Bioversity International

World Agroforestry Centre

Descriptors for

Baobab

(*Adansonia digitata* L.)

List of Descriptors

Allium (E/S)	2000
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)	1999
Cashew* (E)	1986
Chenopodium pallidicaule (S)	2005
Cherimoya (E/S)	2008
Cherry* (E)	1985
Chickpea (E)	1993
Citrus (E/F/S)	1999
Coconut (E)	1992
Coffee (E/S/F)	1996
Cotton (Revised)* (E)	1985
Cowpea* (E)	1983
Crocus (E)	2014
Cultivated potato* (E)	1977
Date palm (F)	2005
Durian (E)	2007
Echinochloa millet* (E)	1983
Eggplant (E/F)	1990
Faba bean* (E)	1985
Fig (E)	2003
Finger millet* (E)	1985
Forage grass* (E)	1985
Forage legumes* (E)	1984
Grapevine (E/S/F)	1997
Groundnut (E/S/F)	1992
Hazelnut (E)	2008
Jackfruit (E)	2000
Kodo millet* (E)	1983
Lathyrus spp. (E)	2000
Lentil* (E)	1985
Litchi (E)	2002
Lupin* (E/S)	1981
Maize (E/S/F/P)	1991
Mango (Revised) (E)	2006
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 (E/P)	2001
*Phaseolus vulgaris** (E/P)	2001
Pigeonpea (E)	1993
Pineapple (E)	1991
Pistacia (excluding *P. vera*) (E)	1998
Pistachio (E/F/A/R)	1997
Plum* (E)	1985
Potato varieties* (E)	1985
Quinoa (E/S/F)	2013
Rambutan (E)	2003
Rice* (E/P)	2007
Rocket (E/I)	1999
Rye and Triticale* (E)	1985
Safflower* (E)	1983
Sesame* (E)	2004
Setaria italica and *S. pumila* (E)	1985
Shea tree (E)	2006
Sorghum (E/F)	1993
Soyabean* (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
Tree tomato (E)	2013
Tropical fruit* (E)	1980
Ulluco (S)	2003
Vigna aconitifolia and *V. trilobata* (E)	1985
Vigna mungo and *V. radiata* (Rev.)* (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

Baobab

(*Adansonia digitata* L.)

Bioversity International is a global research-for-development organization. We deliver scientific evidence, management practices and policy options to use and safeguard agricultural biodiversity to attain sustainable global food and nutrition security. We work with partners in low-income countries in different regions where agricultural biodiversity can contribute to improved nutrition, resilience, productivity and climate change adaptation.

Bioversity International is a member of the CGIAR Consortium – a global research partnership for a food secure future.

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The **World Agroforestry Centre** (ICRAF) is a CGIAR Consortium Research Centre. The Centre's vision is a rural transformation in the developing world as smallholder households strategically increase their use of trees in agricultural landscapes to improve their food security, nutrition, income, health, shelter, social cohesion, energy resources and environmental sustainability. The Centre's mission is to generate science-based knowledge about the diverse roles that trees play in agricultural landscapes, and to use its research to advance policies and practices, and their implementation that benefit the poor and the environment. Our work is conducted by partners from a range of scientific and development institutions.

The World Agroforestry Centre is guided by the broad development challenges pursued by the CGIAR. These include poverty alleviation that entails enhanced food security and health, improved productivity with lower environmental and social costs, and resilience in the face of climate change and other external shocks.

www.worldagroforestry.org

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Cover Photo: Young villagers picking nutritious fruits from an old baobab tree in South Kordofan, Sudan

Credit: J. Gebauer

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CONTENTS

PREFACE

The **'Descriptors for Baobab (*Adansonia digitata* L.)'** were developed by Dr Katja Kehlenbeck from the World Agroforestry Centre (ICRAF) and her team, with main contributions from Charles G. Waruhiu as an output of the CG-funded A4NH (Agriculture for Nutrition and Health) program and the EC-funded Fruiting Africa project. The draft document was enriched with valuable research inputs from students and staff working under the above mentioned ICRAF projects. Adriana Alercia managed the whole development process and provided technical expertise. The scientific overview of this document was provided by Dr Stefano Padulosi from Bioversity International (Bioversity for short).

A draft version prepared in the Bioversity internationally accepted format for descriptor lists was circulated among a number of international experts for their comments. A full list of the names and addresses of those involved in the production of this publication is given in the *Contributors* section.

Bioversity International (formerly known as IPGRI) encourages the collecting of data for all five types of descriptors (see Definitions and Use of the Descriptors), whereby data from the first four categories—*Passport, Management, Environment and Site,* and *Characterization*—should be made available for any accession. The number of descriptors selected in each of the categories will depend on the crop and its importance to the description of the crop. Descriptors listed under *Evaluation* allow for a more extensive description of the accession, but they generally require repeated 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 is promoted by Bioversity 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 Bioversity format, will produce a rapid, reliable, and efficient means of information storage, retrieval and communication, and will assist with the use of germplasm. It is recommended, therefore, that information should be produced by closely following the descriptor list with regard to ordering and numbering descriptors, using the specified descriptors and using the recommended descriptor states.

This descriptors list is intended to be comprehensive for the descriptors it contains. Bioversity does not, however, assume that curators will characterize accessions of their collections using all descriptors given. Descriptors should be used when they are useful to users, either collection' curators for the management and maintenance of their germplasm material or to all other users of plant genetic resources for promoting their sustainable use. To this end, highly discriminating descriptors are listed at the beginning of the *Characterization* section (highlighted text) to facilitate selection of descriptors.

The 'List of Multi-crop Passport Descriptors' (Alercia *et al.*, 2012) was developed to provide consistent coding schemes for common passport descriptors among crops. They are marked in the text as [MCPD]. 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 I, the reader will find a 'Collecting form for baobab' that will facilitate data collection.

Any suggestions for improvement of the 'Descriptors for Baobab (*Adansonia digitata* L.)' will be highly appreciated by Bioversity[1] and ICRAF.

1 Contact: a.alercia@cgiar.org

INTRODUCTION

Common names of baobab in different languages found in according to literature

Country	Language	Name
	Arabic	Hamaraya, hamao, gangoleis
Sudan	Arabic	Humar, hmur, tebeldi
Egypt	Arabic	Habhab
Chad	Arabic	Hamaraya
Mali, Senegal	Bambara	Sira
	English	Baobab, Monkey bread tree, Cream of tartar tree, Upside down tree
	French	Baobab, arbre aux calebasse, arbre de mille ans, calabassier du Sénégal
	German	Affenbrotbaum, baobab
Nigeria, Niger	Haussa	Kuka, kouka
India	Hindi	Gorak-imli
Italy	Italian	Baobab
Malawi	Chichewa	Mlambe, mnumbe, mlambe
Mali	Mandinke	Sito, sira
	Portuguese	Baobás, imbondeiro, cabaçevre
South Africa	Afrikaans and others	Baobab, kremetart, mowana, ximuwu, muvhuyu, mubuyu, muyu
	Spanish	Baobab
Eastern Africa	Swahili	Mbuyu, majoni
Zimbabwe	Shona	Muuyu
Zimbabwe	Ndebele	Mkhono

Baobab (*Adansonia digitata* L.) is an important multipurpose food tree of the semi-arid and sub-humid zones of sub-Saharan Africa, including countries in Western Africa (e.g. Senegal, Mali, Niger, Benin), Southern Africa (e.g. Namibia, South Africa, Mozambique, Zambia, Malawi) and Eastern Africa (e.g. Sudan, Ethiopia, Kenya, Tanzania) (Wickens and Lowe 2008). The genus *Adansonia* belongs to the family Bombacaceae. A recent publication suggests that there are two different species of *Adansonia* in mainland Africa, namely the tetraploid *A. digitata* ('lowland baobab') and the diploid *A. kilima* ('hill baobab'), which is believed to occur on higher altitudes and has a slightly different flower morphology from *A. digitata*, among other minor differences (Pettigrew *et al.* 2012). The remarkable, long-lived baobab tree has a short, swollen trunk with a girth of up to about 28 m, ending in thick, wide-spreading branches that carry a large, round canopy reaching a height of up to 25 m (Sidibe and Williams 2002). It has large palmate leaves and showy whitish flowers that open at night and are pollinated by fruit bats and nocturnal moths (Wickens and Lowe 2008). The fruits are capsules with a hard, woody shell and many seeds embedded in a whitish powdery fruit pulp. Almost all parts of baobab are useful for human beings (Wickens and Lowe 2008), with fruits and leaves being the most important for food and nutrition security of local communities (Sidibe and Williams 2002; Buchmann *et al.*

2010; De Caluwe *et al.* 2010). The naturally dry, whitish fruit pulp is high in sugars, vitamin C and minerals such as calcium, magnesium and iron (Stadlmayr *et al.* 2013). It can be eaten fresh or processed into porridge, juice, jam, ice cream and sweets (Sidibe and Williams 2002). The seeds are rich in protein and fat and can be roasted and eaten as snack or pressed into oil for consumption and industrial use, particularly for cosmetic products (Gebauer *et al.* 2002). The leaves are known to have high protein, beta carotene and iron content and are used fresh as leafy vegetable or dried and powdered as a soup ingredient (Sidibe and Williams 2002; Buchmann *et al.* 2010).

