IPGRI

Descriptors for

Sesame

Sesamum spp.

NBPGR

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)	1999
Cashew (E)	1986
Cherry * (E)	1985
Chickpea (E)	1993
Citrus (E,F,S)	1999
Coconut (E)	1992
Coffee (E,S,F)	1996
Cotton (Revised) (E)	1985
Cowpea (E)	1983
Cultivated potato * (E)	1977
Echinochloa millet * (E)	1983
Eggplant (E,F)	1990
Faba bean * (E)	1985
Fig (E)	2003
Finger millet (E)	1985
Forage grass * (E)	1985
Forage legumes * (E)	1984
Grapevine (E,S,F)	1997
Groundnut (E,S,F)	1992
Jackfruit (E)	2000
Kodo millet * (E)	1983
Lathyrus spp. (E)	2000
Lentil * (E)	1985
Lima bean * (E,P)	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 vulgaris * (E,P)	1982
Pigeonpea (E)	1993
Pineapple (E)	1991
Pistacia (excluding *Pistacia vera*) (E)	1998
Pistachio (A,R,E,F)	1997
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 * (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,F,S)	1999
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

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The International Plant Genetic Resources Institute (IPGRI) is an independent international scientific organization that seeks to advance the conservation and use of plant genetic diversity for the well-being of present and future generations. It is one of 15 Future Harvest Centres supported by the Consultative Group on International Agricultural Research (CGIAR), an association of public and private members who support efforts to mobilize cutting-edge science to reduce hunger and poverty, improve human nutrition and health, and protect the environment. IPGRI has its headquarters in Maccarese, near Rome, Italy, with offices in more than 20 other countries worldwide. The Institute operates through 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 2003, had been signed 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.

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The National Bureau of Plant Genetic Resources (NBPGR) is a scientific organization that acts as the nodal institute at national level for acquisition and management of indigenous and exotic plant genetic resources for food and agriculture, and carries out related research and human resources development, for sustainable growth of agriculture.

The objectives of NBPGR are the following: to plan, organize, conduct and coordinate exploration and collection of indigenous and exotic plant genetic resources; to undertake introduction, exchange and quarantine of plant genetic resources; to characterize, evaluate, document and conserve crop genetic resources and promote their use, in collaboration with other national organizations; to develop information network on plant genetic resources; to conduct research, undertake teaching and training, develop guidelines and create public awareness on plant genetic resources.

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PREFACE

Descriptors for Sesame (*Sesamum* spp.) is a revision of the original IBPGR publication *Descriptors for Sesame* (AGP: IBPGR/80/71 and AGPG: IBPGR/85/132). The 1981 List was based upon the work of an *ad hoc* Working Group consisting of the FAO Expert Consultation on Sesame Improvement and the International Board for Plant Genetic Resources (IBPGR). This list was revised during 1985 to fit the standard format for Descriptor Lists, and its descriptor numbers are given in parentheses beside the present descriptors for cross-referencing purposes.

This revised Descriptor List is based on the work of a team of scientists from the National Bureau of Plant Genetic Resources (NBPGR), New Delhi, India coordinated by Dr. P. N. Mathur from IPGRI South Asia Office, New Delhi. A draft version prepared in the internationally accepted IPGRI format for Descriptor Lists was subsequently sent to a number of international experts for their comments and amendments. A full list of the names and addresses of those involved for the publication of this Descriptors is given in 'Contributors'.

IPGRI encourages the collection of data for all five types of descriptors (see Definitions and Use of Descriptors), whereby data from the first four categories - *Passport*, *Management*, *Environment and site*, and *Characterization* - should be available for any accession. The number of descriptors selected in each of the categories will depend on the crop and their importance to the description of the crop. Descriptors listed under *Evaluation* allow for a more extensive description of accessions, 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 the 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 each curator will characterize accessions of their collection utilizing all descriptors given. Descriptors should be used when they are useful to the curator for the management and maintenance of the collection and/ or to the users of the plant genetic resources. However, highly discriminating descriptors are marked as highlighted text to facilitate selection of descriptors and are listed in Annex I.

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

in the text as [MCPD]. Please note that owing to the genetic 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 sesame" that will facilitate data collecting during field collecting. An alphabetical list of recognized species and their synonyms along with the distribution and characteristics of different *Sesamum* species is presented in Annex III.

Any suggestions for improvement on the Descriptors for sesame will be highly appreciated by IPGRI and NBPGR.

