional information

11. Biochemical markers

Specify methods used and cite reference(s). Refer to *Descriptors for Genetic Markers Technologies*, available in PDF (portable format document) from the IPGRI Web site (www.ipgri.cgiar.org) or by email request to: ipgri-publications@cgiar.org

12. Molecular markers

Refer to *Descriptors for Genetic Markers Technologies*, available in PDF (portable format document) from the IPGRI Web site (www.ipgri.cgiar.org) or by email request to: ipgri-publications@cgiar.org

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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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 Patrizia Tazza designed the layout and the cover.

Annex I. Basic list of highly discriminating descriptors for mango

Mango	IPGRI Descriptor Number	Name
Mangifera indica L.	**7.1.7**	Tree growth habit
	7.1.8	Foliage density
	7.2.1	Leaf blade shape
	7.2.9	Leaf apex shape
	7.2.10	Leaf base shape
	7.2.11	Leaf margin
	7.2.13	Colour of young leaf
	7.2.14	Intensity of anthocyanin pigmentation of juvenile leaf
	7.3.5	Inflorescence position
	7.3.15	Density of flowers in inflorescence
	7.3.16	Type of flower
	7.3.19	Nature of disc
	7.3.20	Number of stamens/staminodes
	7.4.7	Fruit shape
	7.4.8	Shape of fruit apex
	7.4.13	Density of lenticels on fruit skin
	7.4.15	Depth of fruit stalk cavity
	7.4.17	Fruit neck prominence
	7.4.18	Slope of fruit ventral shoulder
	7.4.19	Fruit beak type
	7.4.20	Fruit sinus type
	7.4.25	Adherence of fruit skin to pulp
	7.4.29	Adherence of fibre to fruit skin
	7.5.9	Adherence of fibre to stone
	7.5.11	Space occupied by seed inside the stone [%]
	7.5.15	Seed shape
	7.5.16	Type of embryony

ANNEX II. Collecting form for mango (*Mangifera indica* L.)

SAMPLE IDENTIFICATION

COLLECTING INSTITUTE CODE (2.1):

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

COLLECTING DATE OF SAMPLE [YYYYMMDD] (2.4):

GENUS (1.7.1): SPECIES (1.7.2):

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/research organization, experimental station, genebank 50. Seed company
60. 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

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

TEMPERATURE (6.1.20.1): Annual mean: ☐ °C

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

SAMPLE

BIOLOGICAL STATUS OF ACCESSION (2.17):
100. Wild 200. Weedy 300. Traditional cultivar/landra
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)

PREVAILING STRESSES (2.18.14):
Mention the types of major stresses, i.e. abiotic (drought, flood, etc.), 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. Root	2. Trunk	3. Bark	4. Leaf
5. Flower	6. Fruit	7. Peel	8. Pericarp
9. Seed	99. Other (specify)		

PLANT USES (2.18.7)

1. Food (fruit, juice, pickle)	2. Fuel	3. Wood/timber
4. Medicine	5. Seed for starch extraction	99. Other (specify)

ASSOCIATED FLORA (2.18.16):
Mention other dominant crop/plant species including *Mangifera* species found in and around the collecting site

MANAGEMENT

ACCESSION No. (3.1)

TYPE OF GERMPLASM STORAGE (3.8)

10. Seed collection	20. Field collection	30. *In vitro* collection
40. Cryopreserved collection	99. Other (specify)	

CHARACTERIZATION

GROWTH

Tree growth habit (7.1.7)	Foliage density (7.1.8)

LEAF

Leaf blade shape (7.2.1)	Leaf apex shape (7.2.9)	Leaf base shape (7.2.10)
Leaf margin (7.2.11)	Colour of young leaf (7.2.13)	Intensity of anthocyanin pigmentation (7.2.14)

INFLORESCENCE

Inflorescence position (7.3.5)	Density of flowers in inflorescence (7.3.15)	Type of flower (7.3.16)
Nature of disc (7.3.19)	No. of stamens/staminodes (7.3.20)	

FRUIT

Fruit shape (7.4.7)	Shape of fruit apex (7.4.8)	Density of lenticels on fruit skin (7.4.13)
Depth of fruit stalk cavity (7.4.15)	Fruit neck prominence (7.4.17)	Slope of fruit ventral shoulder (7.4.18)
Fruit beak type (7.4.19)	Fruit sinus type (7.4.20)	Adherence of fruit skin to pulp (7.4.25)
Adherence of fibre to fruit skin (7.4.29)		

STONE/SEED

Adherence of fibre to stone (7.5.9)	Space occupied by seed inside the stone (7.5.11)
Seed shape (7.5.15)	Type of embryony (7.5.16)

EVALUATION

FRUIT MATURITY PERIOD (8.1.2):

1. Early	2. Medium	3. Late

PULP TOTAL SOLUBLE SOLIDS (8.1.6):

1. Very low	2. Low	3. Medium
4. High	5. Very high	

PULP TITRABLE ACIDITY (8.1.7):

1. Low	2. Medium	3. High	4. Very high

COLLECTOR'S NOTES

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