Baobab food products are mainly used for home consumption, but the sale of raw and processed products can contribute significantly to income generation of local communities, particularly of women. The approval of baobab fruit pulp as a novel food ingredient in the European Union and the United States in 2008 increased the marketing opportunities for baobab products, but may lead to resource overexploitation and pose a risk to the nutrition security of local communities (Buchmann *et al.* 2010). The production of baobab pulp and leaves is almost entirely based on trees naturally occurring in forests and woodlands or in farmers' fields, while only rarely are baobab trees planted (Sidibe and Williams 2002; Buchmann *et al.* 2010). As in other undomesticated tree species, there is a high variability among wild individual baobab trees with regard to several characteristics, including morphological fruit traits, nutrient content of pulp, seeds and leaves as well as productivity and other agronomic characteristics (Assogbadjo *et al.* 2005; Cuni Sanchez *et al.* 2011; Munthali *et al.* 2012; Parkouda *et al.* 2012; Wiehle *et al.* 2014). To sustainably develop baobab value chains further and to fulfil the growing demand for high quality baobab products, domestication and cultivation of the species is necessary. Steps in domestication include the characterization of genetic resources, the identification of superior mother trees with desirable traits and their propagation, and the dissemination and cultivation of the planting material (Akinnifesi *et al.* 2008). Growing baobab on farms will also reduce the pressure on natural populations, which could currently be threatened by overexploitation as recorded in Western Africa (Buchmann *et al.* 2010). In other regions such as northern South Africa, rejuvenation of baobab can be lacking due to harsh environmental conditions and pressure from grazing livestock (Venter and Witkowski 2013).

This descriptor list, which follows the international standardized documentation system for the characterization and study of genetic resources as promoted by Bioversity International (2007), is expected to support studies focussing on genetic and morphological diversity of baobab, conservation of its genetic resources, domestication and increasing production and use of baobab products.

DEFINITIONS AND USE OF THE DESCRIPTORS

Bioversity 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. Furthermore, 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 experimental 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 highlighted in the text and are listed at the beginning of the *Characterization* section

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

(a) the Système International d'Unités (SI);

(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 Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart chosen 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*
(http://unstats.un.org/unsd/methods/m49/m49alpha.htm)

(e) quantitative characters, i.e. those that are continuously variable, should preferably be measured quantitatively. Alternatively, in cases where it is difficult to measure in this way, it is acceptable to score instead 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 scale, such as in (e), '0' would be scored when (i) the character is not expressed; (ii) a descriptor is inapplicable. In the following example, '0' will be recorded if an accession does not have leaf hairs:

Young leaf hairiness
Observed on the upper side of the leaf

0	Absent
1	Slightly hairy
2	Hairy
3	Very hairy

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

Presence of stone cell aggregates in mesocarp

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 recorded numerically as YYYYMMDD, where

YYYY	-	4 digits to represent the year
MM	-	2 digits to represent the month
DD	-	2 digits to represent the day

If the month or days are missing, this should be indicated with hyphens or '00' [double zero]. (e.g. 1975----, 19750000; 197506--, 19750600).

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]

FAO WIEWS 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 http://apps3.fao.org/wiews/wiews.jsp.

1.2 Accession number [MCPD]

This number serves as a unique identifier for accessions within a genebank, 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 reused. Letters should be used before the number to identify the genebank or national system (e.g. CGN indicates an accession from the genebank in 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 institute code [MCPD]

FAO WIEWS code of the donor institute. (See instructions under *Institute code*, **1.1**).

1.3.1 Donor institute name

Name of the donor institute (or person). This descriptor should be used only if DONORCODE cannot be filled because the FAO WIEWS code for this institute is not available.

1.4 Donor accession number [MCPD]

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

1.5 Other identifiers associated with the accession [MCPD]

Any other identifiers known to exist in other collections for this accession. Use the following format: INSTCODE:ACCENUMB;INSTCODE:identifier;… INSTCODE and identifier are separated by a colon without space. Pairs of INSTCODE and identifier are separated by a semicolon without space. When the institute is not known, the identifier should be preceded by a colon.

1.6 Genus [MCPD]

Genus name for taxon. Initial uppercase letter required.

1.7 Species [MCPD]

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

1.7.1 Species authority [MCPD]

Provide the authority for the species name.

1.8 Subtaxon [MCPD]

Subtaxon can be used to store any additional taxonomic identifier. The following abbreviations are allowed: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form); 'Group' (for 'cultivar group').

1.8.1 Subtaxon authority [MCPD]

Provide the subtaxon authority at the most detailed taxonomic level.

1.9 Ancestral data [MCPD]

Information about either pedigree or other description of ancestral information (i.e. parent variety in the case of mutant or selection).

1.10 Accession

1.10.1 Accession name [MCPD]

Either a registered or other designation given to the material received other than the *Donor accession number*, **1.4** or *Collecting number*, **2.2**. First letter uppercase. Multiple names are separated by a semicolon without space. Example: Accession name: Bogatyr;Symphony;Emma.

1.10.2 Synonyms

Include here any names other than the current one. Newly assigned station names are frequently used as synonyms.

1.10.3 Common tree/crop name [MCPD]

Common name of the tree/crop. Example: 'malting barley', 'macadamia', 'maïs'.

1.11 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 or double zero.

1.12 Accession size

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

1.13 Type of material received

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

1.14 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 [MCPD]

FAO WIEWS code of the institute(s) collecting the sample. If the holding institute has collected the material, the collecting institute code should be the same as the holding institute code. Multiple values are separated by a semicolon without space. (See instructions under *Institute code*, **1.1**).

2.1.1 Collecting institute name [MCPD]

Name of the institute collecting the sample. This descriptor should be used only if Collecting institute code cannot be filled because the FAO WIEWS code for this institute is not available. Multiple values are separated by a semicolon without space.

2.1.1.1 Collecting institute address [MCPD]

Address of the institute collecting the sample. This descriptor should be used only if *Collecting institute code* cannot be filled since the FAO WIEWS code for this institute is not available. Multiple values are separated by a semicolon without space.

2.2 Collecting number [MCPD]

Original identifier assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number (e.g. 'FM9909'). This identifier is essential for identifying duplicates held in different collections. It should be unique and always accompany subsamples wherever they are sent.

2.3 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 or double zero [00].

2.4 Collecting mission identifier [MCPD]

Identifier of the collecting mission used by the *Collecting institute* **2.1** or **2.1.1** (e.g. 'CIATFOR-052', 'CN426').

2.5 Country of origin [MCPD]

Three-letter ISO 3166-1 code of the country in which the sample was originally collected (landrace, crop wild relative, farmers' variety), bred or selected (breeding lines, GMOs, segregating populations, hybrids, modern cultivars, etc.) should be used.

2.6 Breeding institute code [MCPD]

FAO WIEWS 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. Follow the *Institute code* **1.1** standard. Multiple values are separated by a semicolon without space.

2.6.1 Breeding institute name [MCPD]

Name of the institute (or person) that bred the material. This descriptor should be used only if BREDCODE cannot be filled because the FAO WIEWS code for this institute is not available. Multiple names are separated by a semicolon without space.

2.7 Location of collecting site [MCPD]

Location information below the country level that describes where the accession was collected, preferably in English. 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).

Geographical coordinates

- For latitude and longitude descriptors, two alternative formats are proposed, but the one reported by the collecting mission should be used.

- Latitude and longitude in decimal degree format with a precision of four decimal places corresponds to approximately 10 m at the Equator and describes the point-radius representation of the location, along with geodetic datum and coordinate uncertainty in metres.

The following two mutually exclusive formats can be used for latitude and longitude:

2.8 Latitude of collecting site [DDMMSSH] [MCPD]
Degrees (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).

2.8a Latitude of collecting site [-/+DD.DDDD] [MCPD]
Latitude expressed in decimal degrees. Positive values are North of the Equator; negative values are South of the Equator (e.g. -44.6975).

2.9 Longitude of collecting site [DDDMMSSH] [MCPD]
Degrees (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).

2.9a Longitude of collecting site [-/+DDD.DDDD] [MCPD]
Longitude expressed in decimal degrees. Positive values are East of the Greenwich Meridian; negative values are West of the Greenwich Meridian (e.g. +120.9123).