INTRODUCTION TO SESAME

Since antiquity, sesame (*Sesamum indicum* L. syn. *Sesamum orientale* L.) has been used as a valued oil crop. Today it is grown mainly in the tropics, although its cultivation reaches from 40°N to 40°S latitude. It is typically grown by small holders with nearly all of its production in developing countries. China (825,531 MT) and India (620,000 MT) are the world's principal producers (FAO 2004). Myanmar (390,000 MT), Sudan (122,000 MT), Uganda (110,000 MT), Nigeria (75,000 MT), Pakistan (61,600 MT), Bangladesh (49,000 MT), Thailand (40,000 MT), Central African Republic (38,000 MT), Chad (35,000 MT), Egypt (35,000 MT), Paraguay (34,000 MT), Guatemala (32,386 MT), Iran (30,000 MT), Venezuela (29,000 MT), Korea Rep (23,818 MT), Mexico (22,593 MT) and Turkey (22,000 MT) are other major sesame growing countries.

It is an important source of high quality oil and protein. Roughly half of the seed's weight is its oil, which has excellent stability due to the presence of natural antioxidants such as sesamolin and sesamin (Brar and Ahuja 1979; Kamal-Eldin 1993). The fatty acid composition of sesame oil varies considerably among different cultivars worldwide (Yermanos *et al.* 1972). After oil extraction, the remaining meal contains 35-50% protein, and is rich in tryptophan and methionine. Seed coats are rich in calcium (1.3%) and provide a valuable source of minerals (Johnson *et al.* 1979). The addition of sesame to the high lysine meal of soybean produces a well-balanced animal feed. In spite of that, it has been a neglected crop with a low priority in research support. In fact sesame has many agronomic advantages: (i) the capacity to set seed and yield remarkably well under high temperatures; (ii) a deep taproot for extracting moisture from lower soil layers so it can be cultivated and grown on residual moisture even without rainfall or irrigation; (iii) grows well in pure stands and by intercropping; and (iv) undemanding, fits well into crop rotation as a follow crop.

Origin and domestication

The origin of sesame has been disputed for more than a century (de Candolle 1886; Vavilov 1926; Hiltebrandt 1932; Darlington 1963; Nayar and Mehra 1970; Nayar 1995). It is now well established that sesame was domesticated on the Indian subcontinent and was taken to Mesopotamia by the Early Bronze Age (Bedigian 1988; 2003a; 2003b; 2004b; Bedigian *et al*. 1985; Bedigian *et al.* 1986). Investigations of Bedigian *et al.* (1985) on lignans sesamin and sesamolin lend support to this conclusion, supplementing genetic crosses between the crop and its progenitor. Those crosses were subsequently repeated independently by Hiremath and Patil (1999). Bhat *et al*. (1999), Kawase (2000) and Nanthakumar *et al*. (2000) also used molecular markers to demonstrate the proximity between *S. orientale* and its progenitor, *S. malabaricum* Burm.

Morphological variation

Cultivated *Sesamum indicum* L. has a highly variable genotype. Germplasm characterization and evaluation studies indicate wide diversity in plant height, branching pattern, leaf shape, height of first capsule-bearing node, number of capsules per axil, capsule length and width, number of seeds per capsule, number of locules per capsule, internode length,

and height of first fruiting branch (Bedigian *et al.* 1986). Variations in non-morphological characters are observed for 1000-seed weight, days to maturity, oil content, seed colour, harvest index, determinate habit, resistance to pests and diseases, dehiscence, etc.

As a result of wide variation in habitats, as well as the cultural variation and geographic isolation among its growers, there is an enormous diversity of sesame landraces (Bedigian 1988; 1991; 2004a; Bedigian and Harlan 1983; Bedigian *et al.* 1986). Local varieties remain confined to their narrowly specialized habitats. Diverse demands bring about specialized adaptations, e.g. one variety, 'Hirehir' has a short maturity growing on the hot dry Qoz soils across Sudan; the 'Dinderawi' variety has the longest capsules ever studied (Bedigian and Harlan 1983).

Nomenclature

The Latin binomial *Sesamum indicum* L. has a synonym, *S. orientale* L. The correct name has been a contested matter for decades (Manning 1991). Seegeler (1989) made a strong case for *S. orientale* based on taxonomic priority. The Tropicos database from the Missouri Botanical Garden upholds *S. orientale*. However, Nicholson and Wiersema (2004) presented a new proposal to conserve *S. indicum* against *S. orientale*, based on frequency of use. The conservation of a name has to be approved by a vote of the nomenclature committee of an International Congress of Botany (ICBN), which will take place at the next meeting in 2005. Likewise, many synonyms have been published about wild species in the genus. A fresh review of the taxonomy and ecology of the genus *Sesamum* by Bedigian (2005) offers a current view of relationships within the genus and can be found in Annex III.

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. These types of descriptors include characters such as yield, agronomic performance, stress susceptibilities and biochemical and cytological traits. They are generally the most interesting traits in crop improvement.

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

Highly discriminating descriptors are indicated as highlighted text.

