IPGRI

Descriptors for

Bambara groundnut

Vigna subterranea

List of Descriptors

Almond (revised) * (E)	1985
Apple (E)	1982
Apricot * (E)	1984
Avocado (E,S)	1995
Bambara groundnut (E)	1987
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
Cherry * (E)	1985
Chickpea (E)	1993
Citrus (E,S,F)	1999
Coconut (E)	1992
Coffee (E,S,F)	1996
Cotton (Revised) (E)	1985
Cowpea (E)	1983
Cultivated potato * (E)	1977
Echinochloa millet * (E)	1983
Eggplant (E,F)	1990
Faba bean * (E)	1985
Finger millet (E)	1985
Forage grass * (E)	1985
Forage legumes * (E)	1984
Grapevine (E,S,F)	1997
Groundnut (E,S,F)	1992
Jackfruit (E)	2000
Kodo millet * (E)	1983
Lathyrus (E)	2000
Lentil * (E)	1985
Lima bean * (E)	1982
Lupin * (E,S)	1981
Maize (E,S,F,P)	1991
Mango (E)	1989
Medicago (Annual) * (E,F)	1991
Mung bean * (E)	1980
Oat * (E)	1985
Oca * (S)	1982
Oil palm (E)	1989
Panicum miliaceum and *P. sumatrense* (E)	1985
Papaya (E)	1988
Peach * (E)	1985
Pear * (E)	1983
Pearl millet (E,F)	1993
Phaseolus acutifolius (E)	1985
Phaseolus coccineus * (E)	1983
Phaseolus vulgaris * (E)	1982
Pigeonpea (E)	1993
Pineapple (E)	1991
Pistacia (excluding *Pistacia vera*) (E)	1998
Pistachio (E,F)	1997
Plum * (E)	1985
Potato variety * (E)	1985
Quinua * (E)	1981
Rice * (E)	1980
Rye and Triticale * (E)	1985
Safflower * (E)	1983
Sesame * (E)	1981
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,S,F)	1980
Tea (E,S,F)	1997
Tomato (E, S, F)	1996
Tropical fruit * (E)	1980
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

IPGRI publications are available free of charge to the libraries of genebanks, university departments, research institutions, etc. On request to Head, Communications Services, titles may also be made available to individuals who can show that they have a need for a personal copy of a publication. E, F, S, C, and P, indicate English, French, Spanish, Chinese and Portuguese, respectively. Titles marked with * are available only as photocopies. Some descriptor lists are available for downloading in Abobe" portable document format (PDF) from IPGRI's web site (URL: <http://www.ipgri.cgiar.org>).

Descriptors for

Bambara groundnut

Vigna subterranea

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

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

The International Institute of Tropical Agriculture (IITA) was founded in 1967 as an international agricultural research institute with a mandate for improving food production in the humid tropics and to develop sustainable production systems. It became the first African link in the worldwide network of agricultural research centers known as the Consultative Group on International Agricultural Research (CGIAR), formed in 1971. IITA is governed by an international board of trustees and is staffed by approximately 80 scientists and other professionals from over 30 countries, and approximately 1,300 support staff. Staff are located at the Ibadan campus, and also at stations in other parts of Nigeria, and in Benin, Cameroon, Cote d'Ivoire, and Uganda. Others are located at work sites in several countries throughout sub-Saharan Africa.

Financial support for the research agenda of IITA is provided by the Governments of Austria, Belgium, Brazil, Canada, Denmark, France, Germany, Italy, Japan, Republic of Korea, Netherlands, Nigeria, Norway, South Africa, Sweden, Switzerland, Thailand, the UK, the USA and by the Commission of the European Communities, Common Fund for Commodities, Food and Agriculture Organization of the United Nations (FAO), Ford Foundation, Gatsby Charitable Foundation, International Development Research Centre, International Fund for

Agricultural Development, Rockefeller Foundation, Sasakawa Africa Association, United Nations Development Programme, the World Bank and others.

IITA's mission is to enhance the food security, income and well-being of resource-poor people primarily in the humid and subhumid zones of sub-Saharan Africa by conducting research and related activities to increase agricultural production, improve food systems, and sustainably manage natural resources, in partnership with national and international stakeholders. To this end, IITA conducts research, germplasm conservation, training and information exchange activities in partnership with regional bodies and national programs including universities, non-governmental organizations (NGOs) and the private sector. The research agenda addresses crop improvement, plant health, and resource and crop management within a food systems framework and is targeted at the identified needs of three major agro-ecological zones: the savannahs, the humid forests, and the mid-altitudes.

Research focuses on smallholder cropping and post-harvest systems and on the following food crops: cassava, cowpea, maize, plantain and banana, soybean and yam. In addition to collecting and preserving the germplasm of these crops, IITA has also collected germplasm of bambara groundnut and now has about 2000 accessions of this species in its genebank. This collection has been partially characterized and documented and the germplasm is available to researchers worldwide.

The International Bambara Groundnut Network (BAMNET) was founded as a result of an International Bambara Groundnut Workshop, held 14-16 November 1995 in Harare, Zimbabwe. Bambara groundnut is indigenous to Africa. It is an under-utilized crop and neglected by research. The genetic resources of this crop face a serious threat of genetic erosion in farmers' fields. The objectives of BAMNET are to increase the importance of bambara groundnut by improving its productivity, production, marketing and consumption. BAMNET has more than 120 members from about 28 countries (18 African, 8 European, Israel, USA), FAO and IPGRI. Activities of BAMNET encompass aspects such as agronomy, germplasm conservation and management, breeding, utilization, information, documentation, economics and sociology. However, at present, the activities of BAMNET will focus on crop improvement and breeding; processing and marketing; and information and communication.

Citation
IPGRI, IITA, BAMNET. 2000. Descriptors for bambara groundnut (*Vigna subterranea*). International Plant Genetic Resources Institute, Rome, Italy; International Institute of Tropical Agriculture, Ibadan, Nigeria; The International Bambara Groundnut Network, Germany.
ISBN 92-9043-461-9

IPGRI
Via delle Sette Chiese 142
00145 Rome
Italy

IITA
PMB 5320
Ibadan
53177 Bonn
Germany

BAMNET
c/o ZADI
Villichgasse 17
Nigeria

CONTENTS

PREFACE

Descriptors for bambara groundnut *(Vigna subterranea)* is a revision of the original IBPGR, IITA and GTZ publication, **Bambara groundnut Descriptors** (1987). An updated and revised list was developed by the International Bambara Groundnut Network (BAMNET) and coordinated by Dr. Frank Begemann with the assistance of Dr. Quat Ng, Dr Carel J. Swanevelder and Prof. E.V. Doku. It was prepared in the internationally accepted IPGRI format for descriptor lists. A draft version of the revision was subsequently sent to a number of experts for their comments and amendments. A full list of the names and addresses of those involved is given in 'Contributors'. The 1987 descriptor numbers are given in parentheses beside the present descriptors for cross-referencing purposes.

