IPGRI

Descriptors for

Shea tree
(*Vitellaria paradoxa*)

MINISTERIO DE EDUCACIÓN Y CIENCIA

INIA
Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

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. pumilia* (E)	1985
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
Tropical fruit * (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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Shea tree

(Vitellaria paradoxa)

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Citation: IPGRI, INIA. 2006. Descriptors for Shea tree *(Vitellaria paradoxa)*. International Plant Genetic Resources Institute, Rome, Italy; Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, Madrid, Spain

ISBN-13: 978-92-9043-687-4
ISBN-10: 92-9043-687-5

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PREFACE

Descriptors for Shea tree (*Vitellaria paradoxa*) is the first publication devoted to the sub-Saharan African local tree species and it is expected that descriptors for other native tree species in the region will follow. This document was developed by Michael Mbogga and Oscar Eyog-Matig; Adriana Alercia provided scientific and technical expertise, and supervised and coordinated the production of the publication.

Because *Vitellaria* seeds are very recalcitrant, there are only a few in-vivo collections, it takes many years to attain maturity from seed and it is difficult to get progeny from genotype. The authors felt compelled to develop this Descriptor List because variations exist not only among populations but also among individual trees - users working on genetic diversity of shea tree should not confuse varieties within the species.

A draft version prepared in the internationally accepted IPGRI format for descriptor lists was sent to a number of experts for their comments and feedback, which where used to produce the definitive list. A full list of the names and addresses of those involved is given in the 'Contributors' section.

IPGRI encourages the collecting 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 tree species and their importance to the tree's description. Descriptors listed under *Evaluation* allow for a more extensive description of the 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 should be produced by closely following the descriptor list with regard to ordering and numbering descriptors, using the descriptors specified, and using the descriptor states recommended.

This descriptor list is intended to be comprehensive for the descriptors that it contains. This approach assists with the standardization of descriptor definitions. IPGRI, however, does not assume that curators 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. Highly discriminating descriptors are marked as highlighted text to facilitate selection of descriptors and are listed in Annex I.

Multicrop passport descriptors were developed jointly by IPGRI and FAO, to provide consistent coding schemes for common passport descriptors across crops. They are marked

in the text as [MCPD]. Please note that owing to the generic nature of the 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 a Collecting form for shea tree that will facilitate data collection.

Any suggestions for improvement on the Descriptors for shea tree will be highly appreciated by IPGRI and INIA.

INTRODUCTION TO SHEA TREE

The shea-nut tree, *Vitellaria paradoxa* Gaertn, is a major component of the woody flora of the Sudan and Guinea savannah vegetation zones of sub-Saharan Africa. (Lovett and Haq, 2000). *V. paradoxa* is indigenous to sub-Saharan Africa, and generally only found in semi-arid to arid areas north of the humid forest zone (CABI, 2003). The species' range forms an almost unbroken belt approximately 5,000 km long by 500 km wide from Senegal to Uganda (Bonkoungou, 1987). The most important product of *V. paradoxa* is shea butter (francophone: le beurre de Karité), which is extracted from the dried kernels. This oil is widely utilized locally for domestic purposes such as cooking, as a skin moisturizer and as an illuminant (Lovett and Haq, 2000). Shea butter is also utilized commercially as an ingredient in cosmetic, pharmaceutical and edible products (Abbiw, 1990).

Different names used for *Vitellaria paradoxa* Gaertn. F.

Vitellaria paradoxa C. F. Gaertn., Fruct. 3: 131, t. 205. 1807

Lucuma paradoxa (C. F. Gaertn.) A. DC., Prodr. 8: 173. 1844

Butyrospermum paradoxum (C. F. Gaertn.) Hepper in Taxon 11: 227. 1962. - Holotype: Single seed of unknown origin (P). - Epitype: "Interior of Africa, *Mungo Park* (BM).

subsp. ***paradoxa***

Bassia parkii G. Don, Gard. Dict. 4: 36, 1838. *Butyrospermum parkii* (G. Don) Kotschy, Sitzungsber. Kaiserl. Akad. Wiss., Math-Naturwiss. Cl., Abt. 1, 50(1): 359, t. 2. 1865. *B. paradoxum* (C. F. Gaertn.) Hepper, Taxon 11: 227. 1962. *B. paradoxum* subsp. *parkii* (G. Don) Hepper, Taxon 11: 227. 1962.

subsp. ***nilotica*** (Kotschy) Henry, Chithra et Nair, comb. nov. 1983

Butyrospermum niloticum Kotschy, Sitzungsber. Kaiserl. Akad. Wiss., Math-Naturwiss. Cl., Abt. 1, 50(1): 358. 1865. *B. parkii* subsp. *niloticum* (Kotschy) Hemsley, Kew Bull. 15: 290. 1961. *B. paradoxum* subsp. *niloticum* (Kotschy) Hepper, Taxon 11: 227. 1962.

(Henry *et al*., 1983; Hall & Hindle, 1995)

The subsp. *nilotica* (from east Africa) is distinguished from the subsp. *paradoxa* (from West Africa) by dense ferruginous *indumentum* on pedicels and outer sepals, the constituent hairs being long and spreading and imparting a woolly appearance to these parts, especially in the bud stages. In addition, the flowers tend to be larger, with style lengths from 12-15 cm in paradoxa (Hemsley, 1968).

Other names
Shea-butter tree (English), se (Bambara) Ka'danya (Hausa), kareje (Fulani), lulu (Arabic), karité (French). Bambara = chii, sarakolé = karté, malinké = sié.

Origin

Shea-butter tree is found in areas with 400-1800 mm rainfall per year. The species is of African origin. Its distribution area spreads from Senegal to Uganda (West-East Africa) and up to the Adamaoua Province in Cameroon (North-South Africa). The locations from which Shea germplasm was introduced to other countries in Africa is not well known due to vegetation changes. The species has probably spread out from refugia. Secondly, there have been aspects of human management that suggest semi-domestication is ongoing.

Uses

The fruit when very ripe is either eaten as a snack, but it is also a famine food. It can be eaten raw or lightly cooked. The pulp can be processed into juice. According to McAllan *et al*. 1996 the pulp could be also removed by fermentation. The nuts are laid out to dry in the sun. The kernels are extracted usually before the butter making starts, by cracking open the nuts with stones or gently pounding in a mortar and the powder is made into butter. Shea-butter, or shea-oil, is used in factories to produce baking fat, margarine, cocoa butter substitutes and various moisturing beauty and pharmaceutical products. Well made, the butter can be stored for many months if wrapped in leaves and kept cool.

The unsaponifiable components are used to cure third degree burned victims while the butter is widely used for cooking African foods, traditional medicines and is more and more incorporated in chocolate. The leaves constitute a good forage for animal feeding. They are also used to improve soil fertility. The wood is termite-resistant and is used as building poles.

An edible caterpillar (McAllan *et al*., 1996) which feeds only *Vitellaria paradoxa* is dried and sold in the markets of some countries. It is rich in protein.