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

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

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

(c) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell 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 representations 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; 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 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 consists 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/wiews/). If new Institute Codes are required, they can be generated online by national WIEWS administrators

1.2 Accession number (1.1) [MCPD]

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

1.3 Donor institute code [MCPD]

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

1.4 Donor accession number (1.3) [MCPD]

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

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

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

1.6 Genus (1.5.1) [MCPD]

Genus name for taxon. Initial uppercase letter required

1.7 Species (1.5.2) [MCPD]

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

1.7.1 Species authority [MCPD]

Provide the authority for the species name

1.8 Subtaxa [MCPD]

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

1.8.1 Subtaxa authority [MCPD]

Provide the subtaxa authority at the most detailed taxonomic level

1.9 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

1.9.1 Synonyms

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

1.9.2 Common crop name [MCPD]

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

1.10 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'

1.11 Accession size (1.9)

Approximate number or weight of seeds, tissue culture, etc. of an accession in the genebank

1.12 Type of material received (1.11)

1 Seed
2 Plant (including seedlings)
3 Pollen
4 *In vitro* culture
99 Other (specify in descriptor **1.13 Remarks**)

1.13 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) (2.2)

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

2.2 Collecting institute code [MCPD]

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

2.3 Collecting number (2.1) [MCPD]

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

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

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

2.5 Country of origin (2.4) [MCPD]

Code of the country in which the sample was originally collected. Use the three-letter 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 (2.5)

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

2.7 Breeding institute code [MCPD]

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

2.8 Location of collecting site (2.6) [MCPD]

Location information below the country level that describes where the accession was collected. This might include the distance in 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] (2.7) [MCPD]

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

2.10 Longitude of collecting site[1] (2.8) [MCPD]

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

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

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

2.12 Collecting/acquisition source (2.10) [MCPD]

The coding scheme proposed can be used at two different levels of detail: either by using the global codes such as 10, 20, 30, 40, or by using the more specific codes such as 11, 12, 13, etc.

- 10 Wild habitat
  - 11 Forest/woodland
  - 12 Shrubland
  - 13 Grassland
  - 14 Desert/tundra
  - 15 Aquatic habitat
- 20 Farm or cultivated habitat
  - 21 Field
  - 22 Orchard
  - 23 Backyard, kitchen or home garden (urban, peri-urban or rural)
  - 24 Fallow land
  - 25 Pasture
  - 26 Farm store
  - 27 Threshing floor
  - 28 Park
- 30 Market or shop
- 40 Institute/Experimental station/Research organization/Genebank
- 50 Seed company
- 60 Weedy, disturbed or ruderal habitat
  - 61 Roadside
  - 62 Field margin
- 99 Other (specify in descriptor **2.24 Remarks**)

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1 To convert longitude and latitude in degrees (º), minutes (’), seconds (”), and a hemisphere (North or South and East or West) to decimal degrees, the following formula should be used:

dº 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. 30º30’0’’ S = –30.5 and 30º15’55’’ N = 30.265.

2.13 Collecting source environment

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

2.14 Biological status of accession (2.11) [MCPD]

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

- 100 Wild
  - 110 Natural
  - 120 Seminatural/wild
- 200 Weedy
- 300 Traditional cultivar/landrace
- 400 Breeding/research material
  - 410 Breeder's line
    - 411 Synthetic population
    - 412 Hybrid
    - 413 Founder stock/base population
    - 414 Inbred line (parent of hybrid cultivar)
    - 415 Segregating population
  - 420 Mutant/genetic stock
- 500 Advanced/improved cultivar
- 999 Other (specify in descriptor **2.24 Remarks**)

2.15 Type of sample collected (2.15)

Form 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 Seed
- 2 Vegetative
- 3 Pollen
- 4 Tissue
- 99 Other (specify in descriptor **2.24 Remarks**)

2.16 Number of plants sampled (2.13)

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

2.17 Occurrence of *Sesamum* species in sampling area

Record the name of species and descriptor states assigned to each species separately

- 1 Rare
- 2 Occasional
- 3 Frequent
- 4 Abundant
- 99 Other (specify in descriptor **2.24 Remarks**)

2.18 Associated mycorrhizal fungi and/or rhizobium

Were root samples collected? If so, specify which fungi and/or rhizobium were identified in the laboratory in descriptor **2.24 Remarks**

0 No
1 Yes

2.19 Ethnobotanical data

2.19.1 Ethnic group

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

2.19.2 Local/vernacular name (2.12)

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

2.19.2.1 Translation

Provide translation of the local name into English, if possible

2.19.3 Cultural characteristics

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

0 No
1 Yes

2.19.4 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)