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

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

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

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

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

Any suggestions for improvement on the Descriptors for bambara groundnut will be highly appreciated by IPGRI, IITA and BAMNET.

DEFINITIONS AND USE OF THE DESCRIPTORS

IPGRI uses the following definitions in genetic resources documentation:

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

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

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

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

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

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

Highly discriminating descriptors are marked as highlighted text.

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

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

(b) the units to be applied are given in square brackets following the descriptor name;

(c) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the section where it is used);

(d) the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries* are used;

(e) many quantitative characters, which are continuously variable, are recorded on a 1-9 scale, where:

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

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

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

Shape of central leaf lobe

1 Ovate
2 Elliptic
3 Linear

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

Terminal leaflet

0 Absent
1 Present

(h) blanks are used for information not yet available;

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

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

PASSPORT

1. Accession descriptors

1.1 Accession number (1.1) [MCPD]

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

1.2 Donor name (1.2)

Name of institution or individual responsible for donating the germplasm

1.3 Donor number (1.3) [MCPD]

Number assigned to an accession by the donor

1.4 Other number(s) associated with the accession (1.4) [MCPD]

Any other identification number known to exist in other collections for this accession, e.g. USDA Plant Inventory number (not Collecting number, see descriptor **2.3**). Other numbers can be added as 1.4.3, etc.

1.4.1 Other number 1 (1.4.1)

1.4.2 Other number 2 (1.4.2)

1 .5 Scientific name (1.5)

1.5.1 Genus (1.5.1) [MCPD]

1.5.2 Species (1.5.2) [MCPD]

1.5.3 Subspecies [MCPD]

1.5.4 Botanical variety

1.5.5 Cultivar name

1 .6 Pedigree (1.6)

Parentage or nomenclature and designations assigned to breeders' material

1 .7 Accession

1.7.1 Accession name [MCPD]
Either a registered or other formal designation given to the accession

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

1.8 Acquisition date [YYYYMMDD] (1.7)
Date on which the accession entered the collection

1.9 Accession size (1.9)
Approximate number or weight of seeds, budwoods or plants of an accession in the genebank

1.10 Notes
Any additional information may be specified here

2. Collecting descriptors

2.1 Collecting institute(s) (2.2)
Name and address of the institute(s) and individuals collecting/sponsoring the collection of the sample(s)

2.2 Site number
Number assigned to the physical site by the collector

2.3 Collecting number (2.1) [MCPD]
Original number assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number. This item is essential for identifying duplicates held in different collections. It should be unique and always accompany subsamples wherever they are sent.

2.4 Collecting date of original sample [YYYYMMDD] (2.3) [MCPD]

2.5 Country of origin (2.4) [MCPD]
Name of the country in which the sample was collected. Use the three-letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries*, No. 3166, 4th Edition. Copies of these are available from DIN: Deutsches Institut für Normung e.V., 10772 Berlin, Germany; Tel. +30-2601-369; Fax +30-2601-1231, Tlx. 184 273-din-d.

2.6 Province/State (2.5)

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

2.7 Department/County

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

2.8 Location of collecting site (2.6) [MCPD]

Distance in kilometres and direction from the nearest town, village or map grid reference point (e.g. CURITIBA 7S means 7 km south of Curitiba)

2.9 Latitude of collecting site (2.7) [MCPD]

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

2.10 Longitude of collecting site (2.8) [MCPD]

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

2.11 Elevation of collecting site [m asl] (2.9) [MCPD]

2.12 Collecting source (2.10) [MCPD]

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

- 0 Unknown
- 1 Wild habitat
  - 1.1 Forest/woodland
  - 1.2 Shrubland
  - 1.3 Grasslands
  - 1.4 Desert/tundra
- 2 Farm
  - 2.1 Field
  - 2.2 Orchard
  - 2.3 Garden
  - 2.4 Fallow
  - 2.5 Pasture
  - 2.6 Store

3 Market
- 3.1 Town
- 3.2 Village
- 3.3 Urban area (around city)
- 3.4 Other exchange system

4 Institute/Research organization
99 Other (specify in descriptor **2.21 Collector's notes**)

2.13 Collecting source environment
Use descriptors **6.1.1 to 6.1.22** in section 6

2.14 Status of sample (2.11) [MCPD]
0 Unknown
1 Wild
2 Weedy
3 Traditional cultivar/landrace
4 Breeders' line
5 Advanced cultivar
99 Other (specify in descriptor **2.21 Collector's notes**)

2.15 Type of sample (2.12)
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
3 Pollen
4 Tissue culture
99 Other (specify which part of the plant in descriptor **2.21 Collector's notes**)

2.16 Number of plants sampled (2.13)

2.17 Ethnobotanical data

2.17.1 Ethnic group (2.15)
Name of the ethnic group of the donor of the sample or of the people living in the area of collecting

2.17.2 Local vernacular name (2.14)
Name given by farmer to crop and cultivar/landrace/clone/wild form. State language and dialect if the ethnic group is not provided

2.17.3 Translation

Provide translation of the local accession name into English

2.17.4 Bambara groundnut name meaning

Does the bambara groundnut name have a meaning? If yes, describe it briefly in descriptor **2.21 Collector's notes**

0 No
1 Yes

2.17.5 Parts of plant used

1 Leaf
2 Flower/inflorescence
3 Root
4 Seed
5 Shell (pod)
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.6 Plant uses

1 Food
2 Medicine
3 Animal feed
4 Forage
5 Ornamental
6 Ceremonial
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.7 Frequency of use of the plant

1 Daily
2 Weekly
3 Occasional
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.8 Main cooking methods (2.31)

1 Boiling
2 Baking
3 Roasting
4 Local specialities
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.8.1 Preparatory methods towards cooking

1 Soaking
2 Cracking
3 Removal of seed coat
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.8.2 Time to cooking [min]

Record the number of minutes for each descriptor state of **2.17.8**, as available

2.17.8.3 Stage of crop when used for processing

1 Immature green stage (soft dough stage)
2 Mature green stage (hard dough)
3 Dried bean
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.8.4 Processing

1 Fermentation
2 Puddings
3 Chips
4 Canning
99 Other (specify in descriptor **2.21 Collector's notes)**

2.17.9 Special uses

1 Children
2 Older people
3 Feasts
4 Religious purpose
5 Chiefs
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.10 Cultural data

Is there associated folklore with the collected bambara groundnut type? (e.g. taboos, stories and/or superstitions associated with bambara). If so, describe it briefly in descriptor **2.21 Collector's notes**

0 No
1 Yes

2.17.11 Gender division of labour

1 Female
2 Male

2.17.11.1 Tasks performed

1 Land preparation
2 Sowing
3 Weeding
4 Harvesting
5 Shelling
6 Pounding or grounding
7 Marketing
8 Cooking
99 Other (specify in descriptor **2.21 Collector's notes**)

2.17.12 Palatability (taste quality)

(According to local preference)

1 Poor
2 Acceptable
3 Good

2.17.13 Preferred growing conditions

If yes, describe farmer's perceptions on adaptation in descriptor **2.21 Collector's notes**

0 No
1 Yes

2.17.14 Associated flora

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

2.17.15 Plant population density (2.27)

3 Low
5 Intermediate
7 High

2.17.16 Bambara groundnut popularity

Is the variety popular and widely grown? If yes, describe briefly why in descriptor **2.21 Collector's notes**.