2.10 Coordinate uncertainty [m] [MCPD]
Uncertainty associated with the coordinates in metres. Leave the value empty if the uncertainty is unknown.

2.11 Coordinate datum [MCPD]
The geodetic datum or spatial reference system upon which the coordinates given in decimal latitude and decimal longitude are based (e.g. WGS84, ETRS89, NAD83). The GPS uses the WGS84 *datum*.

2.12 Georeferencing method [MCPD]
The georeferencing method used (GPS, determined from map, gazetteer, or estimated using software). Leave the value empty if georeferencing method is not known.

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

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

2.14 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, etc., or by using the more specific codes, such as 11, 12, etc.

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

20 Farm or cultivated habitat
- 21 Field
- 22 Orchard
- 23 Backyard, kitchen or home garden (urban, periurban 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 (elaborate in descriptor **2.25 Remarks**)

2.15 Biological status of accession [MCPD]

The coding scheme proposed can be used at 3 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
- 130 Semi-natural/sown

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
  - 416 Clonal selection
- 420 Genetic stock
  - 421 Mutant (e.g. induced/insertion mutants, tilling populations)
  - 422 Cytogenetic stocks (e.g. chromosome addition/substitution, aneuploids, amphiploids)
  - 423 Other genetic stocks (e.g. mapping populations)

500 Advanced/improved cultivar (conventional breeding methods)

600 GMO (by genetic engineering)

999 Other (elaborate in descriptor **2.25 Remarks**)

2.16 Collecting source environment

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

2.17 Type of sample collected

Type of material collected. If different types of material have been collected from the same source, each sample (type) should be designated with a unique collecting number and a corresponding unique accession number.

1 Vegetative
2 Seed
3 Pollen
4 *In vitro* culture
99 Other (specify which part of the plant is used in descriptor **2.25 Remarks**)

2.18 Number of plants sampled

Appropriate number of plants collected in the field to produce this accession.

2.19 Number of seeds collected

2.20 General appearance of population

Provide a subjective assessment of the general appearance of the population:

3 Poor
5 Medium
7 Good

2.21 Population isolation [km]

Straight line distance between two adjacent collecting sites.

2.22 Ethnobotanical data

Information on traditional attributes of the sample in place for collecting runs (community): uses, methods of preparation, native names, healing properties, cultural beliefs and other characteristics.

2.22.1 Ethnic group

Name of the ethnic group of the donor of the sample or of the people living in the collecting area.

2.22.2 Local vernacular name

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

2.22.2.1 Translation

Provide translation of the local name into English, if possible.

2.22.3 History of plant use

1 Ancestral/indigenous (always associated with the place and community)
2 Introduced (but in unknown distant past)
3 Introduced (time of introduction known)

2.22.4 Parts of the plant used

1 Fruit
2 Seed
3 Leaf
4 Bark
5 Trunk
6 Root
99 Other (specify in descriptor **2.25 Remarks**)

2.22.5 Plant use

1 Raw fruit pulp as a snack
2 Juice or sauce for porridge
3 Processed fruit pulp as a sweet/ice cream
4 Raw leaves as salad
5 Cooked fresh leaves as a vegetable/sauce
6 Dried powdered leaves as a soup/sauce ingredient
7 Seeds (raw or roasted) as a snack or as soup/sauce ingredient
8 Pressed seed oil as cooking oil
9 Medicinal
10 Industrial (oil for cosmetics, fruit shells for handicrafts)
99 Other (specify in descriptor **2.25 Remarks**)

2.22.6 Cultural characteristics

Is there any folklore associated with the collected material (e.g. taboos, believes, stories and/or superstitions about baobab)? If so, describe it briefly in descriptor **2.25 Remarks**.

0 No
1 Yes

2.22.7 Prevailing stresses

Information on main associated biotic (pests and diseases) and abiotic (drought, salinity, temperature) stresses.

2.22.8 Cultural practices

2.22.8.1 **Sowing date** [YYYYMMDD]

2.22.8.2 **Start of fruit harvest season** [YYYYMMDD]

2.22.8.3 **End of fruit harvest season** [YYYYMMDD]

2.22.9 Cropping system

1 Monoculture
2 Intercropped (specify other crops in descriptor **2.25 Remarks**)

2.22.10 Mode of reproduction

1 Vegetative
2 Seed
3 Both

2.22.11 Associated flora

Other dominant crop/or wild plant species, including other *Adansonia* species, found in and around the collecting site.

2.22.12 Seasonality

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

2.23 Photograph

Was/were (a) photograph(s) taken of the sample or habitat at the time of collecting? If so, provide (an) identification number(s).

0 No
1 Yes

2.23.1 Photograph identification number

2.24 Herbarium specimen

Was a herbarium specimen collected? If so, provide an identification number and indicate in which place (herbarium) the baobab specimen was deposited.

2.24.1 Specimen identification number

2.24.2 Herbarium name

2.25 Remarks

Specify here any additional information recorded by the collector or any specific information on descriptors with value "99" or "999" (=Other).

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 **2.2**)

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

3.3 Accession location in orchard

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

3.3.1 Block designation

3.3.2 Row number

3.3.3 Tree number within the row

3.4 Storage address

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

3.5 Sowing/planting date [YYYYMMDD]

3.6 Plants/propagules establishment [%]

3.7 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 Genebank Standards for Plant Genetic Resources for Food and Agriculture (2014) for details on storage type].

10) Seed collection
    11) Short term
    12) Medium term
    13) Long term
20) Field collection
30) *In vitro* collection (Slow growth)
40) Cryopreserved collection
50) DNA collection
99) Other (elaborate in **3.10 Remarks**)

3.8 Duplication at other location(s)

0 No
1 Yes

3.8.1 Location of safety duplicates [MCPD]

FAO WIEWS code of the institute(s) where a safety duplicate of the accession is maintained. Multiple values are separated by a semicolon without space. It follows **1.1** *Institute code*.

3.9 *In vitro* conservation

3.9.1 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 **3.10 Remarks**)

3.9.2 Date of introduction *in vitro* [YYYYMMDD]

3.9.3 Type of sub-cultured 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 **3.10 Remarks**)

3.9.4 Regeneration process

1 Organogenesis
2 Somatic embryogenesis
99 Other (specify in descriptor **3.10 Remarks**)

3.9.5 Number of genotypes introduced *in vitro*

3.9.6 Number of replicates per genotype

3.9.7 Last subculture date [YYYYMMDD]

3.9.8 Medium used at the last subculture

3.9.9 Number of plants at the last subculture

3.9.10 Location after the last subculture

3.9.11 Next subculture date [YYYYMMDD]

3.10 Remarks

Any additional information may be specified here.

4. Multiplication/regeneration descriptors

4.1 Accession number (Passport **1.2**)

4.2 Population identification (Passport **2.2**)

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]
Estimated year when tree should be propagated for regeneration.

4.7 Propagation method
Method used to produce trees:

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

4.8 Sowing/planting date [YYYYMMDD]

4.9 Cultural practices

4.9.1 Planting density
Number of trees established per hectare.

4.9.2 Fertilizer application
Specify type, doses, frequency of each fertilizer and method of application.

4.9.3 Irrigation
Specify frequency.

4.10 Previous multiplication and/or regeneration

4.10.1 Location

4.10.2 Plot number

4.10.3 Sowing/planting date [YYYYMMDD]

4.11 Number of times accession regenerated
Since the date of acquisition.

4.12 Notes
Any additional information may be specified here.

ENVIRONMENT AND SITE

5. Characterization and/or evaluation site descriptors

5.1 Country of characterization and/or evaluation

(See instructions in descriptor **2.5** Country of origin).

5.2 Site (research institute, farm, collection point)

5.2.1 Latitude

(See format under **2.8/2.8a**).

5.2.2 Longitude

(See format under **2.9/2.9a**).

5.2.3 Elevation [m asl]

5.2.4 Name and address of farm or institute

(Or description of location if on public land/in forests).

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 date [YYYYMMDD]

5.5 Evaluation environment

Environment in which characterization/evaluation was carried out:

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

5.6 Condition of tree

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

1 Dying
2 Old – declining
3 Mature – diseased
4 Mature – non-vigorous
5 Mature – vigorous
6 Young (not yet bearing)

5.7 Seed germination [%]
Specify number of days over which germination is measured.

5.8 Grafting/budding/layering success [%]
Specify number of days over which the success is recorded. Indicate the rootstock.

5.9 Number of days to planting after budding/layering [d]

5.10 Field establishment [%]
Specify number of days over which establishment is measured.

5.11 Sowing/planting site in the field
Give block, strip and/or row/plot numbers as applicable, plants/plot, replication.