The oldest known botanical specimen of *Vitellaria* was apparently collected by Mungo Park, and is currently held in the Natural History Museum in London (Hall *et al*, 1996).

Early commercial interest in the shea butter resource among European manufacturers is evident from many reports written during the first quarter of the 20th century. The monograph by Vuillet (1911), underlines French awareness of the importance and future potential of the shea butter tree. Vuillet's book, illustrated with early photographs, and apparently the first monographic account of any wild tropical African tree, gives detailed chemical analyses of the nut, butter, oil, cake and latex. It also contains much information on trade within West Africa and with Europe.

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 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.

Characterisation 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 and listed in Annex I.

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 Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the section where it is used);

(d) the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries* is 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; (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 Linear
2 Elliptic
3 Lanceolate

(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 FAO website (http://apps3.fao.org/views). If new Institute Codes are required, they can be generated online by national WIEWS administrators.

1.2 Accession number [MCPD]

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

Name of the institution or individual responsible for donating the germplasm.

1.4 Donor accession number [MCPD]

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

1.5 Donor Institute code [MCPD]

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

1.6 Curator's name

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

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

Any other identification (numbers) known to exist in other collections for this accession. Use the following system: INSTCODE: ACCENUMB; INSTCODE: ACCENUMB; … INSTCODE and ACCENUMB follow the standard described above and are separated by a colon. Pairs of INSTCODE and ACCENUMB are separated by a semicolon without space. When the institute is not known, the number should be preceded by a colon.

1.8 Scientific name

1.8.1 Genus [MCPD]

Genus name for taxon. Initial uppercase letter required.

1.8.2 Species [MCPD]

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

1.8.2.1 Species authority [MCPD]

Provide the authority for the species name

1.8.3 Subtaxa [MCPD]

Subtaxa can be used to store any additional taxonomic identifier.

1.8.3.1 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).

1.8.3.2 Subtaxon name

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

1.8.3.3 Subtaxon authority

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 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'.

1.10 Cultivar origin

1 Open pollination
2 Artificial pollination
3 Clonal selection

1.11 Accession

1.11.1 Accession name [MCPD]

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

1.11.2 Synonyms

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

1.12 Common tree name [MCPD]

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

1.13 Acquisition date [YYYYMMDD] [MCPD]

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

1.14 Accession size

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

1.15 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 **1.16 Remarks**)

1.16 Remarks

The Remarks field is used to add notes or to elaborate on descriptors with value "99" (= Other)

2. Collecting descriptors

2.1 Collecting institute(s)

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

2.1.1 Collecting institute code [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. It follows the Institute Code standard. (See instructions under Institute code, **1.1**).

2.2 Site number

Number assigned to the physical site by the collector.

2.3 Collecting number [MCPD]

Original number assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number. This number is essential for identifying duplicates held in different collections.

2.4 Collecting date of sample [YYYYMMDD] [MCPD]

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

2.5 Country of origin [MCPD]

Code of the country in which the sample was originally collected. Use the three-letter abbreviations 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

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 county in which the sample was collected.

2.8 Location of collecting site [MCPD]

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

2.9 Latitude of collecting site[1] [MCPD]

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

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[1] To convert 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 the Northern and Eastern hemispheres and h=–1 for the Southern and Western hemispheres, i.e. 30°30’0” S = –30.5 and 30o15’55” N = 30.265.

2.10 Longitude of collecting site[1] [MCPD]
Degree (3 digits), minutes (2 digits) and seconds (2 digits) followed by E (East) or W (West) (e.g. 0762510W). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 076----W)

2.11 Elevation of collecting site [m asl] [MCPD]
Elevation of collecting site expressed in meters above sea level. Negative values are allowed.

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

10) Wild habitat
    11 Forest/woodland
    12 Shrubland
    13 Grassland/rangeland
    14 Desert/tundra
    15 Aquatic habitat
20) Farm or cultivated habitat
    21 Field
    22 Orchard
    23 Backyard, kitchen or home garden (urban, peri-urban or rural)
    24 Fallow land
    25 Pasture
    26 Farm store
    27 Threshing floor
    28 Park
    29 Agroforestry parklands
30) Market or shop
31) Town
32) Village
33) Urban area (around city)
34) Other exchange system
40) Institute, Experimental station, Research organization, Genebank
50) Seed company
60) Weedy, disturbed or ruderal habitat
    61 Roadside
    62 Field margin
99) Other (specify in descriptor **2.22 Remarks**)

2.13 Collecting source environment
Use descriptors **6.1.1** to **6.2** in section **6**

2.14 Type of sample

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

1 Vegetative
2 Seed/seedling
3 Pollen
4 *In vitro* culture (specify which part of the plant is used in descriptor **2.22 Remarks**)
99 Others (specify in descriptor **2.22** 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
200) Weedy
300) Traditional cultivar/landrace
400) Breeding/research material
  410 Breeder's line
    411) Synthetic population
    412) Hybrid
    413) Founder stock/base population
    414) Inbred line (parent of hybrid cultivar)
    415) Segregating population
  420 Mutant/genetic stock
500) Advanced/improved cultivar
999) Other (Elaborate in descriptor **2.22 Remarks**)

2.16 Breeding institute code [MCPD]

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

2.17 Ethnobotanical data

2.17.1 Ethnic group

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

2.17.2 Local vernacular name

Name given by farmer to *Vitellaria paradoxa*. State local language and/or dialect if the ethnic group is not provided.

2.17.3 Translation

Provide translation of the local name into English, if possible

2.17.4 Shea tree varietal name meaning

Does the shea-butter tree name have a meaning? If yes, describe it briefly in descriptor **2.22 Remarks**

0 No
1 Yes

2.17.5 History of plant use

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

2.17.6 Parts of the plant used

1 Seed
2 Root
3 Trunk
4 Bark (medicinal properties)
5 Leaf
6 Flower/inflorescence
7 Fruit
99 Other (i.e. latex, specify in descriptor **2.22 Remarks**)

2.17.7 Plant uses

1 Food
2 Forage
3 Fuel
4 Medicine
5 Wood/timber
6 Dye
7 Pesticide
8 Cosmetic, moisturiser, soap
99 Other (specify in descriptor **2.22 Remarks**)

2.17.8 Frequency of use of the plant

1 Daily
2 Weekly
3 Seasonal
3 Occasional
99 Other (specify in descriptor **2.22 Remarks**)

2.17.9 Cooking methods

1 Boiling
2 Baking
3 Frying
4 Preserving
5 Processing (to produce butter)
99 Other (specify in descriptor **2.22 Remarks**)

2.17.10 Special uses

1 Children
2 Older persons
3 Feasts
4 Chiefs
99 Other (specify in descriptor **2.22 Remarks**)

2.17.11 Cultural characteristics

Is there folklore associated with the collected shea tree type? (e.g. taboos, stories and/or superstitions). If so, describe it briefly in descriptor **2.22 Remarks**