0 No
1 Yes

2.17.17 Market information

Specify if any premium price was assigned to the type of *Vigna*

0 No
1 Yes

2.17.18 Cultural practices (2.28)

2.17.18.1 Sowing date [YYYYMMDD]

2.17.18.2 First flowering date [YYYYMMDD]

2.17.18.3 First harvest date [YYYYMMDD]

2.17.18.4 Last harvest date [YYYYMMDD]

2.17.19 Cropping system (2.26)

1 Pure stand (on flat field)
2 Pure stand (on ridges)
3 Intercropped (specify crop in descriptor **2.21 Collector's notes**)

2.17.20 Seasonality

1 Available only in season/at particular period
2 Available throughout the year
99 Other (specify in descriptor **2.21 Collector's notes**.)

2.18 Genetic erosion (2.24)

Estimate of the rate at which genetic erosion of the species is occurring in the region of collecting

3 Slow
5 Intermediate
7 Rapid

2.19 Photograph (2.16)

Were photograph(s) taken of the accession or habitat at the time of collecting? If so, provide identification number(s) in descriptor **2.21 Collector's notes**

0 No
1 Yes

2.20 Prevailing stresses (2.29)

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

2.21 Collector's notes

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

MANAGEMENT

3. Seed Management Descriptors

3.1 Accession number (Passport 1.1)

3.2 Population identification (Passport 2.3)
Collecting number, pedigree, cultivar name, etc., depending on the population type

3.3 Storage address
(Building, room, shelf number/location in medium- and/or long-term storage)

3.4 Storage date.4 [YYYYMMDD]

3.5 Seed germination at storage (initial) [%]

3.5.1 Seed contamination by pathogens
0 No
1 Yes

3.6 Date of last seed germination test [YYYYMMDD]

3.7 Seed germination at the last test [%]

3.7.1 Seed contamination by pathogens
0 No
1 Yes

3.8 Date of next seed germination test [YYYYMMDD]
Estimated date when the accession should next be tested

3.9 Seed moisture content at harvest [%]

3.10 Seed moisture content at storage (initial) [%]

3.11 Amount of seed in storage(s) [g] (Passport 1.9)

3.12 Duplication at other location(s) (Passport 1.4)

3.13 Type of maintenance

1 Vegetative
2 Seed
3 Vegetative and seed
4 Tissue culture

4. Multiplication/Regeneration Descriptors

4.1 Accession number (Passport 1.1)

4.2 Population identification (Passport 2.3)

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

4.3 Field plot number

4.4 Multiplication/regeneration site location

4.5 Collaborator

4.6 Cultural practices

4.6.1 Sowing date [YYYYMMDD]

4.6.2 First harvest date [YYYYMMDD]

4.6.3 Last harvest date [YYYYMMDD]

4.7 Sowing density [g m^{-2}]

4.8 Fertilizer application [g m^{-2}]

4.9 Seed germination in the field [%]

4.10 Seedling vigour

Visual assessment 18 days after emergence

3 Low
5 Medium
7 High

4.11 Number of plants established by hectare

4.12 Number of plants used as seed source for each regeneration

4.13 Pollination method

1 Self-pollinated
2 Often cross-pollinated
3 Cross-pollinated

4.14 Pollen viability

3 Low
5 Intermediate
7 High

4.15 Previous multiplication and/or regeneration

4.15.1 Location

4.15.2 Sowing date [YYYYMMDD]

4.15.3 Plot number

4.16 Number of times accession regenerated

Number of regenerations or multiplications since original collection

4.17 Notes

Any additional information may be specified here

ENVIRONMENT AND SITE

5. Characterization and/or evaluation site descriptors

5.1 Country of characterization and/or evaluation (3.1)
(See instructions in descriptor **2.5 Country of origin**)

5.2 Site (research institute) (3.2)

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

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

5.2.3 Elevation [m asl]

5.2.4 Name and address of farm or institute

5.3 Evaluator's name and address (3.3)

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

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

5.5 Sowing date [YYYYMMDD] (3.4)

5.6 Seed germination [%]

5.7 Field establishment [%]

5.8 Number of days to 50% field emergence [d]
(From planting). Emergence for each accession

5.9 First harvest date [YYYYMMDD] (3.5)

5.10 Last harvest date [YYYYMMDD] (3.5)

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 plants in a row [cm]

5.12.2 Distance between rows [cm]

5.13 Environmental characteristics of site
Use descriptors **6.1.1 to 6.1.22** in section 6

5.14 Fertilizer
Specify types, doses, frequency of each and method of application

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

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 - 10.9%
5	Rolling	11 - 15.9%
6	Hilly	16 - 30%
7	Steeply dissected	>30%, moderate elevation range
8	Mountainous	>30%, great elevation range (>300 m)
99	Other	(specify in 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 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
2 Escarpment
3 Interfluve
4 Valley
5 Valley floor
6 Channel
7 Levee
8 Terrace
9 Floodplain
10 Lagoon
11 Pan
12 Caldera
13 Open depression
14 Closed depression
15 Dune
16 Longitudinal dune
17 Interdunal depression
18 Mangrove
19 Upper slope
20 Midslope
21 Lower slope
22 Ridge
23 Beach
24 Beachridge
25 Rounded summit
26 Summit
27 Coral atoll
28 Drainage line (bottom position in flat or almost-flat terrain)
29 Coral reef
99 Other (specify in appropriate section's Notes)