5.12 Field spacing

5.12.1 Distance between trees in a row [m]

5.12.2 Distance between rows [m]

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

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

5.15 Environmental characteristics of site
Use descriptors **6.1.1** 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. (From FAO, 1990).

1	Flat	0	-	0,5%
2	Almost flat	0,6	-	2,9%
3	Gently undulating	3	-	5,9%
4	Undulating	6	-	10,9%
5	Rolling	11	-	15,9%
6	Hilly	16	-	30%
7	Steeply dissected	>30%, moderate elevation range		
8	Mountainous	>30%, great elevation range (>300m)		
99	Other (elaborate in descriptor **6.2 Remarks**)			

6.1.2 Higher level landform (general physiographic features)

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

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

6.1.3 Land element and position

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

1	Plain level	17	Interdunal depression
2	Escarpment	18	Mangrove
3	Interfluve	19	Upper slope
4	Valley	20	Midslope
5	Valley floor	21	Lower slope
6	Channel	22	Ridge
7	Levee	23	Beach
8	Terrace	24	Beachridge
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	30	Other (specify in appropriate section's Notes)
16	Longitudinal dune		

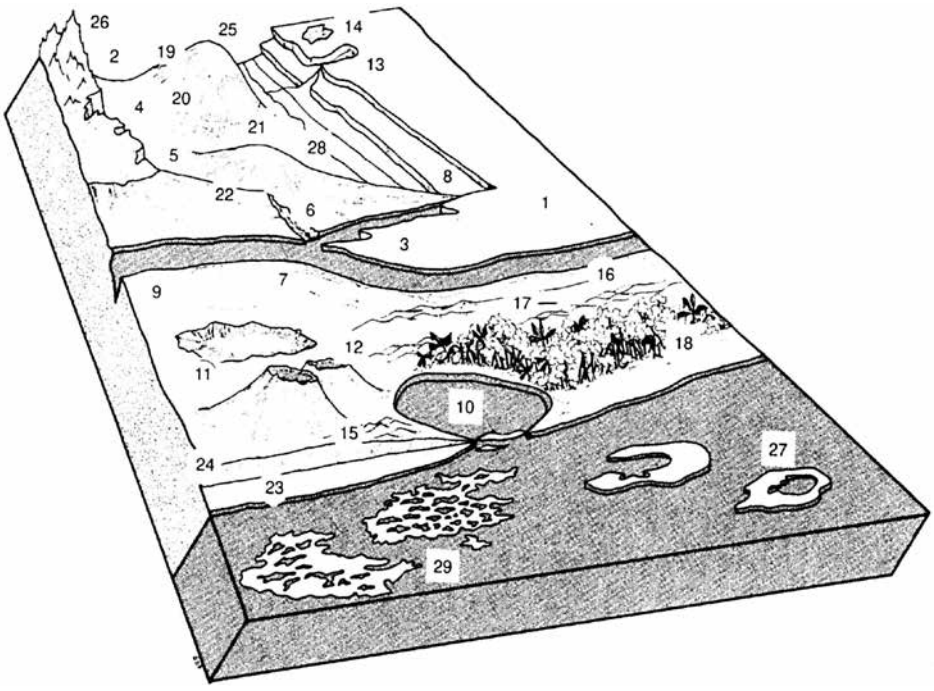

Fig. 1. Land element and position

6.1.4 Slope [°]

Estimated slope of the site.

6.1.5 Slope aspect

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

6.1.6 Land use classification

(From FAO, 2006).

6.1.6.1 Crop agriculture (if present)

1 Annual field cropping
2 Perennial field cropping
3 Tree and shrub cropping

6.1.6.2 Mixed farming

1 Agroforestry
2 Home garden
3 Agropastoralism/pasture

6.1.6.3 Forestry

1 Natural forest and woodland
2 Plantation forestry

6.1.6.4 Nature protection

1 Nature and game reserve, National park
2 Degradation control planting

6.1.6.5 Human Settlement

1 Village
2 Town
99 Other (e.g. 'in industrial area', 'riverside', specify in appropriate descriptor **Remarks**)

6.1.7 Overall natural vegetation surrounding and at the site (if present)

(Adapted from FAO, 2006).

10 Herbaceous
- 11 Grassland
- 12 Forb land

20 Closed forest (continuous tree layer, crowns overlapping, large number of tree and shrub species in distinct layers)

30 Woodland (continuous tree layer, crowns usually not touching, understory may be present)

40 Scrubland

50 Dwarf shrubs

99 Other (elaborate in appropriate descriptor **Remarks**)

6.1.8 Soil drainage

(Adapted from FAO, 2006).

3 Poorly drained

5 Moderately drained

7 Well drained

6.1.9 Soil matrix colour

(Adapted from FAO, 2006).

The colour of the soil matrix material in the root zone around the accession is recorded in moist condition (or both dry and moist condition, if possible) using the notation for hue, value and chroma as given in the Munsell Soil Color Charts (Munsell, 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

6.1.10 Soil texture classes

(Adapted from FAO, 2006). For convenience in determining the texture classes of the following list, particle size classes are given for each of the fine earth fractions 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
  10.1 Fine sandy loam
  10.2 Coarse sandy loam
11 Loamy sand
  11.1 Loamy very fine sand
  11.2 Loamy fine sand
  11.3 Loamy coarse sand
12 Sand (unspecified)
  12.1 Very fine sand
  12.2 Fine sand
  12.3 Medium sand
  12.4 Coarse sand

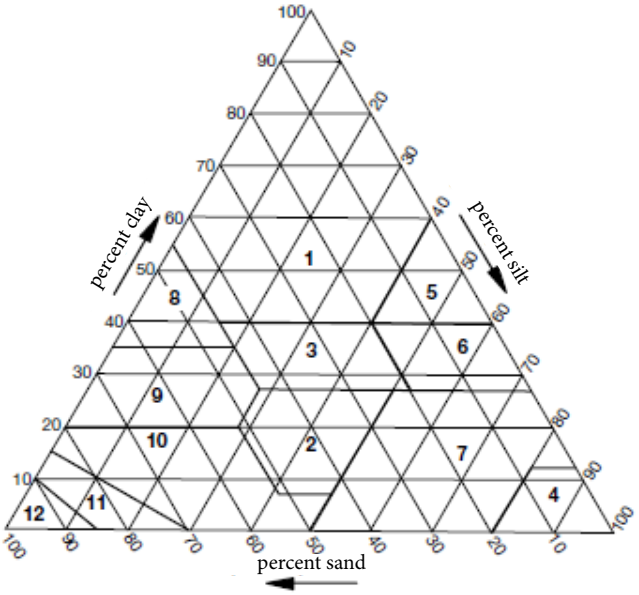

Fig. 2. Soil texture classes (adapted from FAO, 2006)

6.1.11 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

6.1.12 Water availability

1 Rainfed
2 Irrigated
3 Flooded
4 River banks
5 Sea coast
99 Other (specify in appropriate descriptor **Remarks**)

6.1.13 Soil fertility

General assessment of the soil fertility based on existing vegetation.

3 Low
5 Moderate
7 High

6.1.14 Climate of the site

Should be assessed as close to the site as possible.

6.1.14.1 Temperature [°C]

Provide either the monthly or the annual mean.

6.1.14.1.1 Number of recorded years

6.1.14.2 Duration of the dry season [d]

6.1.14.3 Rainfall [mm]

Provide either the monthly or the annual mean.

6.1.14.3.1 Number of recorded years

6.2 Remarks

Provide here any additional information related to the site (i.e. if data collected refers to collecting or to characterization/evaluation sites).