0 No
1 Yes

2.17.12 Shea tree popularity

Is the variety popular and widely grown? If yes, describe briefly the reasons in descriptor **2.22 Remarks**

0 No
1 Yes

2.17.13 Preferred growing conditions

If yes, describe farmer's perceptions on hardiness of the variety in relation to main stresses in descriptor **2.22 Remarks**

0 No
1 Yes

2.17.14 Prevailing stresses

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

2.17.15 Cultural methods

2.17.15.1 Silvicultural system (e.g. agroforestry parklands)

2.17.15.1.1 Monoculture [specify spacing, i.e. in Sahelian zone, for tree plantation (monoculture), the spacing advised is 4 x 4 m (625 trees per ha) to end (adult plantation) after thinning with 150 trees per ha]

2.17.15.1.2 Multi-species (specify species)

2.17.15.1.3 Agropastoralism (specify type of animals)

2.17.15.1.4 Natural stands (i.e. wild types topworked with cultivar/self sown trees retained in homesteads)

2.17.15.2 Propagation method

Method used to propagate trees

1 Seed
2 Grafting (specify type of grafting and the species, hybrid and/or clone used as rootstock, in descriptor **2.22 Remarks**)
3 Cutting
4 Budding
5 Layering
6 Tissue culture (specify which part of plant used, in descriptor **2.22** Remarks)
99 Other (specify in descriptor **2.22 Remarks**)

2.17.15.3 Irrigation

1 Rain-fed
2 Irrigated (specify average annual amount of water supplied per hectare)
99 Other (specify in descriptor **2.22 Remarks**)

2.17.16 Associated flora

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

2.17.17 Seasonality

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

2.17.18 Nutritional value

(Source)

1 Protein
2 Carbohydrates
3 Minerals
4 Vitamins
99 Other (specify in descriptor **2.22 Remarks**)

2.17.19 Market information

Specify if any premium price was assigned to the shea tree nuts, butter or other products according to quality

0 No
1 Yes

2.17.19.1 Type of market

1 Local
2 National
3 International

2.18 Collecting site population structure

2.18.1 Number of trees sampled

2.18.2 Frequency of plants at collecting site

3 Low
5 Intermediate
7 High

2.19 Plant population density

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

2.20 Herbarium specimen

Was a herbarium specimen collected? If so, provide an identification number and indicate in which place (Herbarium) the specimen was deposited, in descriptor **2.22 Remarks.**

0 No
1 Yes

2.21 Photograph

Was photograph(s) taken of the accession or habitat at the time of collecting? If so, provide an identification number(s) in descriptor **2.22 Remarks.**

0 No
1 Yes

2.22 Remarks

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

MANAGEMENT

3. Management descriptors

3.1 Accession number (Passport 1.2)

3.1.1 Local plant number

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

3.2 Population identification (Passport 2.3)

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/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 (Slow growth)
40) Cryopreserved 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]

Code of the institute where a safety duplicate of the accession is maintained. It follows the Institute Code standard. See instructions under **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 auxiliary meristem
4 Apical or auxiliary 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 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 Regeneration year [YYYY]
Year (estimated) when tree should be propagated for regeneration

4.7 Propagation method

Method used to produce trees

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

4.8 Sowing/planting date [YYYYMMDD]

4.9 Cultural practices

4.9.1 Planting density

Number of trees established per hectare

4.9.2 Fertilizer application

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

4.9.3 Irrigation

Specify 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)

5.2.1 Latitude
(See instructions under **2.9**)

5.2.2 Longitude
(See instructions under **2.10**)

5.2.3 **Elevation** [m asl]

5.2.4 Name and address of farm or institute

5.3 Evaluator's name and address

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

5.5 Evaluation environment
Environment in which characterization/evaluation was carried out

1 Field
2 Screenhouse
3 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)
7 Healthy – cropping poorly
8 Healthy – cropping well

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 and method of application

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

5.15 Environmental characteristics of site
Use descriptors **6.1.1** to **6.2** 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	3-5.9%
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 (>300m)
99	Other (specify in the appropriate section's Notes)	

6.1.2 Higher level landform (general physiographic features)

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

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

6.1.3 Slope [°]

Estimated slope of the site

6.1.4 Slope form

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

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

6.1.5 Overall vegetation surrounding and at the collecting site

(Adapted from FAO 1990)

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

6.1.6 Soil parent material

(Adapted from FAO 1990)

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

6.1.6.1 Unconsolidated material

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

6.1.7 Stoniness/rockiness/hardpan/cementation

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

6.1.8 Soil drainage

(Adapted from FAO 1990)

3 Poorly drained
5 Moderately drained
7 Well-drained

6.1.9 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

6.1.10 Soil moisture

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

1 Dry
5 Slightly moist
7 Moist
9 Wet

6.1.11 Soil matrix colour

(Adapted from FAO 1990)

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

1 White
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

6.1.12 Soil organic matter content

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

6.1.13 Soil pH

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

6.1.18.1.1 pH at 0-10 cm
6.1.18.1.2 pH at 11-20 cm
6.1.18.1.3 pH at 21-30 cm
6.1.18.1.4 pH at 31-60 cm
6.1.18.1.5 pH at 61-90 cm

6.1.14 Soil erosion

3 Low
5 Intermediate
7 High

6.1.15 Rock fragments

(Adapted from FAO 1990)

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

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

6.1.16 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. 1)

1 Clay
2 Loam
3 Clay loam
4 Silt
5 Silty clay
6 Silty 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

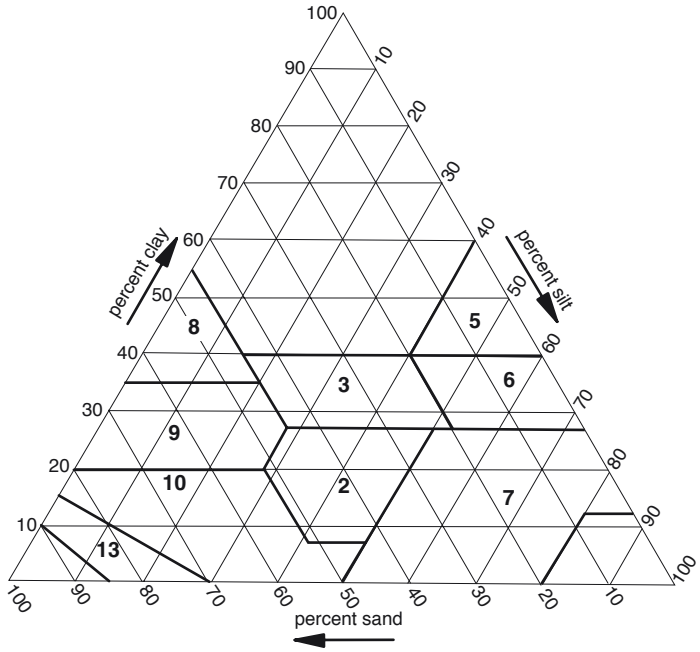

Fig. 1. Soil texture classes

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 Soil taxonomic classification