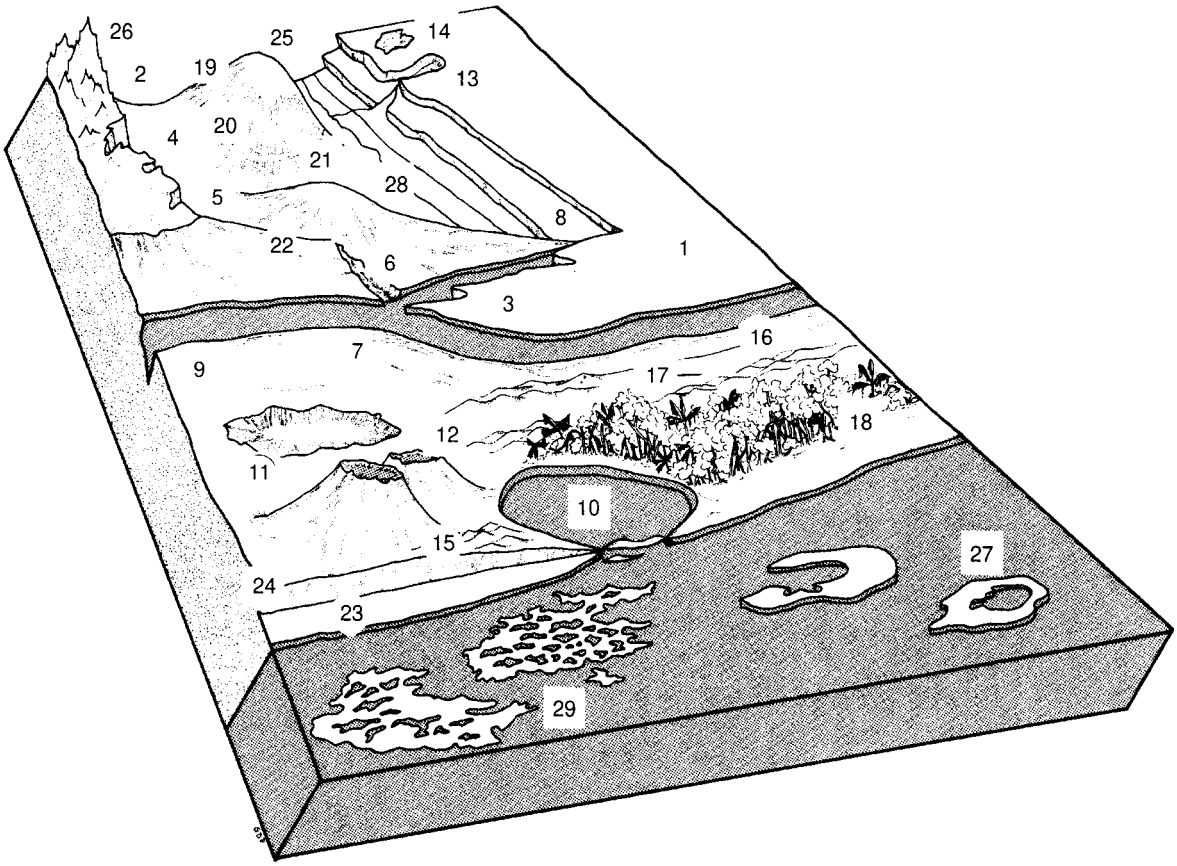

Fig. 1. Land element and position

6.1.4 Slope [°]

Estimated slope of the site

6.1.5 Slope aspect

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

6.1.6 Crop agriculture

(From FAO 1990)

1 Annual field cropping
2 Perennial field cropping

6.1.7 Overall vegetation surrounding and at the 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	Savannah	(Grasses with a discontinuous layer of trees or shrubs)
99	Other	(specify in appropriate section's Notes)

6.1.8 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.

6.1.8.1 Unconsolidated material

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

6.1.8.2 Rock type (Adapted from FAO 1990)

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

6.1.9 Stoniness/rockiness/hardpan/cementation

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

6.1.10 Soil drainage

(Adapted from FAO 1990)

3 Poorly drained
5 Moderately drained
7 Well drained

6.1.11 Soil salinity

1 <160 ppm dissolved salts
2 160 - 240 ppm
3 241 - 480 ppm
4 >480 ppm

6.1.12 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

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

6.1.14 Soil pH

Actual value of the soil within the following root depths around the accession

6.1.14.1 pH at 0-10 cm

6.1.14.2 pH at 11-15 cm

6.1.14.3 pH at 16-30 cm

6.1.14.4 pH at 31-60 cm

6.1.14.5 pH at 61-90 cm

6.1.15 Soil erosion

3 Low
5 Intermediate
7 High

6.1.16 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%

6.1.17 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 fractions below. (See Fig. 2)

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

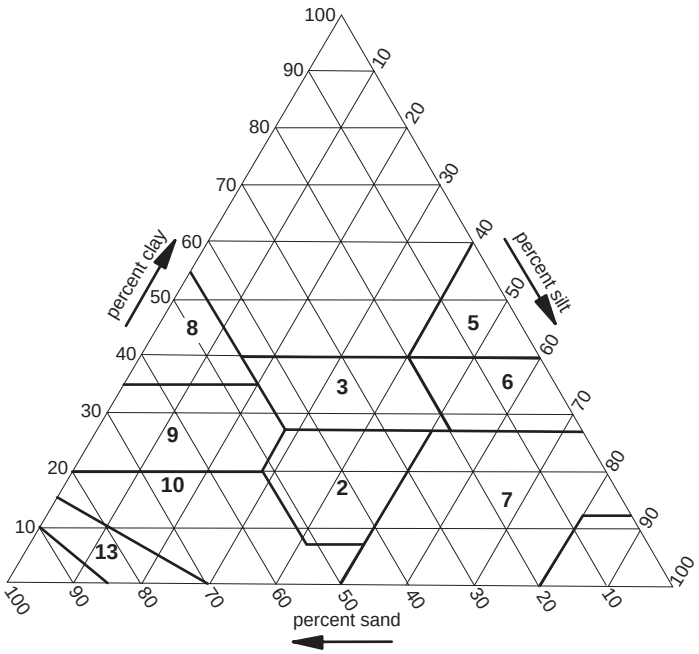

Fig. 2. Soil texture classes

6.1.17.1 Soil particle size classes

(Adapted from FAO 1990)

1	Clay	< 2 µm
2	Fine silt	2 - 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 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 from forest)
5 Peaty

6.1.19 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.).

6.1.20 Water availability

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

6.1.21 Soil fertility

General assessment of the soil fertility based on existing vegetation

3 Low
5 Moderate
7 High

6.1.22 Climate of the site

Should be assessed as close to the site as possible

6.1.22.1 Temperature [°C]

Provide either the monthly or the annual mean

6.1.22.2 Dry season length [d]

6.1.22.3 Rainfall [mm]

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

6.1.22.4 Wind

Annual average (state number of years recorded)

6.1.22.4.1 Frequency of typhoons or hurricane force winds

3 Low
5 Intermediate
7 High

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

6.1.22.4.3 Annual maximum wind velocity [m/s]

6.1.22.5 Frost

6.1.22.5.1 Date of most recent frost [YYYYMMDD]

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

6.1.22.5.3 Duration of temperature below 0°C [d]

6.1.22.6 Relative humidity

6.1.22.6.1 Relative humidity diurnal range [%]

6.1.22.6.2 Relative humidity seasonal range [%]

6.1.22.7 Light

1 Shady
2 Sunny

6.1.22.8 Daylength [h]
Provide either the monthly (mean, maximum, minimum) or the seasonal (mean, maximum, minimum)

CHARACTERIZATION

7. Plant descriptors

7.1 Vegetative

7.1.1 Growth habit (4.1.4)

Recorded 10 weeks after planting, based on the 4th petiole (P)/4th internode (I) length ratio (P/I) – as measured in descriptors 8.1.6