2.19.5 Plant uses

1 Seed
2 Oil
3 Oil cake
4 Medicinal
5 Ornamental
6 Feed
99 Other (specify in descriptor **2.24 Remarks**)

2.19.6 Main cooking methods (seed only)

1 Baking
2 Roasting
3 Snacks
99 Other (specify in descriptor **2.24 Remarks**)

2.19.7 Number of recipes

Record the number of recipes for each descriptor state of **2.19.6**, as available

2.19.8 Growing conditions

1 Arid
2 Semi arid
3 Stony (rocky, mountainous)
4 Wet land (flooded)
5 Wet land (raised beds)
6 Upland
7 Slopes
8 Natural swamp
9 Atoll (pits)
99 Other (specify in descriptor **2.24 Remarks**)

2.19.9 Cultural practices

2.19.9.1 Planting date [YYYYMMDD]

2.19.9.2 Harvest date [YYYYMMDD]

2.19.10 Cropping system

1 Monoculture
2 Intercropped (specify crop in descriptor **2.24 Remarks**)

2.19.11 Landrace/variety popularity

Is the landrace/variety collected is popular and widely grown? If yes, describe briefly why in descriptor **2.24 Remarks**

2.19.12 Market information

Specify if any premium price was assigned to this particular landrace/variety

0 No
1 Yes

2.20 Herbarium specimen

Was a herbarium specimen collected? If so, provide an identification number in the descriptor **2.24 Remarks**

2.21 Associated flora

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

2.22 Prevailing stresses

Information on associated biotic and abiotic stresses (stage of the crop at which biotic and/or abiotic stress occurred and its duration). Indicate if disease indexing was done at the time of collecting

0 No
1 Yes

2.23 Photograph (2.14)

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

0 No
1 Yes

2.24 Remarks

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

MANAGEMENT

3. Management descriptors

3.1 Accession number (Passport 1.2)

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

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

3.4 Storage date [YYYYMMDD]

3.5 Seed germination at storage [%]

3.6 Date of last germination test [YYYYMMDD]

3.7 Seed germination at the last test [%]

3.8 Date of next test [YYYYMMDD]
Estimate date when the accession should next be tested

3.9 Seed moisture content at harvest [%]

3.10 Moisture content at storage [%]

3.11 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 (specify in descriptor **3.18 Remarks**)

3.12 Acquisition date [YYYYMMDD] (1.7) [MCPD]
Date on which the accession entered the collection where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens. Leading zeros are required

3.13 Amount of seed in storage [g or number] (Passport 1.11)
Approximate number or weight of seeds or plants of an accession in the genebank

3.14 Location of safety duplicates [MCPD]
Code of the institute where a safety duplicate of the accession is maintained. It follows the Institute Code standards. See instructions under **1.1** Institute Code

3.15 Type of stored plant material
1 Seed
2 Vegetative
3 Tissue
4 Pollen
99 Other (specify in descriptor **3.18 Remarks**)

3.16 *In vitro* conservation

3.16.1 Type of source explants
1 Seed or zygotic embryo
2 Meristem
3 Shoot tip
4 Somatic embryo
5 Other organ via callus or suspension culture
99 Other (specify in descriptor **3.18 Remarks**)

3.16.2 Date of introduction *in vitro* [YYYYMMDD]

3.16.3 Type of subculture material
1 Apical or axillary bud
2 Callus
3 Cell suspension
99 Other (specify in descriptor **3.18 Remarks**)

3.16.4 Regeneration process
1 Organogenesis
2 Somatic embryogenesis
99 Other (specify in descriptor **3.18 Remarks**)

3.16.5 Number of individuals introduced *in vitro*

3.16.6 Number of replicates per genotype

3.16.7 Last subculture date [YYYYMMDD]

3.16.8 Medium used at the last subculture

3.16.9 Number of plants at the last subculture

3.16.10 Location after the last subculture

3.16.11 Next subculture date [YYYYMMDD]

3.17 Cryopreservation

3.17.1 Type of material for cryopreservation
1 Seed
2 Zygotic embryo
3 Apex or axillary bud
4 Somatic embryo
5 Callus
6 Cell suspension
99 Other (specify in descriptor **3.18 Remarks**)

3.17.2 Introduction date in liquid nitrogen [YYYYMMDD]

3.17.3 Number of samples introduced in liquid nitrogen

3.17.4 End of storage period [YYYYMMDD]

3.17.5 Number of samples taken from liquid nitrogen

3.17.6 Type of subcultured material for recovery (After liquid nitrogen)
1 Seed
2 Zygotic embryo
3 Apex or axillary bud
4 Somatic embryo
5 Callus
6 Cell suspension
99 Other (specify in descriptor **3.18 Remarks**)