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

6.1.19 Soil fertility

General assessment of the soil fertility based on existing vegetation

3 Low
5 Moderate
7 High

6.1.20 Climate of the site

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

6.1.20.1 **Temperature** [°C]

Provide either the monthly or the annual mean

6.1.20.2 **Rainfall** [mm]

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

6.1.20.3 Relative humidity

6.1.20.3.1 **Relative humidity diurnal range** [%]

6.1.20.3.2 **Relative humidity seasonal range** [%]

6.1.20.4 Light

1 Shady
2 Sunny

6.2 Notes

Any additional information may be specified here

CHARACTERIZATION

7. Plant descriptors

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

7.1 Growth descriptors

7.1.1 **Tree age** [y]

7.1.2 **Tree vigour**

3 Low
5 Medium
7 High

7.1.3 **Tree height** [m]

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

7.1.4 **Trunk height** [m]

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

7.1.5 **Trunk circumference** [cm]

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

7.1.6 **Trunk surface**

3 Smooth
7 Rough
9 Very rough

7.1.7 **Bark thickness** [mm]

7.1.8 **Shape of fissures**

1 Square
2 Rectangular
3 Diamond
99 Other (specify in descriptor **7.6** Notes)

7.1.9 Trunk/bark colour

When no fire influences

1 White
2 Ash-grey
3 Dark grey
4 Dark brown
5 Black
99 Other (specify in descriptor **7.6** Notes)

7.1.10 Crown diameter [m]

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

7.1.11 Crown shape

(See Fig. 2)

1 Pyramidal
2 Broadly pyramidal
3 Spherical
4 Oblong
5 Semicircular
6 Elliptical
99 Other (i.e. 'irregular', specify in descriptor **7.6** Notes)

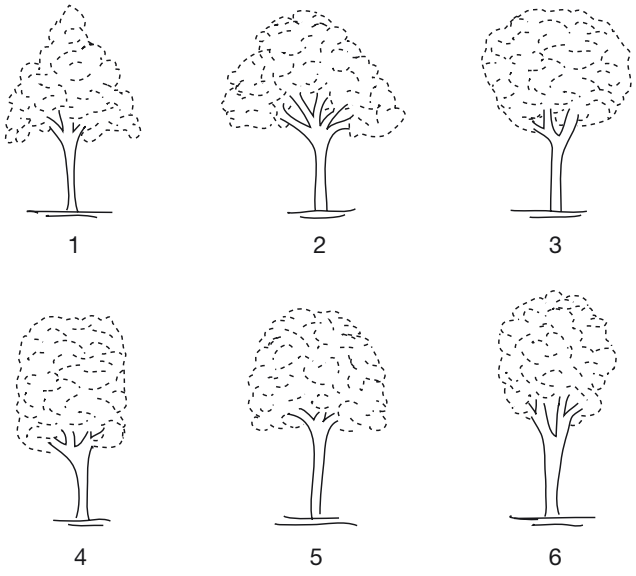

Fig. 2. Crown shape

7.1.12 Tree growth habit

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

7.1.13 Branching density

3 Sparse
5 Medium
7 Dense

7.1.14 Branching pattern

(See Fig. 3)

1 Erect
2 Opposite
3 Verticillate
4 Horizontal
5 Irregular
6 Plagiotropic
99 Other (specify in descriptor **7.6** Notes)

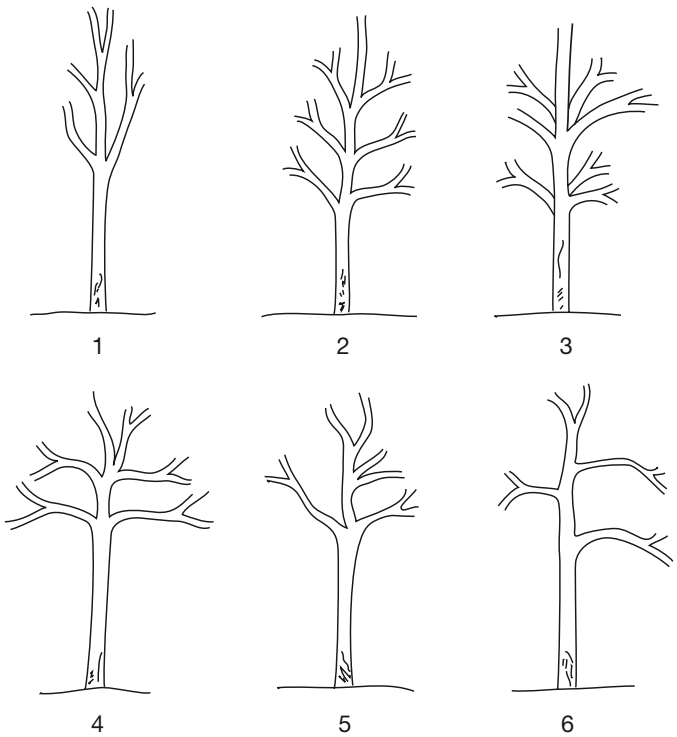

Fig. 3. Branching pattern

7.1.15 Apical dominance

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

3 Weak
5 Intermediate
7 Strong

7.2 Leaf descriptors

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

7.2.1 Leaf arrangement

1 Distal end of branches
99 Other (specify in descriptor **7.6**, Notes)

7.2.2 Leaf blade length [cm]

Measured from the base to the tip of the leaf blade

7.2.3 Leaf blade width [cm]

Measured at the widest point

7.2.4 Leaf blade shape

(See Fig. 4)

1 Obovate
2 Elliptic
3 Broadly elliptic
4 Narrowly elliptic
5 Oblong
6 Obovate-oblong
7 Ovate-oblong
99 Other (specify in descriptor **7.6** Notes)

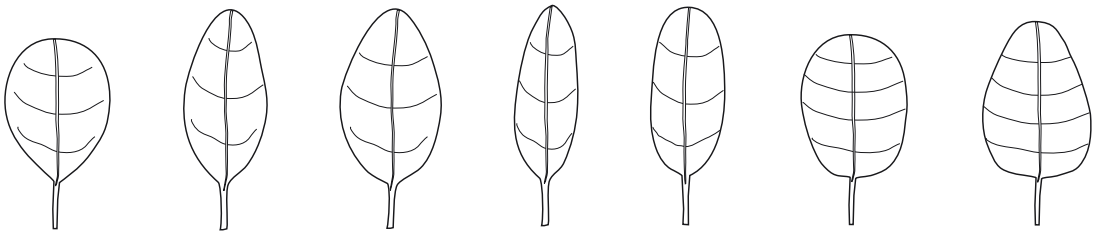

Fig. 4. Leaf blade shape

7.2.5 Leaf apex shape

(See Fig. 5)