1 Bunch type (P/I = >9)
2 Semibunch type (P/I = 7 – 9)
3 Spreading type (open) (P/I = <7)

7.1.2 Terminal leaflet shape (4.1.3)

Recorded 10 weeks after planting. See Fig.3

1 Round
2 Oval
3 Lanceolate
4 Elliptic
99 Other (specify in descriptor **7.5 Notes**)

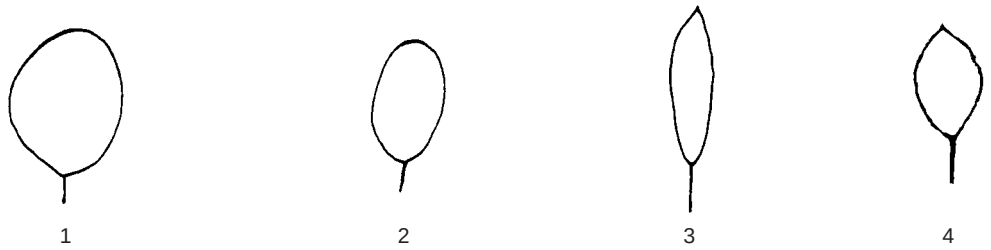

Fig. 3. Terminal leaflet shape

7.1.3 Colour of fully expanded terminal leaflet (6.1.1)

Recorded 10 weeks after planting

1 Green
2 Red
3 Purple
99 Other (specify in descriptor **7.5 Notes**)

7.1.4 Stem hairiness (6.1.12)

Recorded after harvest

0 Absent
3 Sparse
7 Dense

7.1.5 Photoperiodic reaction type

1 Short-day
2 Day-neutral
3 Long-day

7.2 Flower

7.2.1 Number of days from sowing to first flowering [d] (4.2.1)

7.2.2 Number of days from sowing to 50% flowering [d] (4.2.2)

Recorded when 50% of the plants have begun to flower

7.2.3 Banner length [mm] (6.2.2)

Average length of two flowers of five plants

7.2.4 Dark pigmentation on wings and banner (6.2.3)

0 Absent
1 Present

7.3 Fruit

7.3.1 Pod shape (4.2.3)

Recorded on the basis of one-seeded pod, within two months after harvest. (See Fig. 4)

1 Without point
2 Ending in a point, round on the other side
3 Ending in a point, with nook on the other side
4 Ending in two points on each side
99 Other (specify in descriptor **7.5 Notes**)

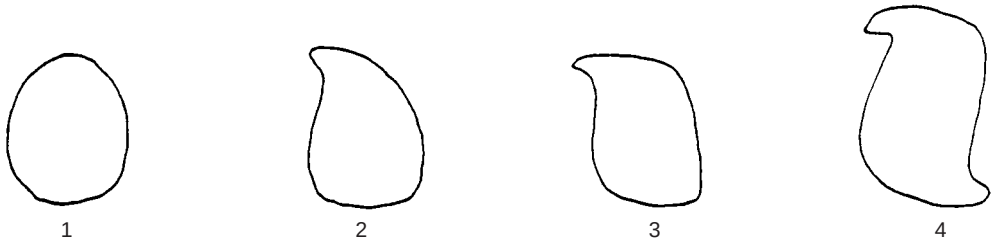

Fig. 4. Pod shape

7.3.2 Pod colour (4.2.4)

Recorded within two months after harvest

1 Yellowish-brown
2 Brown
3 Reddish-brown
4 Purple
5 Black
99 Other (specify in descriptor **7.5 Notes**)

7.3.3 Pod texture (4.2.5)

Recorded within two months after harvest

1 Smooth
2 Little grooves
3 Much grooved
4 Much folded

7.4 Seed

7.4.1 Seed shape (6.3.1)

Recorded on the basis of seeds of one-seeded pod, within two months after harvest

1 Round
2 Oval
99 Other (specify in the descriptor **7.5 Notes**)

7.4.2 Seed colour/pattern (4.3)

The seed colour/pattern as listed below should be used. It is divided into 3 subgroups. Under each subgroup, there are different testa colours in combination with eye patterns and/or testa patterns that differentiate types of seed colour/pattern. Munsell colour codes are given beside the descriptor state of each of the colour groups.

7.4.2.1 Testa with pure colour, without eye pattern around hilum

Recorded within two months

1	Cream	2.5Y 8/4-8/8 5YR 7/4 7.5 YR 8/2-8/4 7.5YR 7/4
2	Grey	5RP 5/2 10R 5/2 10R 4/2
3	Light red	2.5R 5/6 5R 5/2-5/6

4	Dark red	2.5R 4/2-4/6 5R 3/4
5	Light brownish red	2.5YR 6/4-6/6 5R 4/4 10R 5/4-5/6
6	Dark brown	5R 3/2
7	Dark purple	5RP 4/2-4/6 5RP 3/2
8	Black	
99	Other (specify in the descriptor **7.5 Notes**)	

7.4.2.2 Testa with pure colour with an eye pattern around hilum

This group of testa colour is described in combination of the testa background colour (as in **7.4.2.1**) and eye patterns (see Fig. 5)

1 Cream testa with black butterfly-like eye
2 Cream testa with dark red butterfly-like eye
3 Cream testa with grey butterfly-like eye
4 Cream testa with black triangular eye
5 Cream testa with brown triangular eye
6 Cream with grey triangular eye
7 Cream testa with black irregular eye
8 Cream testa with grey double thick lines on both sides of the eye
9 Cream testa with brown circular eye
10 Light brown testa with grey butterfly-like eye
11 Light brownish red testa with dark brown triangular eye
12 Grey testa with black triangular eye
99 Other (specify in the descriptor **7.5 Notes**)

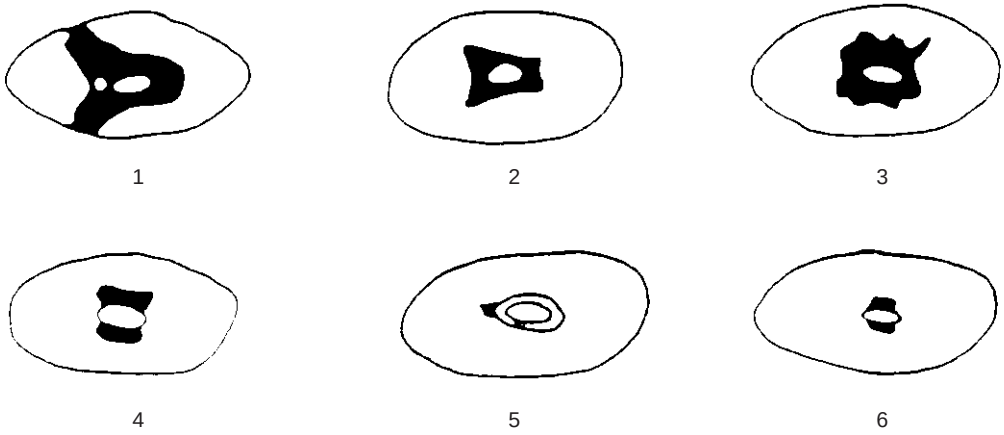

Fig. 5. Kind of eye pattern

7.4.2.3 Testa with mixed colour, with or without eye pattern around hilum

This group of testa colour/pattern is described in combination of testa background colour (as in **7.4.2.1**), eye pattern (see Fig. 5) and testa pattern (see Fig. 6). Recorded within two months