3.17.7 Regeneration process
1 Organogenesis
2 Somatic embryogenesis
99 Other (specify in descriptor **3.18 Remarks**)

3.17.8 Number of recovered samples

3.17.9 Location after the last subculture

3.18 Remarks

Any additional information may be specified here

4. Multiplication/regeneration descriptors

4.1 Accession number (Passport 1.2)

4.2 Population identification (Passport 2.3)

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

4.3 Multiplication/regeneration site location

4.4 Collaborator's name

4.5 Season

1 Summer (*Kharif*)
2 Winter (*Rabi*)
3 Spring (*Zaid*)

4.6 Sowing/planting date [YYYYMMDD] (3.4 / 5.4)

4.7 Cultural practices

4.7.1 Distance between plants [cm]

4.7.2 Distance between rows [cm]

4.7.3 Fertilizer application

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

4.7.4 Water availability

If irrigated, specify frequency of irrigation in descriptor **4.12 Remarks**

4.8 Plant/seedling vigour

Assessed at 20 days after emergence

3 Low
5 Medium
7 High

4.9 Number of plants established

4.10 Previous multiplication and/or regeneration (1.8)

4.10.1 Location

4.10.2 Sowing/planting date [YYYYMMDD]

4.10.3 Plot number

4.11 Number of times accession regenerated (1.10)

Since the date of acquisition

4.12 Remarks

Any additional information, including the information relating to method of isolation, selfing, sibbing, previous crop grown, etc., 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

5.2.2 Longitude

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 Sowing date [YYYYMMDD] (3.4)

5.5 Harvest date [YYYYMMDD] (3.5)

5.6 Evaluation/environment

Environment in which characterization/evaluation was carried out

1 Field
2 Screen house
3 Glasshouse
4 Laboratory
99 Other (specify in descriptor **5.15 Remarks**)

5.7 Type of planting material

1 Seed
2 Tissue culture plantlet (specify)
3 Vegetative part
99 Other (specify in descriptor **5.15 Remarks**)

5.8 Planting site in the field

Give block, strip and/or row/plot numbers as applicable, plants/plot, replication

5.9 Field spacing

5.9.1 **Distance between plants in a row** [cm]

5.9.2 **Distance between rows** [cm] (3.7)

5.10 Seed germination [%]
Percentage of plants germinated

5.11 Field establishment [%]
Percent of plants established

5.11.1 **Days to establishment** [d]
Specify number of days from planting after which establishment is measured

5.12 Environmental characteristics of site
Use descriptors **6.1** to **6.2** in section **6**

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

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

5.15 Remarks
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 (Adapted from FAO 1990)

1	Flat	0-0.5%
2	Almost flat	0.6-2.9%
3	Gently undulating	3-5.9%
4	Undulating	6-10.9%
5	Rolling	11-15.9%
6	Hilly	16-30%
7	Steeply dissected	>30%, moderate elevation range
8	Mountainous	>30%, great elevation range (>300 m)
99	Other	(specify in descriptor **6.2 Remarks**)

6.1.2 Higher level landform (general physiographic features)

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

1 Plain
2 Basin
3 Valley
4 Plateau
5 Upland
6 Hill
7 Mountain
99 Other (Specify in descriptor **6.2 Remarks**)

6.1.3 Land element and position

Description of the geomorphology of the immediate surroundings of the collecting 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 Beach ridge
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 descriptor **6.2 Remarks**)