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

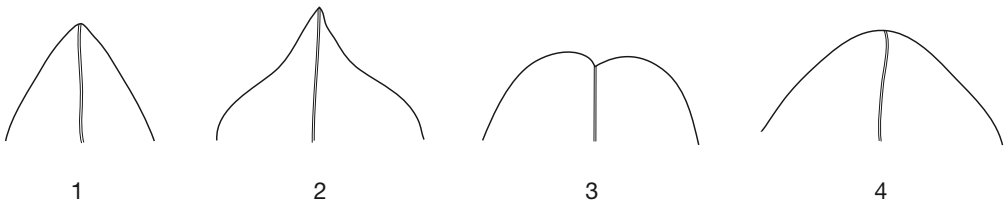

Fig. 5. Leaf apex shape

7.2.6 Leaf apex angle [°]

7.2.7 Leaf base shape

(See Fig. 6)

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

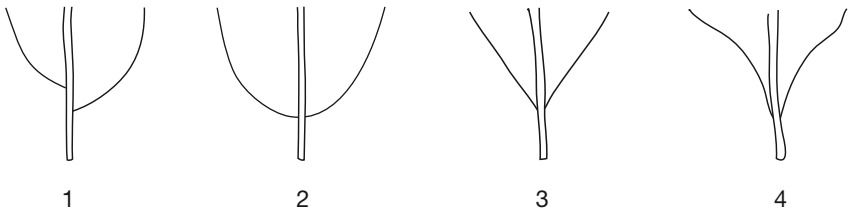

Fig. 6. Leaf base shape

7.2.8 Leaf base angle [°]

Intersection of leaf with petiole

7.2.9 Leaf blade margin

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

7.2.10 Adult leaf colour

Evaluated at adaxial side, at fully mature stage

1 Light green
2 Green
3 Dark green
4 Pinkish green

7.2.11 Young leaf colour

Evaluated at adaxial side at flushing time

1 Red
2 Pink
3 Light green
4 Green

7.2.12 Latex exudation detaching fully developed leaves

3 Low
5 Medium
5 High

7.2.13 Leaf upper surface pubescence

0 Absent
3 Sparse
5 Intermediate
7 Dense

7.2.14 Leaf lower surface pubescence

0 Absent
3 Sparse
5 Intermediate
7 Dense

7.2.15 Leaf midrib pubescence

1 Glabrous
2 Sparsely puberulent

7.2.16 Number of leaf secondary nervures

7.2.17 Petiole shape

1 Flattened
2 Rounded
3 Rounded straight adaxially

7.2.18 Petiole length [mm]

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

7.2.19 Grooves on petiole

0 Absent
1 Present

7.2.20 Crotch angle of petiole

1 Acute (<90º)
2 Obtuse (>90º)

7.3 Inflorescence descriptors

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

7.3.1 Flowering precocity [y]

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

7.3.2 Date of appearance of first inflorescence [YYYYMMDD]

7.3.3 Date of appearance of 75% inflorescences [YYYYMMDD]

7.3.4 Female flower aroma

Recorded during opening

3 Mild
5 Intermediate
7 Strong

7.3.5 Inflorescence colour

1 White
2 Cream
3 Light green
4 Pale yellow
5 Light yellow
6 Dark yellow
7 Crimson

7.3.6 Secondary flowering

0 Absent
1 Present

7.3.7 Inflorescence density

3 Sparse
5 Intermediate
7 Dense

7.3.8 Number of inflorescence ramifications

7.3.9 Length of inflorescence main axis [mm]

7.3.10 Number of primary lateral inflorescence branches

Average of 20 inflorescences at peak bloom period

7.3.11 Alternate bearing

Estimated as percentage of inflorescence bud drop in on-years

3 Slight <25%
5 Moderate 26 -50%
7 High 51 -75%
9 Very high >75%

7.3.12 Size of floral parts

7.3.12.1 Length of sepals [mm]

7.3.12.2 Length of filaments [mm]

7.4 Fruit descriptors

Average of 20 well-developed fruits at harvest time (or when they fall down), unless otherwise specified

7.4.1 Number of years to first fruiting after sowing/planting [y]

7.4.2 Number of days from flowering to fruit maturity [d]

7.4.3 Fruiting season type

1 Early
2 Mid-season
3 Late

7.4.4 Fruiting season date

7.4.4.1 Start of fruiting season [YYYYMMDD]

7.4.4.2 End of fruiting season [YYYYMMDD]

7.4.5 Fruit bearing habit

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

7.4.6 Fruit clustering habit

Specify number of trees evaluated per accession

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

7.4.7 Fruit shape

Specify number of fruits evaluated. (See Fig. 7)

1 Oblate
2 Spheroid
3 Ellipsoid
4 Oblong
5 Ovoid
99 Other (i.e. 'irregular' specify in descriptor **7.6** Notes)

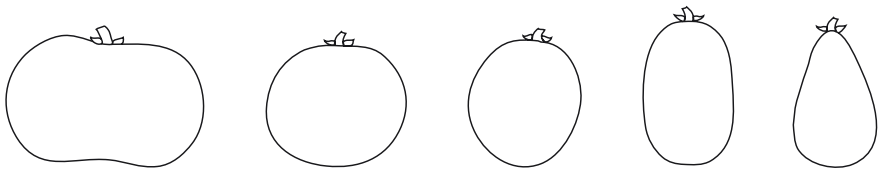

Fig. 7. Fruit shape

7.4.8 Fruit surface

1 Smooth
2 Rough

7.4.9 Fruit apex shape

1 Deeply depressed
2 Slightly depressed
3 Flattened
4 Rounded
5 Pointed

7.4.10 Fruit pubescence

3 Sparse
5 Intermediate
7 Dense

7.4.11 Fruit length [cm]

Average of ten fruits

7.4.12 Fruit diameter [cm]

Measured at the widest point. Average of ten fruits

7.4.13 Fruit weight [kg]

7.4.14 Colour of pericarp

1 Green
2 Yellowish green
3 Yellow
4 Reddish yellow
5 Brown
99 Other (specify in descriptor **7.6** Notes)

7.4.15 Colour of mesocarp

1 Green
2 Yellow

7.4.16 Thickness of mesocarp

3 Thin
7 Thick

7.4.17 Fruit taste

1 Sweet
2 Insipid

7.4.18 Fruit latex exudation

Determined at the time of detaching mature fruits

3 Low
5 Medium
7 High

7.5 Seed descriptors

7.5.1 **Seed length** [cm]

Average of 20 seeds selected from 20 mature fruits

7.5.2 **Seed width** [cm]

Average of 20 seeds recorded at the widest point

7.5.3 **Number of seeds per fruit**

1 One seed
2 More than one seed

7.5.4 **100-Seed weight** [g DW]

7.5.5 **Seed shape**

(See Fig. 8)

1 Spheroid
2 Ellipsoid
3 Oval
4 Ovoid
99 Other (i.e. specify in descriptor **7.6** Notes)

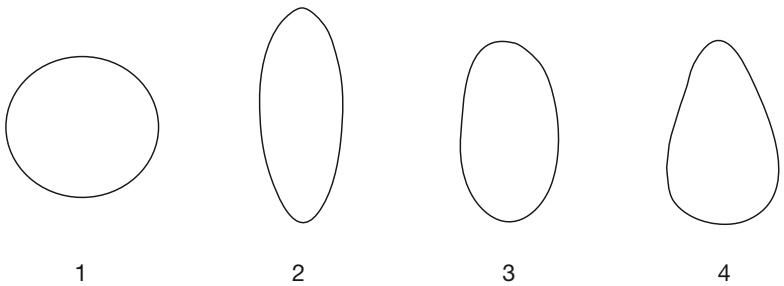

Fig. 8. Seed shape

7.5.6 Seed surface pattern

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

7.5.7 Seed coat colour

As colour and patchiness vary with time, it is suggested to ensure that seed is ripe

1 Creamish
2 Dull brown
3 Brown
4 Pale brown
5 Dark brown
99 Other (specify in descriptor **7.6** Notes)

7.5.8 Adherence of seed coat to kernel

Specify the method used in the descriptor **7.6** Notes, i.e. after boiling, oven roasting or sun-drying, etc.