CHARACTERIZATION

7. Plant descriptors

List of minimum descriptors for baobab

Number	Name
Characterization	
7.1.8	Bark colour
7.2.2	Number of leaflets of mature leaves
7.2.8	Leaf taste
7.2.14	Mature leaf hairiness
7.2.17	Leaflet length [cm]
7.3.1	Fruit shape
7.3.2	Fruit apex shape
7.3.4	Fruit neck prominence
7.3.5	Fruit beak type
7.3.6	Fruit length [cm]
7.3.7	Fruit diameter 1 [cm]
7.3.10	Total weight of 10 fruits [g]
7.3.11	Pulp weight of 10 fruits [g]
7.3.12	Seed weight of 10 fruits [g]
7.3.17	Fruit cross section outline
7.3.21	Fruit shell thickness [mm]
7.3.25	Adherence of pulpy seed to fibre
7.3.26	Pulp colour of fresh fruit
7.3.27	Adherence of fruit pulp to seed (Scratch with your finger nails)
7.3.29	Pulp sweetness
7.3.30	Pulp sourness
7.3.31	Pulp bitterness
7.4.3	Number of seeds per fruit
7.4.4	Seed length [mm]
Evaluation	
8.1.1	Number of fruits per tree
8.1.2	Total fruit weight per tree [kg]
8.1.3	Regular bearer
8.2.2	Leaf protein content [g/100g FW]
8.2.3	Leaf β carotene content [mg/100g FW]
8.2.5	Leaf calcium content [mg/100g FW]

8.2.8	Leaf iron content [mg/100g FW]
8.2.9	Leaf zinc content [mg/100g FW]
8.3.3	Pulp sugar content [°Brix]
8.3.4	Pulp ascorbic acid content [mg/100g FW]
8.3.7	Pulp calcium content [mg/100g FW]
8.3.10	Pulp iron content [mg/100g FW]
8.4.3	Seed oil content [g/100 g FW]
9.1	Reaction to drought
9.2	Reaction to high temperature

7.1 Tree descriptors

7.1.1 Tree shape

(See Fig. 3).

1 Ellipsoid
2 Roundish
3 Semi-circular
4 Pyramidal
99 Other (e.g. 'irregular' specify in descriptor **7.5 Notes**)

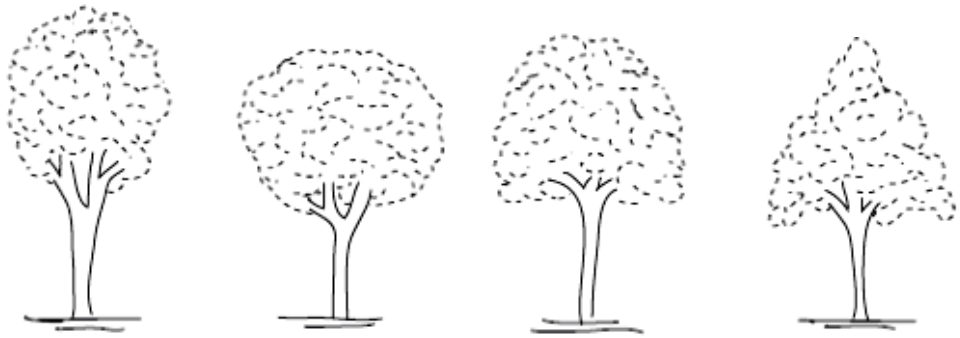

Fig. 3. Tree shape

7.1.2 Tree growth habit

(See Fig. 4).

1 Erect
2 Spreading
3 Drooping

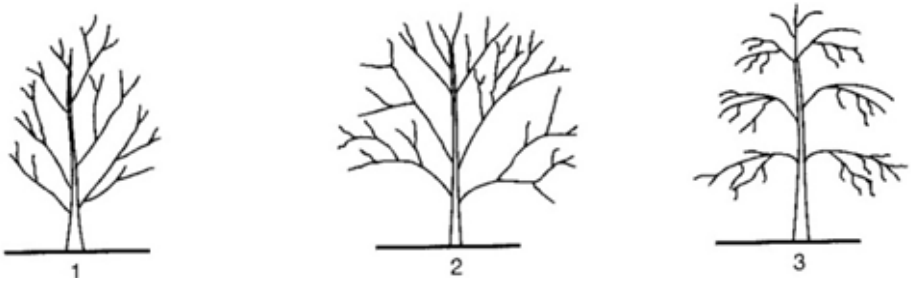

Fig. 4. Tree growth habit

7.1.3 **Tree height** [m]

Measured height of mature trees from ground level to the top of the tree.

7.1.4 **Crown diameter** [m]

Measured as the mean diameter using two directions.

7.1.5 **Trunk diameter** [cm]

Record diameter at breast height.

7.1.6 **Trunk shape**

(See Fig. 5).

1 Cylindrical
2 Bell-shaped
3 Cone-shaped
4 Concave

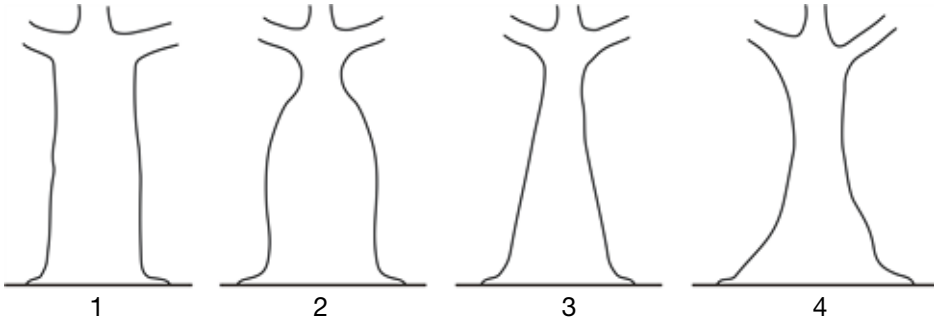

Fig. 5. Trunk shape

7.1.7 Density of main branches

3 Sparse
5 Medium
7 Dense

***7.1.8 Bark colour**

1 Grey
2 Brown
3 Reddish-brown
99 Other (specify in descriptor **7.5 Notes**)

7.1.9 Bark texture

1 Smooth
2 Rough

7.2 Leaf

7.2.1 Leaf attitude in relation to branch

(See Fig. 6).

1 Erect
2 Horizontal
3 Drooping
99 Other (specify in descriptor **7.5 Notes**)

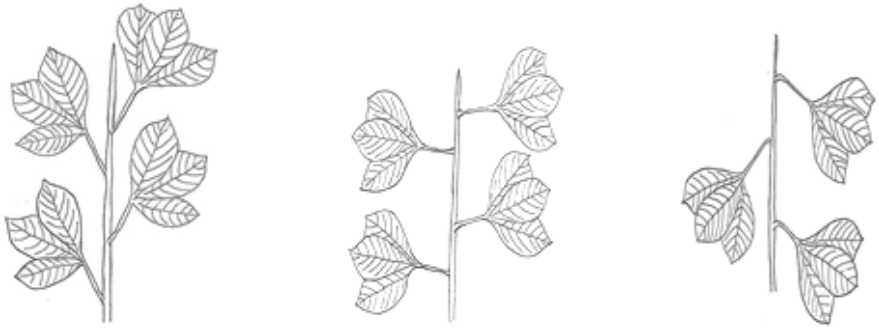

Fig. 6. Leaf attitude in relation to branch

***7.2.2 Number of leaflets of mature leaves**

(See Fig. 7).

1 Simple
2 Three leaflets
3 Five leaflets
4 Seven leaflets
99 Other (specify number of leaflets in descriptor **7.5 Notes**)

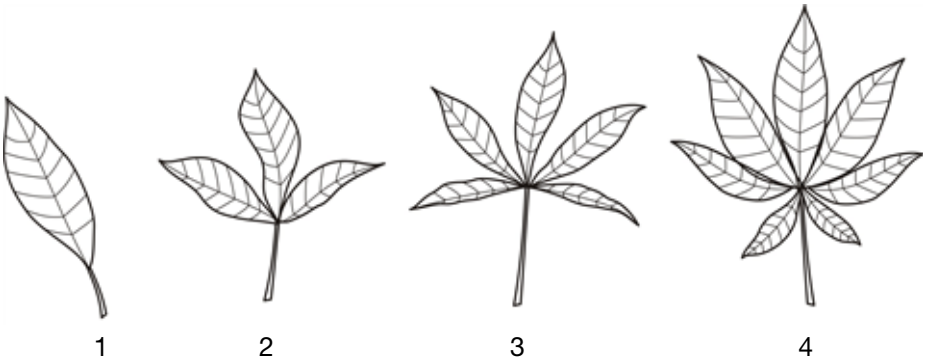

Fig. 7. Number of leaflets of mature leaves

7.2.3 Leaflet blade shape

(See Fig. 8).

1 Elliptic
2 Oblong
3 Ovate
4 Obovate
5 Lanceolate
99 Other (specify in descriptor **7.5 Notes**)

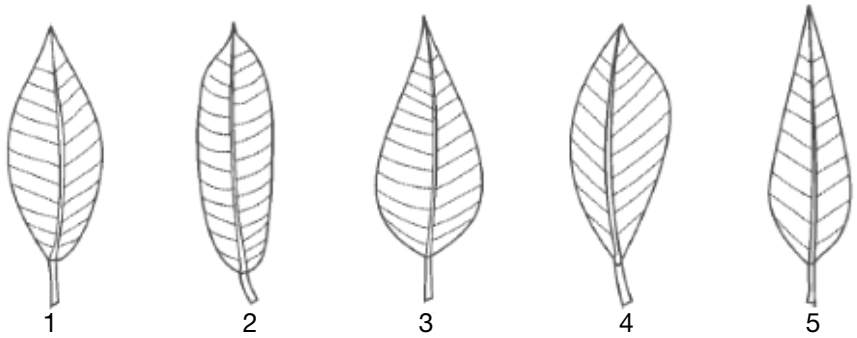

Fig. 8. Leaflet blade shape

7.2.4 Leaflet apex shape

(See Fig. 9).