1 Black small dotted spots on brown background without eye
2 Dark brown small dotted spots on cream background without eye
3 Black and grey mottles on cream background without eye
4 Black and brown mottles on cream background with grey butterfly-like eye
5 Black marbled spots on cream background with grey butterfly-like eye
6 Dark brown marbled spots on cream background with grey butterfly-like eye
7 Black rhomboid spots on cream background on the micropylar end with grey butterfly-like eye
8 Dark brown rhomboid spots on cream background on the micropylar end with grey butterfly-like eye
9 Black rhomboid spots on cream background on both micropylar and non-micropylar ends with grey butterfly-like eye
10 Dark brown rhomboid spots on cream background on both micropylar and non-micropylar ends with grey butterfly-like eye
11 Black stripes on cream background with black butterfly-like eye
12 Black stripes on cream background with black irregular eye
13 Brown stripes on cream background with brown butterfly-like eye
14 Brown stripes on cream background with grey butterfly-like eye
15 Brown stripes on cream background with brown irregular eye
16 Cream rhomboid on black background on both sides of the hilum with grey triangular eye
17 Cream rhomboid on dark brown background on both sides of the hilum with grey triangular eye
18 Black Holstein on cream background
19 Dark brown Holstein on cream background
99 Other (specify in the descriptor **7.5 Notes**)

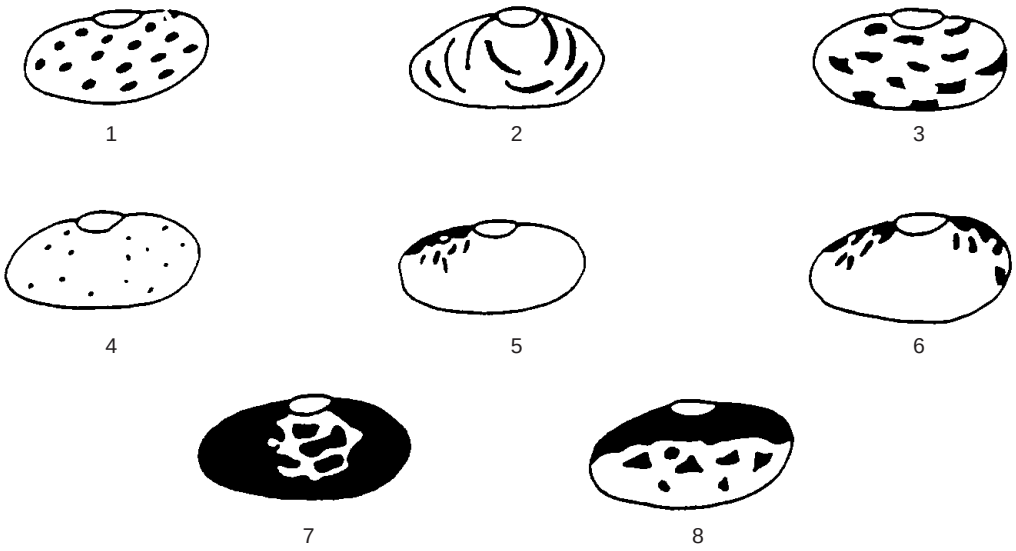

Fig. 6. Kind of testa pattern

7.5 Notes

Any additional information, especially in the category of `other' under various descriptors above, may be specified here

EVALUATION

8. Plant descriptors

8.1 Vegetative

8.1.1 Peduncle length [mm] (6.2.4)
Recorded at the stage of open flower; average length of two peduncles of five healthy plants

8.1.2 Number of flowers per peduncle (6.2.5)
Average of the 10 peduncles used in **8.1.1**

8.1.3 Number of leaves (6.1.5)
Recorded two weeks after first flowering; average number of 10 plants

8.1.4 Terminal leaflet length [mm] (6.1.2)
Recorded 10 weeks after planting; average length of three leaves at the fourth node of five healthy plants

8.1.5 Terminal leaflet width [mm] (6.1.3)
Recorded 10 weeks after planting; average width of three leaves at the fourth node of five healthy plants

8.1.6 Petiole length [mm] (6.1.4)
Recorded 10 weeks after planting; average length of three leaves at the fourth node of five healthy plants

8.1.7 Plant spread [cm] (6.1.6)
Recorded 10 weeks after planting; average of five plants. Widest length between two opposite points

8.1.8 Plant height [cm] (6.1.7)
Measured from the ground level (at the base of the plant) to the tip of the highest point, including the terminal leaflet. Recorded 10 weeks after planting; average height of five plants

8.1.9 Nodulation capacity
Recorded 10 weeks after planting; average capacity of five healthy plants

0 None
3 Few nodules
7 Abundant nodules

8.1.10 Internode length [mm] (6.1.8)
Recorded 10 weeks after planting; average length of fourth internode of three longest stems of five healthy plants

8.1.11 Number of nodes per stem (6.1.9)
Recorded at harvest; average number of three stems of five healthy plants

8.1.12 Number of branches per stem (6.1.10)
Recorded at harvest; average number of three stems of five healthy plants

8.1.13 Number of stems per plant (6.1.11)
Recorded at harvest; average number of five healthy plants

8.1.14 Number of days from planting to maturity [d]

8.2 Yield

8.2.1 Pod length [mm] (4.2.7)
Recorded within two months after harvest; average length of 10 pods

8.2.2 Pod width [mm] (4.2.8)
Recorded within two months after harvest; average width of 10 pods

8.2.3 Shell thickness [1/100 mm] (4.2.6)
Recorded within two months after harvest; average thickness of 10 pods

8.2.4 Shelling percentage [%] (4.2.9)
Recorded within two months after harvest; average percentage of 10 pods, based on weight of mature seed (at 12% moisture content)

8.2.5 Number of pods per plant (6.2.6)
Average number of 10 plants

8.2.6 Number of seeds per pod (6.2.7)
Average number of 10 pods recorded within two months after harvest

8.2.7 100-seed weight [g] (6.2.8)
Recorded within two months after harvest (at 12% moisture content)

8.2.8 Yield [g/m^2]
Weight of dried seed (at 12% moisture content)

8.2.9 Seed length [mm] (6.3.2)

Recorded within two months after harvest; average length of 10 seeds

8.2.10 Seed width [mm] (6.3.3)

Recorded within two months after harvest; average width of 10 seeds

8.3 Quality

8.3.1 Protein content [% DW]

8.3.2 Fat content [% DW]

8.3.3 Carbohydrate content [% DW]

8.4 Notes

Specify here any additional information

9. Abiotic stress susceptibility

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

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

9.1 Reaction to low temperature

9.2 Reaction to drought

9.3 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, laboratory. Record such information in descriptor **10.5 Notes**. These are coded on a susceptibility scale from 1 to 9, viz.:

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

10.1 Fungi

	Causal organism	Common name
10.1.1	*Alternaria alternata*	Leaf spot
10.1.2	*Ascochyta phaseolorum*	Blight
10.1.3	*Cercospora canescens*	Leaf spot
10.1.4	*Didymella pinodes*	Leaf spot
10.1.5	*Fusarium oxysporum*	Wilt
10.1.6	*Phyllosticta voandzeiae*	Leaf spot
10.1.7	*Sclerotium rolfsii*	Root rot
10.1.8	*Sphaerotheca voandzeiae*	Powdery mildew