3 Easily separable
5 Intermediate
7 Difficult to separate

7.5.9 Ratio of kernel dry weight to nut volume

1 Almost nil
2 Intermediate
3 Almost equal to one

7.5.10 Colour of cotyledons

Recorded on dry kernel

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

7.5.11 Cotyledon attachment

1 Fused
2 Free
99 Other (specify in descriptor **7.6** Notes)

7.5.12 Seed germination

Observations should be made on 'cryptogeal' germination mode and the first shoots emergence time

7.5.13 Latex exudation of the nut

3 Low
5 Medium
7 High

7.5.14 Oil yield from mature seeds [% DW]

As percentage of kernel. Specify the method for determination

7.5.15 Quality of oil produced

Specify the quality according to the utilisation type (edible oil, cosmetic, confectionary, margarine, pharmaceutical, etc.)

7.5.15.1 Oil utilization type

1 Edible oil
2 Cosmetics
3 Confectionary
4 Margarine
5 Pharmaceutical
99 Other (specify in descriptor **7.6** Notes)

7.5.15.2 Quality of oil

3 Low
5 Intermediate
7 high

7.5.16 Melting point for oil produced [°C]

The melting point varies between 32 to 40°C according to chemical components of the shea butter

1 Weak (32°C – 36°C)
2 Intermediate (>36°C - 38°C)
3 Strong (>38 - 40°C)

7.6 Notes

Any additional information may be specified here

EVALUATION

8. Plant descriptors

8.1 Fruit

8.1.1 **Yield per tree** [kg per year]

8.1.2 **Number of fruits per tree**
Average of ten trees per accession

8.1.3 **Fruit productivity** [kg/m²]
Average of ten trees per accession. Yield relative to tree canopy size calculated from length and width

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

8.1.5 **Number of months to maturity**
Record the number of months to maturity

8.1.6 **Fruit bearing**
3 Poor
5 Medium
7 Good

8.2 Kernel

8.2.1 **Chemical composition**

8.2.1.1 **Kernel protein content** [%]

8.2.1.2 **Kernel carbohydrate content** [%]

8.2.1.3 **Kernel fat content** [%]
Specify the method used for determination

8.2.1.4 **Kernel unsaponifiable matter content**
3 Poor
5 Medium
7 High

8.2.2 Kernel fatty acid composition

Assess mainly stearic and oleic acid composition

3 Poor
5 Medium
7 High

8.3 Notes

Specify here any other additional information

9. Abiotic stress susceptibility

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

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

9.1 Reaction to high temperature

9.2 Reaction to soil salinity

9.3 Reaction to mineral deficiency

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

9.4 Reaction to mineral toxicity

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

9.5 Reaction to water logging

9.6. Reaction to drought
(I.e. leaves, etc, turn red when water stressed)

9.7 Reaction to constant winds

9.8 Notes
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, and laboratory. Also, specify the causal organism and the corresponding symptoms. Record such information in descriptor **10.4** Notes. These are coded on a susceptibility scale from 1 to 9, viz.:

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

10.1 Pests

	Causal organism	Common name
10.1.1	*Allagogus brunneus*	
10.1.2	*Anacridium melanorhodon*	
10.1.3	*Apate terebrans*	
10.1.4	*Bostra glaucalis*	
10.1.5	*Cardiophorus quadriplagiatus*	
10.1.6	*Ceratitis silvestrii*	Oriental fruit fly
10.1.7	*Chionalma pretoriae*	
10.1.8	*Chionaspis* sp.	Scale
10.1.9	*Cirina bytyrospermi*	Silk moth
10.1.10	*Cirina forda*	Caterpillar
10.1.11	*Conogethes punctiferalis*	Shoot borer
10.1.12	*Curimosphena senegalensis*	Plumose scale
10.1.13	*Doliopygus serratus*	
10.1.14	*Doliopygus terebrans*	
10.1.15	*Glypsus conspicuus*	
10.1.16	*Gobertina picticornis*	
10.1.17	*Hockeria* spp.	
10.1.18	*Mesocomys pulchriceps*	
10.1.19	*Metahylesinus togonus*	
10.1.20	*Mussidia nigrivenella*	Jack scale
10.1.21	*Nephopteryx* sp. *orphnanthes*	Bark borer

10.1.22	*Pachydissus* spp.	
10.1.23	*Pachytilus migratorius*	
10.1.24	*Philematium festivum*	
10.1.25	*Platypus hintzi*	
10.1.26	*Xyloctonus quadridens*	
10.1.27	*Xyloctonus scolytoides*	Leaf eating beetle

10.2 Diseases

10.2.1	*Botryodiplodia* spp.	Leaf spot
10.2.2	*Colletotrichum* sp.	Anthracnose
10.2.3	*Corticium salmonicolor*	Pink stem disease
10.2.4	*Erwinia carotovora*	Bacterial disease
10.2.5	*Fomes* sp.	
10.2.6	*Hoplolaimus* sp.	Root diseases
10.2.7	*Fusicladium butyrospermi*	Blossom and fruit blight
10.2.8	*Macrophomina phaseolina*	Root rot
	Rosellinia arcuata	
	Rosellinia bunodes	
10.2.9	*Pestalotia heterospora*	Leaf galls
10.2.10	*Phellinus* sp.	Dry rot
10.2.11	*Phyllosticta* sp.	Fruit rot
	Phytophthora sp.	
10.2.12	*Rhizoctonia solani*	
10.2.13	*Rhizopus stolonifer*	Pink disease
10.2.14	*Sphaerostilbe repens*	Stinking root disease
10.2.15	*Uredo artocarpi* Rust	

10.3 Parasitic plants

10.3.1	*Globimetula braunii*
10.3.2	*Tapinanthus dodoneifolius*
19.3.3	*Tapinanthus globiferus*
10.3.4	*Tapinanthus ophiodes*
10.3.5	*Tapinanthus pentagonia*

10.4 Notes

Specify here any additional information

11. Biochemical markers

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

12. Molecular markers

Refer to Descriptors for Genetic Markers Technologies, available in pdf (portable document format) 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

BIBLIOGRAPHY

Abbiw D.K. 1990. Useful plants of Ghana, West African uses of wild and cultivated plants. Intermediate Technology Publications and The Royal Botanic Gardens, Kew, London. pp. 66-67.