1 Acute
2 Apiculate
3 Cuspidate
4 Obtuse / rounded
5 Acuminate

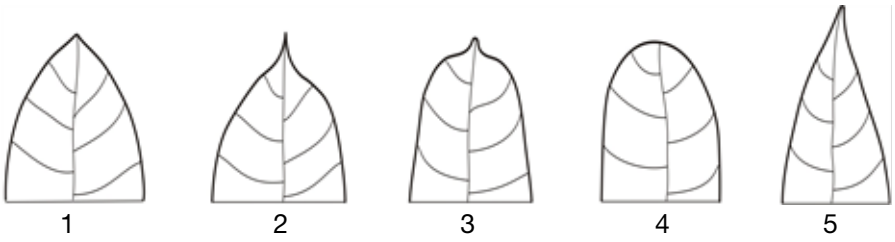

Fig. 9. Leaflet apex shape

7.2.5 Leaflet base shape

(See Fig. 10).

1 Acute
2 Attenuate
3 Acuminate

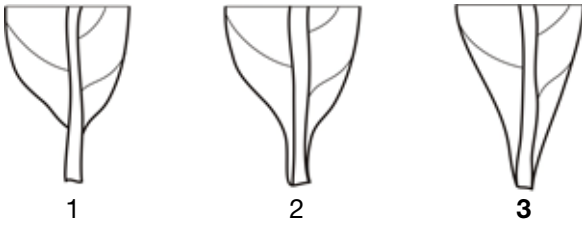

Fig. 10. Leaflet base shape

7.2.6 Leaflet margin

(See Fig. 11).

1 Entire
2 Undulate

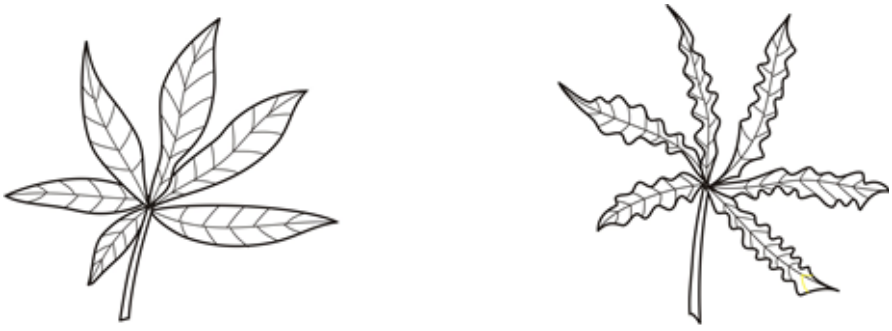

Fig. 11. Leaflet margin

7.2.7 Leaf fragrance

Recorded in fully developed mature leaf when crushed.

0 Absent
1 Mild
2 Strong

*7.2.8 Leaf taste

Test leaf sweetness by tasting / chewing the edible ones (those neither very mature nor too young).

1 Sweet
2 Sour
3 Bitter
4 Neutral
99 Other (describe in descriptor **7.5Notes**)

7.2.9 Young leaf sliminess

Test leaf sliminess by pressing leaf between the thumb and the first finger.

0 Absent (not slimy)
1 Slightly slimy
2 Moderately slimy
3 Very slimy

7.2.10 Mature leaf sliminess

0 Absent (not slimy)
1 Slightly slimy
2 Moderately slimy
3 Very slimy

7.2.11 Young leaf colour

If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes.

1 Pale green
2 Green

7.2.12 Mature leaf colour

If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes.

1 Pale green
2 Green
3 Dark green

7.2.13 Young leaf hairiness

Observed on the upper side of the leaf.

0 Absent
1 Slightly hairy
2 Hairy
3 Very hairy

*7.2.14 Mature leaf hairiness

Observed on the upper side of the leaf.

0 Absent
1 Slightly hairy
2 Hairy
3 Very hairy

7.2.15 Leaf petiole length [cm]

Randomly select 10 mature and healthy leaves and record the average petiole length. Measure from the base of the petiole to the base of leaflet petiole.

7.2.16 Leaflet petiole length [cm]

Take 10 middle leaflets from leaves selected in **7.2.15** and record the average leaflet petiole length. Measure from the base of the leaflet petiole to the base of leaf blade.

*7.2.17 Leaflet length [cm]

Take 10 middle leaflets from leaves selected in **7.2.15** and record the average leaflet length. Measure from the base of the leaf blade to the leaf tip.

7.2.18 Leaflet width [cm]

Take 10 middle leaflets from leaves selected in **7.2.15** and record the average leaflet width. Measure in the widest part.

7.2.19 Dry-season leaf retention

0 No
1 Yes

7.3 Fruit

Randomly select 10 mature and healthy fruits at least with their pedicels per tree and record the average.

*7.3.1 Fruit shape

Record the predominant shape using 10 fruits per tree. (See Fig. 12).

1 Oblong
2 Oblong compressed
3 Ellipsoid
4 Globose
5 Obpyriform (pear-shaped)
6 Reniform (kidney-shaped)
7 Crescent-shaped
8 Ovate
9 Obovate
99 Other (i.e. 'irregular'specify in descriptor **7.5 Notes**)

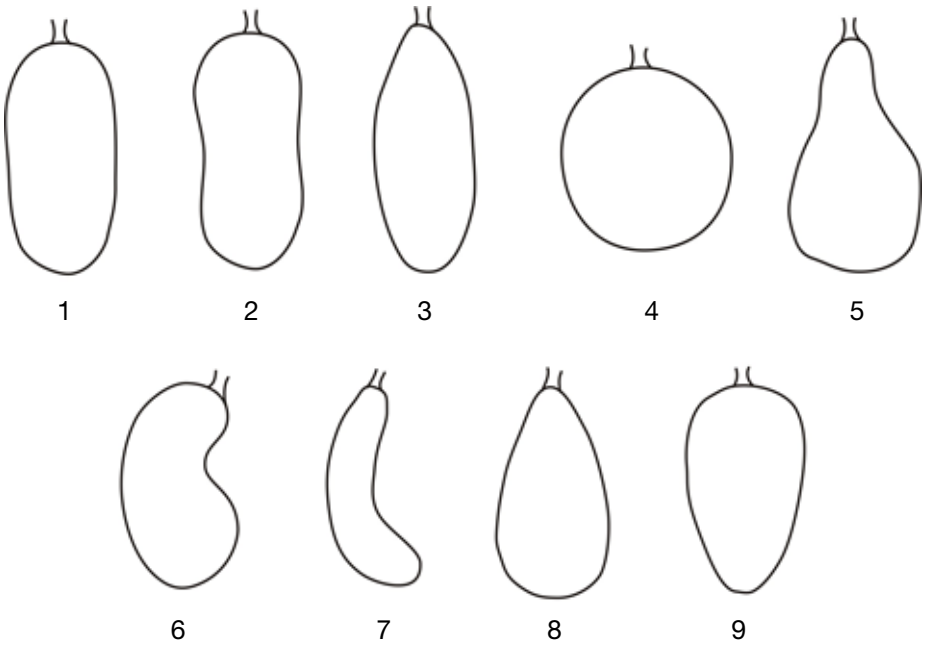

Fig. 12. Fruit shape

*7.3.2 Fruit apex shape

(See Fig. 13).

1 Acute
2 Obtuse
3 Round
4 Depressed
99 Other (specify in descriptor **7.5 Notes**)

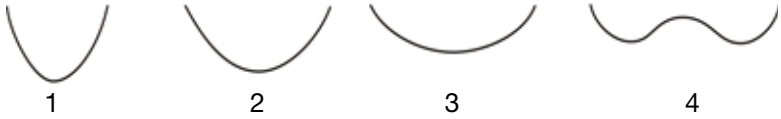

Fig. 13. Fruit apex shape

7.3.3 Fruit pedicel insertion

(See Fig. 14).

1 Vertical
2 Slightly oblique
3 Oblique

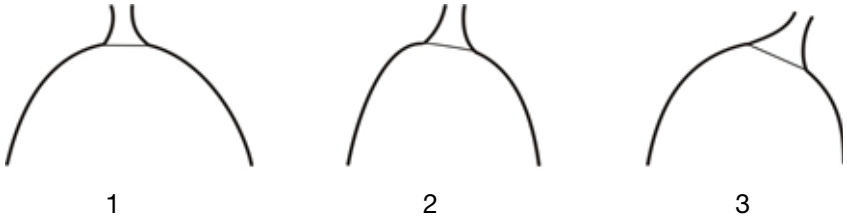

Fig. 14. Fruit stalk insertion

*7.3.4 Fruit neck prominence

(See Fig. 15).