10.2 Viruses

10.2.1	*Bean common mosaic virus*	BCMV
10.2.2	*Cowpea aphid-borne mosaic virus*	CABMV
10.2.3	*Cowpea mild mottle virus*	CPMMV
10.2.4	*Cowpea mosaic virus*	CPMV
10.2.5	*Cowpea mottle virus*	CPMoV
10.2.6	*Cucumber mosaic virus*	CMV
10.2.7	*Peanut mottle virus*	PeMoV
10.2.8	*Bean southern mosaic virus*	BSMV
10.2.9	*Voandzeia necrotic mosaic virus*	VNMV

10.3 Insects

1 0.3.1	*Agonoscelis* sp.	Sucking bug
10.3.2	*Araecerus fasciculatus*	Cocoa weevil
10.3.3	*Bruchidius atrolineatus*	Bruchid
10.3.4	*Callosobruchus chinensis*	Chinese bruchid
10.3.5	*Callosobruchus maculatus*	Cowpea weevil
10.3.6	*Clavigralla tomentosicollis*	Bean bug

10.4 Nematodes

10.4.1	*Meloidogyne* spp.	Root knot nematode

10.5 Notes
Specify any additional information here

11. Biochemical markers

11.1 Isozyme
For each enzyme, indicate the tissue analysed and the zymogram type. A particular enzyme can be recorded as 11.1.1; 11.1.2, etc. according to the international nomenclature system for enzymes

11.2 Seed storage proteins

11.3 Other biochemical markers
(E.g. anthocyanins)

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

12.1 Restriction fragment length polymorphism (RFLP)
Report probe/enzyme combination (approach can be used for nuclear, chloroplast or mitochondria genomes)

12.2 Amplified fragment length polymorphism (AFLP)
Report primer pair combinations and accurate molecular size of products (used for nuclear genomes)

12.3 DNA amplification fingerprinting (DAF); random amplified polymorphic DNA (RAPD); AP-PCR
Accurately report experimental conditions and molecular size of products (used for nuclear genomes)

12.4 Sequence-tagged microsatellites (STMS)
Report primer sequences, and accurate product sizes (can be used for nuclear or chloroplast genomes)

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

12.6 Other molecular markers

13. Cytological characters

13.1 Chromosome number

13.2 Ploidy level
(2x, 3x, 4x, etc.)

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

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

Heller, J., F. Begemann and J. Mushonga eds. 1995. Proceedings of the Workshop on Conservation and Improvement of Bambara groundnut [*Vigna subterranea* (L.) Verdc.], 14-16 November, 1995, Harare, Zimbabwe.

International Bambara Groundnut Network (BAMNET) URL: http://www.dainet.de/genres/bambara/

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

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.

Plant Viruses Online: Descriptions and Lists from the VIDE Database. Version: 16 January 1997. URL: <http://biology.anu.edu.au/Groups/MES/vide/>.

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.

Stearn, William T. 1995. Botanical Latin, 4th edition. David & Charles Publishers, Newton Abbot, United Kingdom.

United States Department of Agriculture, Agricultural Research Service, National Genetic Resources Program. *Germplasm Resources Information Network - (GRIN)*. [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland. Available: <http://www.ars-grin.gov/cgi-bin/npgs>

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

CONTRIBUTORS

Coordinators

Dr F. Begemann
Centre for Agricultural Documentation and Information (ZADI)
Information Centre for Genetic Resources (IGR)
Villichgasse 17
53177 Bonn
GERMANY
Email: begemann@zadi.de

Prof. Emmanuel V. Doku
Department of Crop Science
University of Ghana
PO Box 25
Legon, Accra
GHANA
Email: gaas@ghastinet.gn.apc.org or agric.dean@ug.gn.apc.org

Dr. N. Q. Ng, Germplasm
Scientist/Geneticist
Coordinator,
Conservation and Use of Plant Biodiversity
IITA
PMB 5320
Ibadan
NIGERIA
Email: q.ng@cgiar.org

Dr Carel J. Swanevelder
Agricultural Research Council – Grain Crops Institute
Oil and Protein Seed Research
Private Bag X1251
Potchefstroom 2520
SOUTH AFRICA
Email: Martienette@ops1.agric.za

Reviewers

Dr Sayed Azam-Ali
Reader in Tropical Agronomy
Division of Agriculture and Horticulture
School of Biological Sciences
University of Nottingham
LE12 5RD
UNITED KINGDOM

Dr. Graves Gillaspie
USDA-ARS
University of Georgia
Genetic Resources Unit
1109 Experiment Street
Griffin, Georgia 30223-1797
USA
Email: s9gg@ars-grin-gov

Prof. S. K. Karikari
Dept. of Crop Science and Production
Botswana College of Agriculture
Private Bag 0027
Gaborone
BOTSWANA
Email: skarikar@temo.bca.bw

Ms Rosalia Madamba
Dept. Research and Specialist Services
P.O. Box 8100
Causeway, Harare
ZIMBABWE

Dr Festo Massawe
Division of Agriculture and Horticulture
School of Biological Sciences
University of Nottingham
LE12 5RD
UNITED KINGDOM

Mr G.O. Rachier
Kakamega Regional Research Centre, KARI
PO Box 169
Kakamega
KENYA

Dr Joachim Heller
Fachhochschule Wiesbaden
University of Applied Sciences
FB 04
Von-Lade-Str. 1
D - 65366 Geisenheim
GERMANY
Email: J.Heller@geisenheim.fbl.fh-wiesbaden.de

Dr Karin Nichterlein
Plant Breeding and Genetics Section
Joint FAO/IAEA Division
Of Nuclear Techniques in Food and Agriculture
P.O. Box 100
A-1400 Vienna
AUSTRIA
Email: K.Nichterlein@iaea.org

Prof J.C. Norman
Department of Crop Science
University of Ghana
P.O. Box 25
Legon, Accra
GHANA
Email: narpcsir@ncs.com.gh

Dr Ruth Wingender
Institut für Landwirtschaftliche Botanik
Friedrich-Wilhelms-Universität Bonn
Meckenheimer Allee 176
D-53115 Bonn
GERMANY
Email: ilb@ibm.rhrz.uni-bonn.de

ACKNOWLEDGEMENTS

IPGRI, IITA and BAMNET wish to place on record their sincere thanks to the numerous workers around the world who have contributed directly or indirectly to the development of *Descriptors for bambara groundnut*.

Ms Adriana Alercia coordinated and managed the production of the publication and provided scientific and technical expertise. Ms Patrizia Tazza prepared the cover and the layout. Mrs Helen Thompson assisted during the text production.

The following IPGRI Staff provided substantial scientific advice: Drs F. Morales, T. Hodgkin and F. Engelmann.