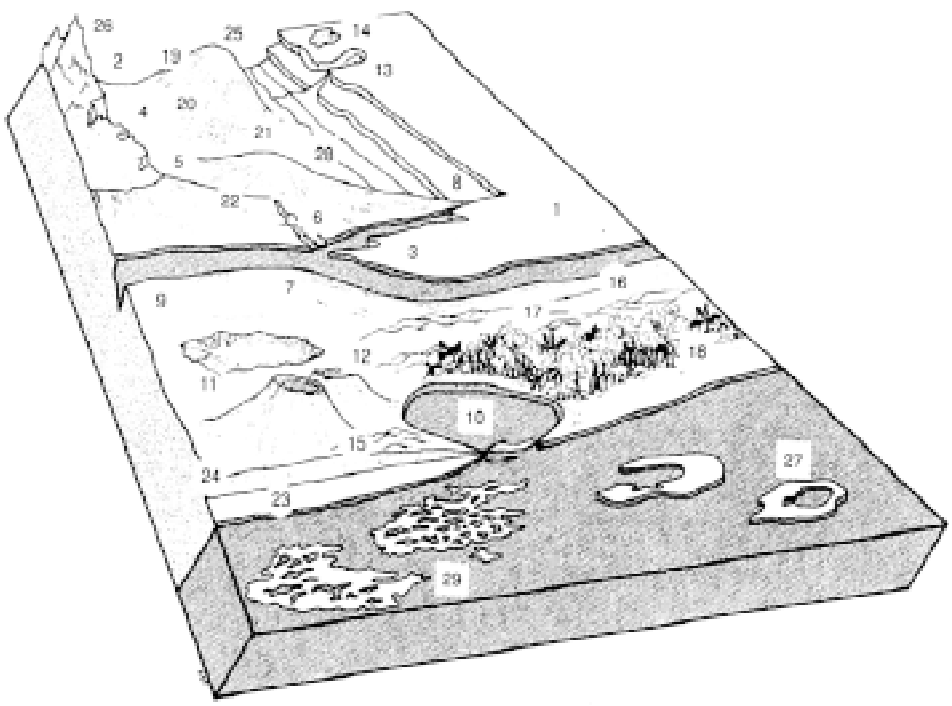

Fig. 1. Land element and position

6.1.4 Slope [°]

Estimated slope of the collecting 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

(Adapted from FAO 1990)

1 Annual field cropping
2 Perennial field cropping

6.1.7 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 descriptor **6.2 Remarks**)

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)
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 Organic deposits
15 Colluvial deposits
16 *In situ* weathered
17 Saprolite
99 Other (specify in descriptor **6.2 Remarks**)

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 descriptor **6.2 Remarks**)
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 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

6.1.12 Soil salinity

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

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 Charts (Munsell Color 1977). 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

6.1.14 Soil pH (2.16)

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

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

6.1.15 Soil erosion

3 Low
5 Intermediate
7 High

6.1.16 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 (2.18)

(Adapted from FAO 1990)

For convenience in determining the texture classes of the following list, particle size classes are also given for each of the fine earth fraction listed 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

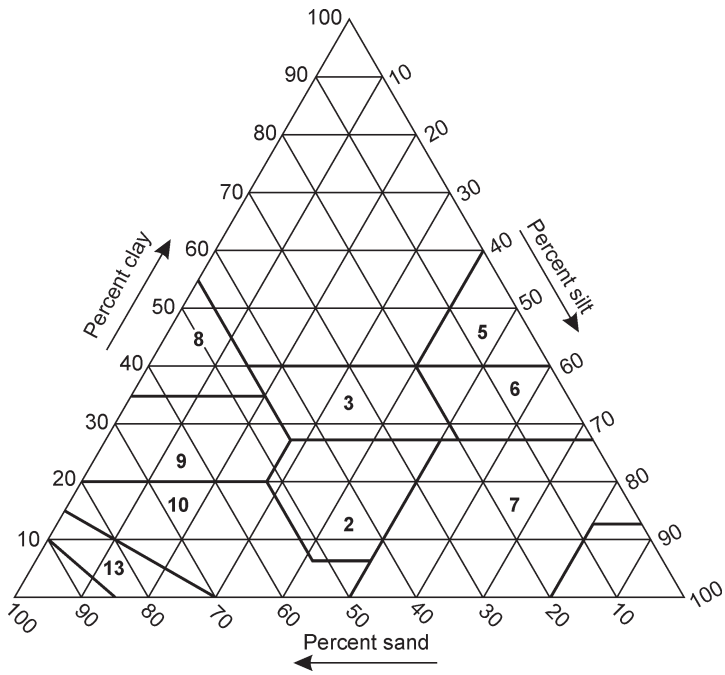

Fig. 2. Soil texture classes

6.1.17.1 Soil particle size classes

(Adapted from FAO 1990)

1	Clay	< 2 µm
2	Fine silt	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 organic matter content

1 Nil (as in arid zones)
2 Low (as in long-term cultivation in 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 Rainfed
2 Irrigated
3 Flooded
4 River banks
5 Sea coast
99 Other (specify in descriptor **6.2 Remarks**)

6.1.21 Soil moisture content [Øg]

Moisture content measured gravimetrically

$$Øg = \frac{\text{Wet weight of the soil-Dry weight of the soil}}{\text{Dry weight of the soil}} \times 100$$

6.1.22 Soil fertility

General assessment of the soil fertility based on existing vegetation

3 Low
5 Moderate
7 High

6.1.23 Climate of the site

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

6.1.23.1 Temperature [°C]

Provide either the monthly or the seasonal mean

6.1.23.2 Dry season length [d]

6.1.23.3 Rainfall [mm]

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

6.1.23.4 Wind [m/s]

Annual average (state number of years recorded)

6.1.23.4.1 Frequency of typhoons or hurricane force winds

3 Low
5 Intermediate
7 High

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

6.1.23.4.3 Annual maximum wind velocity [m/s]

6.1.23.5 Frost

6.1.23.5.1 Date of most recent frost [YYYYMMDD]

6.1.23.5.2 Lowest temperature [ºC]
Specify seasonal average and minimum survival temperature

6.1.23.5.3 Duration of temperature below 0ºC [d]

6.1.23.6 Relative humidity

6.1.23.6.1 Relative humidity diurnal range [%]

6.1.23.6.2 Relative humidity seasonal range [%]

6.1.23.7 Light
3 Shady
7 Sunny

6.1.23.8 Day length [h]
Provide either the monthly (mean, maximum, minimum) or the seasonal (mean, maximum, minimum)

6.2 Remarks
Any other site-environment-specific information

CHARACTERIZATION

7. Plant descriptors

For all quantitative descriptors (metric traits), record the mean of at least five measurements per individual accession. Most of the observations should be made at maximum vegetative growth stage (at 50% flowering), unless otherwise specified.