0 Absent
1 Slightly prominent
2 Prominent
3 Very prominent

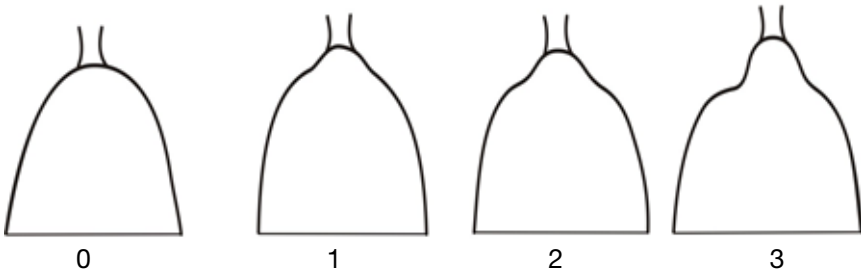

Fig. 15. Fruit neck prominence

***7.3.5 Fruit beak type**

(See Fig.16).

0 Absent
1 Perceptible
2 Pointed
3 Prominent

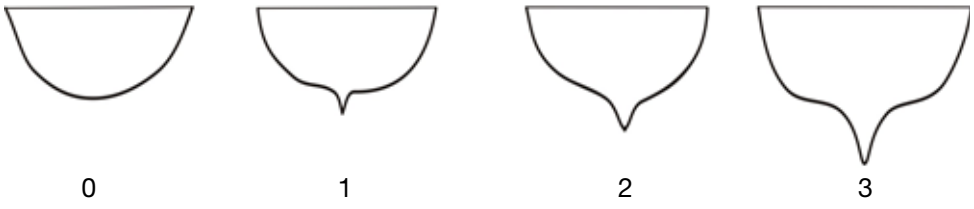

Fig. 16. Fruit beak type

***7.3.6 Fruit length** [cm]

Measured from the base to the tip of the fruit.

***7.3.7 Fruit diameter 1** [cm]

Measured at the widest point.

7.3.8 Fruit diameter 2 [cm]

Measured at 90° from the first measurement at the widest point.

7.3.9 Fruit pedicel length [cm]

Measured at the longest length, but only if the complete pedicel is available.

***7.3.10 Total weight of 10 fruits** [g]

***7.3.11 Pulp weight of 10 fruits** [g]

Remove the pulp-covered seeds and the fibre from the opened fruit shell, separate the pulp from the seeds by using a wooden mortar and pestle (or similar tools) without crushing the seeds, then sieve the pulp powder and determine its weight.

***7.3.12 Seed weight of 10 fruits** [g]

Remove the fibres from the sieved seeds (see above), wash the seeds to remove remaining pulp, dry the seeds and determine their weight.

7.3.13 Fruit shell weight of 10 fruits [g]

7.3.14 Fruit shell hairiness

0 Not hairy
1 Partly hairy
2 Evenly hairy

7.3.15 Colour of hairs on the fruit skin

If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes:

1 Green
2 Grey
3 Yellowish
99 Other (specify in descriptor **7.5 Notes**)

7.3.16 Fruit ground colour

Remove all the hairs to observe colour of the skin. If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes.

1 Black
2 Brown
3 Green
4 Gray
5 Yellowish
99 Other (specify in descriptor **7.5 Notes**)

***7.3.17 Fruit cross section outline**

(See Fig. 17).

1 Not contoured
2 Shallowly contoured
3 Deeply contoured

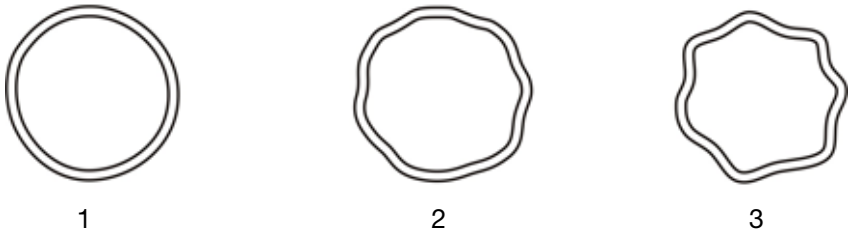

Fig. 17. Fruit outline

7.3.18 Number of segments per fruit

Record the average number of segments per fruit (fruit cross section).

7.3.19 Fruit shell surface texture

1 Smooth
2 Wrinkled

7.3.20 Fruit shell hardness to crack

Use fingers to determine shell hardness by breaking a piece of shell.

1 Easily cracked
2 Slightly hard
3 Hard
4 Very hard

*7.3.21 Fruit shell thickness [mm]

Measured at the centre of fruit.

7.3.22 Fibre colour

Observe fibres in the central part inside the fruits. If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes:

1 White
2 Cream
3 Orange
4 Brown
99 Other (specify in descriptor **7.5 Notes**)

7.3.23 Adherence of fibre to fruit shell

3 Weak
5 Intermediate
7 Strong

7.3.24 Texture of fibres in fruit

1 Soft
2 Intermediate
3 Coarse

***7.3.25 Adherence of pulpy seed to fibre**

3 Weak
5 Intermediate
7 Strong

***7.3.26 Pulp colour of fresh fruit**

If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes.

1 White
2 Cream
3 Light orange
4 Dark orange
99 Other (specify in descriptor **7.5 Notes**)

***7.3.27 Adherence of fruit pulp to seed**

(Scratch with your finger nails).

0 Absent
3 Weak
5 Intermediate
7 Firm / Strong

7.3.28 Pulp texture of ripe fruit

3 Soft
5 Intermediate
7 Firm

***7.3.29 Pulp sweetness**

0 Absent
3 Slightly sweet
5 Sweet
7 Very sweet

***7.3.30 Pulp sourness**

0 Absent
3 Slightly sour
5 Sour
7 Very sour

***7.3.31 Pulp bitterness**

0 Absent
3 Slightly bitter
5 Bitter
7 Very bitter

7.3.32 Pulp aroma / scent

0 Absent
1 Mild
2 Perceptible
3 Strong

7.4 Seed traits

Randomly select 10 healthy seeds out of the total seeds from the 10 collected fruits from one tree.

7.4.1 Seed coat colour

If possible use colour codes from the Royal Horticultural Society. If these are not available, use the following colour codes:

1 Dark brown
2 Reddish black
99 Other (specify in descriptor **7.5 Notes**)

7.4.2 Seed shape

(See Fig. 18.).

1 Oblong
2 Reniform (kidney-shaped)
3 Very reniform

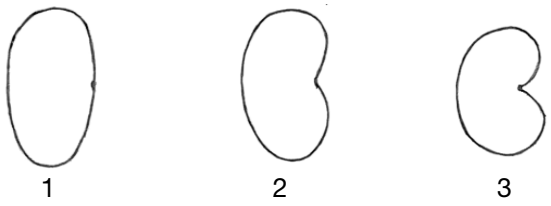

Fig. 18. Seed shape

99 Other (specify in descriptor **7.5 Notes**)

***7.4.3 Number of seeds per fruit**

Average of 10 fruits.

***7.4.4 Seed length** [mm]

Average of 10 seeds.

7.4.5 Seed width [mm]

Measured at the widest point of the seed; average of 10 seeds.

7.4.6 Seed thickness [mm]

Measured at 90º from the measurement of seed width; average of 10 seeds.

7.4.7 Seed coat texture

(Thin coat of the seed).

1 Soft/smooth
2 Coarse/rough

7.4.8 Seed testa hardness

(Hard shell below the coat). Scarify several seeds with knife and finger, press with probe / penetrometer to quantify pressure needed to break testa.

3 Soft
5 Intermediate
7 Hard
9 Very hard

7.4.9 Colour of endosperm

Scarify seeds to reveal endosperm.

1 White
2 Grey
99 Other (specify in descriptor **7.5 Notes**)

7.4.10 Proportion of endosperm to whole seed [%]

Scarify seeds to reveal endosperm.

1 < 25%
2 26 – 50%
3 51 – 75%
4 >75%

7.5 Notes

Specify any additional information here.

EVALUATION

8. Tree descriptors

8.1 Agronomic characters

***8.1.1 Number of fruits per tree**

Count only mature fruits.

***8.1.2 Total fruit weight per tree** [kg]

***8.1.3 Regular bearer**

0 No
1 Yes

8.1.4 Fruit maturity period

1 Early
2 Medium
3 Late

Chemical analysis

8.2 Leaf nutrient content

Edible portion of fresh, raw leaves for human consumption.