ANNEX I. Multicrop Passport Descriptors

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

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

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

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

[1] Authority is only provided at the most detailed taxonomic level

11. Longitude of collecting site (LONGITUDE)

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

12. Elevation of collecting site [m asl] **(ELEVATION)**

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

13. Collecting date of original sample [YYYYMMDD] **(COLLDATE)**

Collecting date of the original sample where YYYY is the year, MM is the month and DD is the day.

14. Status of sample (SAMPSTAT)

1	Wild	0	Unknown
2	Weedy		
3	Traditional cultivar/Landrace	99	Other (Elaborate in REMARKS field)
4	Breeder's line		
5	Advanced cultivar		

15. Collecting source (COLLSRC)

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

1	Wild habitat	2	Farm	3	Market	4	Institute/Research organization
1.1	Forest/ woodland	2.1	Field	3.1	Town		
		2.2	Orchard	3.2	Village		
1.2	Shrubland	2.3	Garden	3.3	Urban	0	Unknown
1.3	Grassland	2.4	Fallow	3.4	Other exchange system		
1.4	Desert/ tundra	2.5	Pasture			99	Other (Elaborate in REMARKS field)
		2.6	Store				

16. Donor institute code (DONORCODE)

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

17. Donor number (DONORNUMB)

Number assigned to an accession by the donor. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system)

18. Other number(s) associated with the accession (OTHERNUMB)

Any other identification number known to exist in other collections for this accession. Letters should be used before the number to identify the genebank or national system (e.g. IDG indicates an accession that comes from the genebank at Bari, Italy; CGN indicates an accession from the genebank at Wageningen, The Netherlands; PI indicates an accession within the USA system). Multiple numbers can be added and should be separated with a semicolon

19. Remarks (REMARKS)

The remarks field is used to add notes or to elaborate on descriptors with value "99" (=Other). Prefix remarks with the field name they refer to and a colon (e.g. COLLSRC: roadside). Separate remarks referring to different fields are separated by semicolons.

FAO WIEWS DESCRIPTORS

1. Location of safety duplicates (DUPLSITE)

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

2. Availability of passport data (PASSAVAIL)

(i.e. in addition to what has been provided)

0 Not available
1 Available

3. Availability of characterization data (CHARAVAIL)

0 Not available
1 Available

4. Availability of evaluation data (EVALAVAIL)

0 Not available
1 Available

5. Acquisition type of the accession (ACQTYPE)

1 Collected/bred originally by the institute
2 Collected/bred originally by joint mission/institution
3 Received as a secondary repository

6. Type of storage (STORTYPE)

Maintenance type of germplasm. If germplasm is maintained under different types of storage, multiple choices are allowed, separated by a semicolon (e.g. 2;3). (Refer to FAO/IPGRI Genebank Standards 1994 for details on storage type)

1 Short-term
2 Medium-term
3 Long-term
4 *In vitro* collection
5 Field genebank collection
6 Cryopreserved
99 Other (elaborate in REMARKS field)

ANNEX II. COLLECTING FORM for bambara groundnut

SAMPLE IDENTIFICATION

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

COLLECTING No. (2.3): PHOTOGRAPH No. (2.19):

COLLECTING DATE [YYYYMMDD] (2.4):

GENUS (1.5.1): SPECIES (1.5.2):

BOTANICAL VARIETY (1.5.4): CULTIVAR NAME (1.5.5):

PEDIGREE (1.6) SPECIES (1.7.2):

COLLECTING SITE LOCATION

COUNTRY (2.5):

PROVINCE/STATE (2.6): DEPARTMENT/COUNTY (2.7):

LOCATION (2.8): km: direction: from:

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

COLLECTING SITE ENVIRONMENT

COLLECTING SOURCE (2.12):
0. Unknown 1. Wild habitat 2. Farm 3. Market 4. Institute/Research organization 99. Other (specify):

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

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

SOIL FERTILITY (6.1.21): (code: 3=Low; 5=Moderate; 7=High)

SOIL TEXTURE CLASSES (6.1.17): State class (e.g. Clay, Loam, Silt)

SOIL TAXONOMIC CLASSIFICATION (6.1.19):
State class (e.g. Alfisols, Spodosols, Vertisols)

WATER AVAILABILITY (6.1.20):
1. Rain-fed 2. Irrigated 3. Flooded 4. River banks 5. Sea coast 99. Other (specify):

RAINFALL (6.1.22.3: Annual mean: ⌊__⌋ mm

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly mean [mn]:	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋

TEMPERATURE (6.1.22.1): Annual mean: ⌊__⌋ °C

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly mean [°C]:	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋

SAMPLE

STATUS OF SAMPLE (2.14):
0. Unknown 1. Wild 2. Weedy 3. Traditional cultivar/Landrace 4. Breeder's line 5. Advanced cultivar 99. Other (specify):

TYPE OF SAMPLE (2.15):
1. Vegetative 2. Seed 3. Pollen 4. Tissue culture 99. Other (specify):

NUMBER OF PLANTS SAMPLED (2.16):

PREVAILING STRESSES (2.20):
Mention the types of major stresses, i.e. abiotic (drought), biotic (pests, diseases, etc.)

ETHNOBOTANICAL DATA

LOCAL/VERNACULAR NAME (2.17.2):

ETHNIC GROUP (2.17.1):

PARTS OF PLANT USED (2.17.5):
1. Leaf 2. Flower/inflorescence 3. Root 4. Seed 5. Shell (pod) 99. Other (specify):

PLANT USES (2.17.6)
1. Food 2. Medicine 3. Animal feed 4. Forage 5. Ornamental 6. Ceremonial 99. Other (specify):

ASSOCIATED FLORA (2.17.14):

CHARACTERIZATION AND EVALUATION

Vegetative

Growth habit (7.1.1): 1. Bunch type 2. Semibunch type 3. Spreading type (open)

Terminal leaflet shape (7.1.2): 1. Round 2. Oval 3. Lanceolate 4. Elliptic 99. Other (specify):

Photoperiodic reaction type (7.1.5): 1. Short-day 2. Day-neutral 3. Long-day

Number of days from sowing to first flowering [d] (7.2.1):

Terminal leaflet length [mm] (8.1.4):

Terminal leaflet width [mm] (8.1.5):

Petiole length [mm] (8.1.6):

Plant spread [cm] (8.1.7):

Plant height [cm] (8.1.8):

Nodulation capacity (8.1.9):

Internode length [mm] (8.1.10):

Number of branches per stem (8.1.12):

Number of stems per plant (8.1.13):

Number of days from planting to maturity [d] (8.1.14):

Yield

Shelling percentage [%] (8.2.4):
Number of pods per plant (8.2.5):
Number of seeds per pod (8.2.6):
100-seed weight [g] (8.2.7):
Yield [g/m^2] (8.2.8):
Seed length [mm] (8.2.9):
Seed width [mm] (8.2.10):

Quality

Protein content [% DW] (8.3.1):
Fat content [% DW] (8.3.2):

Collector's Notes:

FUTURE HARVEST
<www.futureharvest.org>

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

ISBN 92-9043-461-9