Adu-Ampomah Y., Amponsah J.D., Yidana J.A. (1995) Germplasm collection of sheanut (*Vitellaria paradoxa)* in Ghana. Plant Genetic Plant Resources Newsletter, 102: 37-38.

Alercia, A., Diulgheroff, S. and Metz, T., 2001. Source / contributor: FAO (Food and Agriculture Organization of the United Nations), IPGRI (International Plant Genetic Resources Institute). In: List of Multicrop Passport Descriptors. www.ipgri.cgiar.org

American Phytopathological Society. 1994. Common names for plant diseases. Am. Phytopathol. Soc., St. Paul MN, USA.

Boffa J-M. 1999. Agroforestry parklands in sub-Saharan Africa. FAO Conservation Guide No. 34.

Booth F.E.M. and Wickens, G.E. 1988. Non-timber uses of selected arid zone trees and shrubs in Africa. FAO Conservation Guide 19. FAO, Rome.

CAB International. 1999. Crop Protection Compendium. CD-ROM. CAB International, UK.

CAB International. 2000. *Vitellaria paradoxa* [original text by P Lovett]. In: Forestry Compendium Global Module. Wallingford, UK: CAB International.

De Vicente, C., Alercia, A. and Metz T., 2004. Source/Contributor: IPGRI (International Plant Genetic Resources Institute). In: Descriptors for Genetic Markers Technologies. www. ipgri.cgiar.org

Eyog Matig, O., Gaoué O.G. and Dossou, B. 2002. Programme de resources génétiques forestières en Afrique au sud du Sahara. Réseau "Espèces Ligneuses Alimentaires. Compte rendu de la première reunion du Réseau. 11-13 décembre 2000, CNSF Ouagadougou, Burkina Faso. IPGRI, Rome. 235p.

FAO. 1990. Guidelines for Soil Profile Description, 3rd edition (revised). Food and Agriculture Organization of the United Nations, International Soil Reference Information Centre, Land and Water Development Division. FAO, Rome.

Fontaine C., Lovett P.N., Sanou H., Maley J., Bouvet J-M. 2004. Genetic diversity of the shea tree (*Vitellaria paradoxa* C.F. Gaertn), detected by RAPD and chloroplast microsatellite markers. Heredity, 93 (6): 639-648.

Forsyth, J. 1966. Agricultural insects of Ghana.Ghana Universities Press, Accra. 163 pp.

Hall, J.B., Aebisher, D. P., Tomlinson, H.F., Osei-Amaning, E. and Hindle, J.R. 1996. *Vitellaria paradoxa*; a monograph. School of Agricultural and Forest Sciences, University of Wales, Bangor.

Hall J.B., Hindle J.R. 1995. Epitypification of *Vitellaria paradoxa* C.F. Gaertn. (Sapotaceae). Taxon, 44 (3): 409-410.

Henry A.N., Chithra V., Nair N.C. 1983. *Vitellaria* vs. *Butyrospermum* (Sapotaceae). Taxon, 32: 286.

Jackson G. 1974. Cryptogeal germination and other seedling adaptions to the burning of vegetation in savanna regions: The origin of the pyrophytic habit. New Phytologist, 73: 771-780.

Kornerup, A. and J.H. Wanscher. 1984. Methuen Handbook of Colour. Third edition. Methuen, London.

Katende, A.B., Birnie, A. ad Tengnas, B. 1995. Useful trees and shrubs for Uganda; Identification, propagation and management for agricultural and pastoral communities. Technical Handbook 10. Regional Land Management Unit, Nairobi.

Lovett, P.N. and Haq, N. 2000. Diversity of the Shea-nut tree (*Vitellaria paradoxa* (C.F. Gaertn.) in Ghana. Genetic Resources and Crop Evolution. 47: 293-304.

Lovett P.N., Haq N. 2000. Diversity of the Sheanut tree (*Vitellaria paradoxa* Gaertn C. F.) in Ghana. Genetic Resources and Crop Evolution 47 (3): 293-304

Lovett PN, Haq N (2000) Evidence for anthropic selection of the Sheanut tree (Vitellaria paradoxa). Agroforestry Systems 48 (3): 273-288

Lovett P.N., Ouna J., Ojok P., Apunyu A., Akot L., Erongot C. and Masters E.T. 2000. Shea tree improvement in Uganda: germplasm diversity, selection and propagation. Paper presented at the "The Shea Tree (*Vitellaria paradoxa* subsp. *nilotica*): First Regional conference for Eastern and Central Africa 26-30 June 2000, Lira, Uganda.

Lovett P.N. 2000. The Genetic Diversity of the Sheanut tree (*Vitellaria paradoxa*) in the Farming Systems of Northern Ghana. Ph.D. thesis. University of Southampton. 187 pp.

Lovett P.N. 2005. The Shea Butter Value Chain: Production, Transformation and Marketing in West Africa. WATH Technical Report No. 2: http://www.watradehub.com/program/Shea.htm

Lovett P.N. 2005. Shea butter industry expanding in West Africa. Inform, 16 (5): 273-275

Masters, E.T., Yidana, J.A., Lovett, P.N. 2004. Reinforcing Sound Management through Trade: Shea Tree Products in Africa. Unasylva, 55 (219): 46-51.

McAllan, A., Aebischer, D. and Tomlinson, H. 1996. *Parkia biglobosa* - the Dawadawa tree (Néré) and *Vitellaria paradoxa* – The shea-butter tree (Karité) – A handbook for extension workers. School of Agricultural and Forest Sciences, Univ. of Wales, Bangor, UK. 30p.

Munsell Color. 1975. Munsell Soil Color Chart. Munsell Color, Baltimore, MD, USA.

Munsell Color. 1977. Munsell Color Charts for Plant Tissues, 2nd edition, revised. Munsell Color, Macbeth Division of Kollmorgen Corporation, 2441 North Calvert Street, Baltimore, MD 21218, USA.

Rana, R.S., R.L. Sapra, R.C. Agrawal and Rajeev Gambhir. 1991. Plant Genetic Resources. Documentation and Information Management. National Bureau of Plant Genetic Resources (Indian Council of Agricultural Research), New Delhi, India.

Royal Horticultural Society. 1966, c. 1986. R.H.S. Colour Chart (edn. 1, 2). Royal Horticultural Society, London.