8.2.1 Leaf water content [g/100g FW]

***8.2.2 Leaf protein content** [g/100g FW]

***8.2.3 Leaf β carotene content** [mg/100g FW]

8.2.4 Leaf ash content [g/100g FW]

8.2.5 Leaf calcium content [mg/100g FW]

8.2.6 Leaf potassium content [mg/100g FW]

8.2.7 Leaf magnesium content [mg/100g FW]

***8.2.8 Leaf iron content** [mg/100g FW]

***8.2.9 Leaf zinc content** [mg/100g FW]

8.3 Pulp nutrient content

Edible portion of raw pulp from mature fruits.

8.3.1 Pulp water content [g/100g FW]

8.3.2 Pulp protein content [g/100g FW]

***8.3.3 Pulp sugar content** [°Brix]

***8.3.4 Pulp ascorbic acid content** [mg/100g FW]

8.3.5 Pulp total acidity [g Eq. citric acid/100g FW]

8.3.6 Pulp ash content [g/100g FW]

***8.3.7 Pulp calcium content** [mg/100g FW]

8.3.8 Pulp potassium content [mg/100g FW]

8.3.9 Pulp magnesium content [mg/100g FW]

***8.3.10 Pulp iron content** [mg/100g FW]

8.3.11 Pulp zinc content [mg/100g FW]

8.3.12 Quantity of fibres in fruit

3 Low
5 Intermediate
7 High

8.3.13 Pulp total soluble solids [%]

Recorded as percentage solids read directly from a Brix Scale superimposed over the refractive index scale.

8.4 Seed nutrient content

Edible portions of fresh and raw seeds.

8.4.1 Seed water content [g/100g FW]

8.4.2 Seed protein content [g/100g FW]

***8.4.3 Seed oil content** [g/100g FW]

8.4.4 Seed ash content [g/100g FW]

8.4.5 Seed calcium content [mg/100g FW]

8.4.6 Seed potassium content [mg/100g FW]

8.4.7 Seed magnesium content [mg/100g FW]

8.4.8 Seed iron content [mg/100g FW]

8.4.9 Seed zinc content [mg/100g FW]

8.4.10 Seed aminoacid composition [mg/100g DW]
Estimate essential amino acids in seed sample.

8.5 Notes
Specify any additional information here.

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

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

***9.1 Reaction to drought**

***9.2 Reaction to high temperature**

9.3 Reaction to low temperature

9.4 Reaction to excessive rainfall

9.5 Reaction to flooding

9.6 Reaction to soil salinity

9.7 Remarks
Specify any additional information here.

10. Biotic stress susceptibility
In each case, it is important to state the origin of the infestation or infection, i.e. natural, field inoculation, laboratory. Record such information in descriptor **10.3 Remarks**. These are coded on a susceptibility scale from 1 to 9, viz:

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

10.1 Pests and diseases

	Causal Organism	Common name
10.1.1	*Heliothis armigera*	Cotton bollworm
	Diparopsis castanea	Red bollworm
	Earias biplaga	Spiny bollworm
10.1.2	*Dysdercus fasciatus*	Cotton-stainer bugs
	D. intermedius	
	D. nigrofasciatus	
	D. superstitiosus	
	Odontopus exsanguinis	
	O. sexpunctatus	
	Oxycarenus albidipennis	
10.1.3	*Podagrica* spp.	Flea beetle
10.1.4	*Analeptes trifasciata*	Longhorn beetle

10.2 Fungi
10.2.1 *Daldinia concentrica*
10.2.2 *Trametes socotrana*

10.3 Remarks
Specify any additional information here.

11. Biochemical markers

Specify methods used and cite reference(s). Refer to *Descriptors for genetic marker technologies*, available in PDF format from Bioversity International web site (http://www.bioversityinternational.org/) or by email request to bioversityinternational-publications@cgiar.org.

12. Molecular markers

Refer to *Descriptors for genetic marker technologies*, available in PDF format from Bioversity International web site (http://www.bioversityinternational.org/) or by email request to bioversityinternational-publications@cgiar.org.

13. Cytological characters

13.1 Chromosome number

13.2 Ploidy level

13.3 Other cytological characters

14. Identified genes

Describe any specific identified gene present in the accession.

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Annex I: COLLECTING FORM for baobab

==========

SAMPLE IDENTIFICATION

COLLECTING INSTITUTE CODE (2.1):

COLLECTING NUMBER (2.2):

PHOTOGRAPH No (2.23): HERBARIUM SPECIMEN (2.24):

COLLECTING DATE OF SAMPLE [YYYYMMDD] (2.3):

GENUS (1.6): SPECIES (1.7): SUBTAXON (1.8):
COMMON TREE/CROP NAME (1.10.3):

==========

COLLECTING SITE LOCATION

COUNTRY OF ORIGIN (2.5):

LOCATION (2.7): km: direction: from:

LATITUDE (2.8/a): LONGITUDE (2.9/a): ELEVATION (2.13): m asl

Additional notes:

==========

COLLECTING SITE ENVIRONMENT

COLLECTING/ACQUISITION SOURCE (2.14):
10. Wild habitat
20. Farm or cultivated habitat
30. Market or shop
40. Institute, Experimental station, Research Org., Genebank
50. Seed company
60. Weedy, disturbed or ruderal habitat
99. Other (specify):

HIGHER LEVEL LANDFORM (6.1.2):
1. Plain 2. Basin 3. Valley 4. Plateau
5. Upland 6. Hill 7. Mountain:

SLOPE [°] (6.1.4): SLOPE ASPECT (6.1.5): (code N,S,E,W)

SOIL TEXTURE CLASSES (6.1.10): Specify class (e.g. clay, silt, loamy sand)

OVERALL NATURAL VEGETATION SURROUNDING AND AT THE SITE (IF PRESENT) (6.1.7):
11.Grassland 12.Forbland 20.Closed forest 30.Woodland
40.Scrubland 50.Dwarf shrubs 99.Other (specify):

SOIL DRAINAGE (6.1.8):
3.Poorly drained 5.Moderately drained 7.Well drained

==========

SAMPLE

BIOLOGICAL STATUS OF ACCESSION (2.15):
100. Wild
200. Weedy
300. Traditional cultivar/landrace
400. Breeding/research material
500. Advanced/improved cultivar (conventional breeding)
600. GMO (by genetic engineering)
999. Other (specify):

TYPE OF SAMPLE COLLECTED (2.17):
1.Vegetative 2.Seed 3. Pollen 4. *In vitro* 99.Other (specify):

No. of PLANTS SAMPLED (2.18): No. of SEEDS COLLECTED (2.19):

GENERAL APPEARANCE OF POPULATION (2.20):
3.Poor 5.Medium 7.Good

POPULATION ISOLATION (2.21) [km]

PREVAILING STRESSES (2.22.7):
Information on main associated biotic (pests and diseases) and abiotic (drought, salinity, temperature) stresses

==========

ETHNOBOTANICAL DATA

LOCAL/VERNACULAR NAME (2.22.2):

ETHNIC GROUP (2.22.1):

PARTS OF THE PLANT USED (2.22.4):
1.Fruit 2.Seed 3.Leaf 4. Bark 5. Trunk 6. Root 99.Other (specify):

PLANT USE (2.22.5):

1. Raw fruit pulp as a snack
2. Juice or sauce for porridge
3. Processed fruit pulp as a sweet/ice cream
4. Raw leaves as salad
5. Cooked fresh leaves as a vegetable/sauce
6. Dried powdered leaves as a soup/sauce ingredient
7. Seeds (raw or roasted) as a snack or as soup/sauce ingredient
8. Pressed seed oil as cooking oil
9. Medicinal
10. Industrial (oil for cosmetics, fruit shells for handicrafts)
99. Other (elaborate):

CULTURAL CHARACTERISTICS (2.22.6): Mention if there is any folklore (i.e., taboos, stories and/or superstitions)
0. No 1. Yes: specify in REMARKS (2.25)

CULTURAL PRACTICES (2.22.8):
Sowing date [YYYYMMDD] (2.22.8.1):

Start of fruit harvest season [YYYYMMDD] (2.22.8.2):

End of fruit harvest season [YYYYMMDD] (2.22.8.3):

MODE OF REPRODUCTION (2.22.10):
1.Vegetative 2.Seed 3.Both

SEASONALITY (2.22.12):
1.Available only in season/at particular period 2.Available throughout the year

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ASSOCIATED FLORA (2.22.11):
Other dominant crop/or wild plant species, including other *Adansonia* species, found in and around the collecting site

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REMARKS (2.25):

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