To make the colour description as simple as possible and because the complexity and difficulty in recording colour descriptors, since most of them include colour variations, it was decided to list only the main colours.

7.1 Seedling characters (4.1.1)

Observed within 7 to 15 days after germination

7.1.1 Leaf enations (4.1.1.1)
0 Absent
1 Present

7.1.2 Colour of cotyledons (4.1.1.2)
1 Green
2 Green with white margin

7.1.3 Shape of cotyledons (4.1.1.3)
1 Flat
2 Cup shaped
99 Other (specify in descriptor **7.8 Remarks**)

7.1.4 Cotyledon hairiness
0 Absent
1 Present

7.1.5 Insertion of cotyledons (4.1.1.4)
1 Sessile
2 Pedicellate

7.1.6 Length of cotyledon [mm] (4.1.1.5)

7.1.7 Length of hypocotyl [mm] (4.1.1.6)

7.2 Plant characters

7.2.1 Plant growth type (4.1.2)

(See Fig. 3)

1 Indeterminate
2 Determinate

Fig. 3. Plant growth type

7.2.2 Plant growth habit

(See Fig. 4)

1 Prostrate
2 Semi-erect
3 Erect

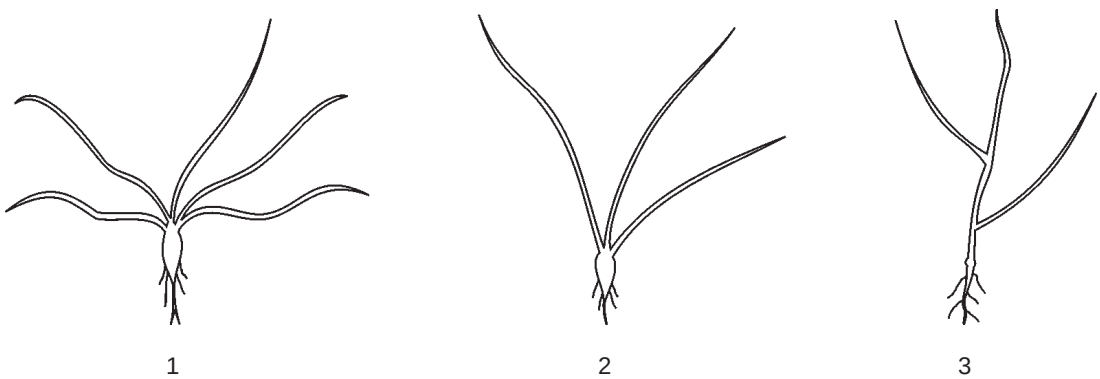

Fig. 4. Plant growth habit

7.2.3 Root system (6.1.7)

(See Fig. 5)

1 Shallow fibrous
2 Deep thin taproot
3 Tuberous thick taproot

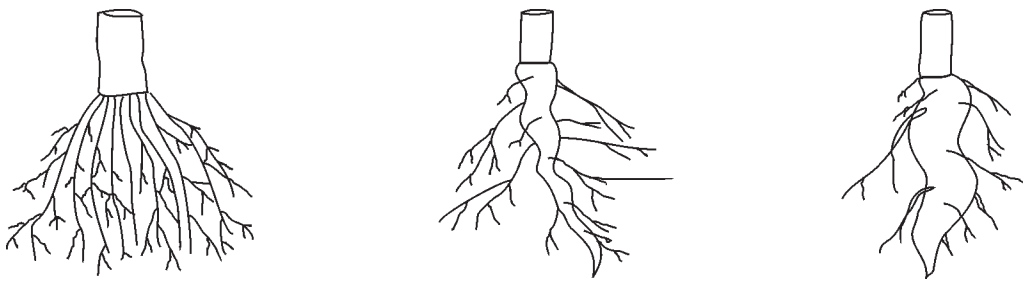

Fig. 5. Root system

7.3 Stem characters

7.3.1 Plant height [cm] (6.1.3)

Measured at flower initiation on the main stem from the ground level up to the apex

7.3.2 Main stem colour (4.1.5)

Presence of pigments recorded on mature plants, colour should be determined on the older, lower, part of the stem