Sanou H., Picard N., Lovett P.N., Dembélé M, Korbo A, Diarisso D and Bouvet J-M (in press) Phenotypic variation of agromorphological traits of *Vitellaria paradoxa* C.F Gaertn in Mali. Genetic Resources and Crop Evolution

Sanou H., Lovett P.N., Bouvet J-M. (in press) Comparison of quantitative and molecular variation in agroforestry populations of the shea tree (*Vitellaria paradoxa* C.F Gaertn) in Mali. Molecular Ecology

Sanou H., Kamboue S., Z. Teklehaimanot, Dembélé M., Yossi H., Sibidou S., Lompo D., Bouvet J. M. 2004. Vegetative propagation of *Vitellaria paradoxa* by grafting. *Agroforestry systems,* 60, 93-99

Stearn, William T. 1995. Botanical Latin. Fourth Edition. David & Charles Publishers, Newton Abbot, UK.

Thomas, D.G. 1970. Other crops. In: Agriculture in Uganda, 2nd edn. J.D. Jameson (Ed.), pp. 207-273. Oxford University Press, London. 395 pp.

van Hintum, Th.J.L. 1993. A computer compatible system for scoring heterogeneous populations. Genet. Resour. & Crop Evol. 40:133-136.

Vuilliet , J. (1911) Le karité et ses produits. Larose, Paris. 150 pp.

Walter S., Cole D., Kathe W., Lovett P., Paz Soldán M. 2003. Impact of certification on the sustainable use of NWFP: Lessons-learnt from three case studies. Reviewed paper presented at the International Conference on Rural Livelihoods, Forests and Biodiversity. 19-23 May 2003, Bonn, Germany

Wills, J.B. 1962. Crops other than cocoa. In: Agriculture and land use in Ghana, (Ed. by J. B. Wills), pp. 364-365. Oxford University Press, Oxford. 503 pp.

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ACKNOWLEDGEMENTS

IPGRI wishes to place on record their sincere thanks to the numerous Shea-butter tree workers around the world who have contributed directly or indirectly to the development of **Descriptors for Shea tree**.

Mr. Michael Mbogga from the Regional Office of Sub-Saharan Countries drafted the document and Dr O. Eyog-Matig from the Regional Office of West and Central Africa coordinated its development and review. Ms Adriana Alercia provided scientific and technical expertise, supervised, and coordinated the production of the publication. Ms Patrizia Tazza designed the cover and layout.

Substantial scientific advice provided by Dr. Peter Lovett during the review process is gratefully acknowledged.

Annex I. Basic list of minimum discriminating descriptors for Shea tree

IPGRI Descriptor Number	Nome
7.1.6	Trunk surface
7.1.7	Bark thickness [mm]
7.1.11	Crown shape
7.1.15	Apical dominance
7.2.5	Leaf apex shape
7.2.8	Leaf base angle [°]
7.2.10	Adult leaf colour
7.2.11	Young leaf colour
7.4.4	Fruiting season dates
7.4.7	Fruit shape
7.4.9	Fruit apex shape
7.4.11	Fruit length [cm]
7.4.12	Fruit diameter [cm]
7.4.13	Fruit weight [kg]
7.4.17	Fruit taste
7.5.1	Seed length [cm]
7.5.2	Seed width [cm]
7.5.3	Number of seeds per fruit
7.5.5	Seed shape
7.5.7	Seed coat colour
7.5.16	Melting point for oil produced [°C]
8.2.1.4	Kernel unsaponifiable matter content
8.2.2	Kernel fatty acid composition

Annex II. COLLECTING FORM for Shea tree

SAMPLE IDENTIFICATION

COLLECTING INSTITUTE(S) (2.1): COLLECTING DATE OF SAMPLE (2.4):

COLLECTING No. (2.3): COMMON TREE NAME (1.12):

HERBARIUM SPECIMEN (2.20): PHOTOGRAPH No. (2.21):

SPECIES (1.8.2): SUBTAXA (1.8.3):

COLLECTING SITE LOCATION

COUNTRY OF ORIGIN (2.5):

LOCATION (2.8): km: direction: from:

LATITUDE (2.9): LONGITUDE (2.10): ELEVATION (2.11): m asl

COLLECTING SITE ENVIRONMENT

COLLECTING / ACQUISITION SOURCE (2.12):

10. Wild habitat
20. Farm or cultivated habitat
30. Market or shop
40. Institute, Exp. 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 [°] (6.1.3):

SAMPLE

BIOLOGICAL STATUS OF ACCESSION (2.15):

100. Wild
200. Weedy
300. Traditional cultivar/Landrace
400. Breeding/research material
500. Advanced/improved cultivar
999. Other (specify):

TYPE OF SAMPLE (2.14):

1. Vegetative 2. Seed/Seedling 3. Pollen 4. *In vitro* culture 99. Other (specify)

NUMBER OF TREES SAMPLED (2.18.1):

ETHNOBOTANICAL DATA (2.17)

ETHNIC GROUP (2.17.1):

LOCAL/VERNACULAR NAME (2.17.2):

PREVAILING STRESSES (2.17.14):

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

HISTORY OF PLANT USE (2.17.5):

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

PARTS OF THE PLANT USED (2.17.6):

1. Seed	2. Root	3. Trunk	4. Bark
5. Leaf	6. Flower / inflorescence	7. Fruit	99. Other (specify)

CULTURAL CHARACTERISTICS (2.17.11):

Mention if there is any folklore (i.e., taboos, stories and/or superstitions associated with the accession)

0 No 1 Yes (specify)

SILVICULTURAL SYSTEM (2.17.15.1):

1. Monoculture 2. Multi-species (specify species) 3. Agropastoralism 4. Natural stands

---

PROPAGATION METHOD (2.17.15.2):

1. Seed	2. Grafting	3. Cutting	4. Budding
5. Layering	6. Tissue culture	99. Other (specify)	

SEASONALITY (2.17.17):

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

---

ASSOCIATED FLORA (2.17.16):

Mention other dominant crop / plant species, found in and around the collecting site

==========

CHARACTERIZATION

Trunk surface (7.1.6): 3. Smooth 7. Rough 9. Very rough

Tree growth habit (7.1.12): 1. Erect 2. Semi-erect 3. Spreading 99. Other (specify)

Leaf arrangement (7.2.1):

Fruit shape (7.4.7): 1. Oblate 2. Spheroid 3. Ellipsoid 4. Oblong 99. Other (specify)

Colour of fruit pericarp (7.4.14): 1. Green 2. Yellowish green 3. Yellow 5. Reddish yellow 6. Brown

---

Seed shape (7.5.5): 1. Spheroid 2. Ellipsoid 3. Oblong
4. Oval 5. Ovoid 99. Other

Seed coat colour (7.5.7): 1. Creamish 2. Dull brown 4. Brown 5. Pale brown 6. Dark brown 99. Other (specify)

Colour of cotyledons (7.5.10): 1. Yellowish brown 2. Dull brown 3. Brown 4. Dark brown 99. Other (specify)

==========

COLLECTOR'S NOTES:

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FUTURE HARVEST

IPGRI is
a Future Harvest Centre
supported by the
Consultative Group on
International Agricultural
Research (CGIAR)

ISBN-13: 978-92-9043-687-4
ISBN-10: 92-9043-687-5

Cover photo: Dolores Agúndez

Printed on environmentally friendly paper