1 Green
2 Yellow
3 Purplish green
4 Purple
99 Other (specify in descriptor **7.8 Remarks**)

7.3.3 Stem hairiness (4.1.6)

(See Fig. 6)

0 Glabrous (hair absent)
3 Weak or sparse
5 Medium
7 Strong or profuse

Fig. 6. Stem hairiness

7.3.4 Shape of hair

(See Fig. 7)

1 Short and straight
2 Medium and straight
3 Long and bent

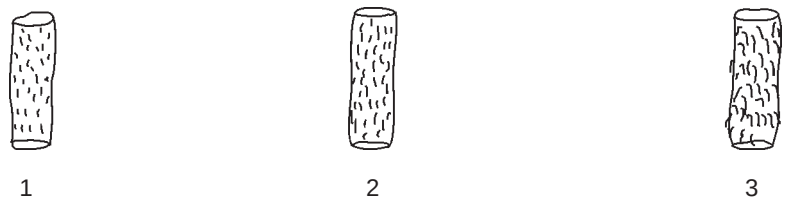

Fig. 7. Shape of hair

7.3.5 Stem shape in cross section (4.1.7)

(See Fig. 8)

1 Round
2 Square

Fig. 8. Stem shape in cross section

7.3.6 Stem fasciation (4.1.9)

0 Absent
1 Present

7.3.7 Stem branching

(See Fig. 9)

1 Opposite
2 Alternate
3 Ternate
4 Mixed

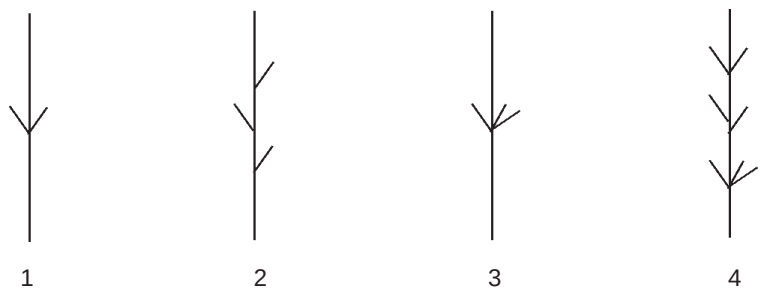

Fig. 9. Stem branching

7.3.8 Branching pattern (4.1.4)

0 Non branching
1 Basal branching
2 Top branching
3 Other (specify in descriptor **7.8 Remarks)**

7.3.9 Internode length [cm] (4.2.11)

Measured as an average of 10 internode distances on the same stalk, with five replicate branches from the same plant

7.3.10 Number of primary branches

7.3.11 Number of secondary branches

7.4 Leaf characters

7.4.1 Leaf colour (4.1.10)

Recorded at onset of flowering on fully formed functional leaf (not at apex and not at physiological maturity).

1 Green
2 Green with yellowish cast
3 Green with blue-gray cast
4 Green with purple cast
99 Other (specify in descriptor **7.8 Remarks**)

7.4.2 Leaf hairiness (4.1.11)

Recorded on ventral surface of bottom leaves (See Fig. 10)

0 Glabrous (hair absent)
3 Weak or sparse
5 Medium
7 Strong or profuse

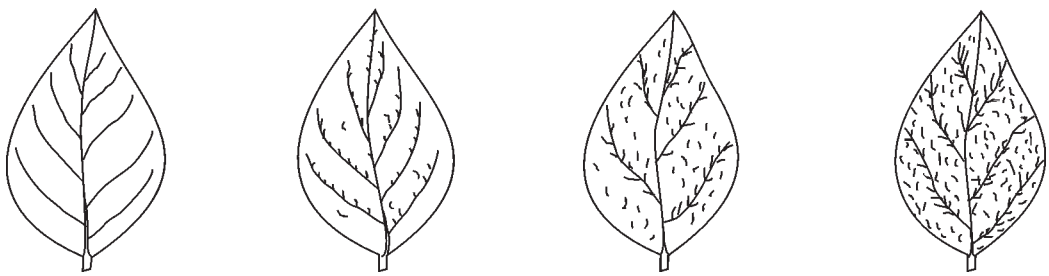

Fig. 10. Leaf hairiness

7.4.3 Shape of hair

(See Fig. 7)

1 Short and straight
2 Medium and straight
3 Long and bent

7.4.4 Leaf arrangement (4.1.12)

Recorded on the upper half of the main stem at beginning of flowering. (See Fig. 11)

1 Opposite
2 Alternate
3 Ternate
4 Mixed

Fig. 11. Leaf arrangement

7.4.5 Leaf shape

Record middle and top leaves separately. (See Fig. 12)

1 Linear
2 Lanceolate
3 Elliptic
4 Ovate
5 Narrowly cordate
99 Other (specify in descriptor **7.8 Remarks**)

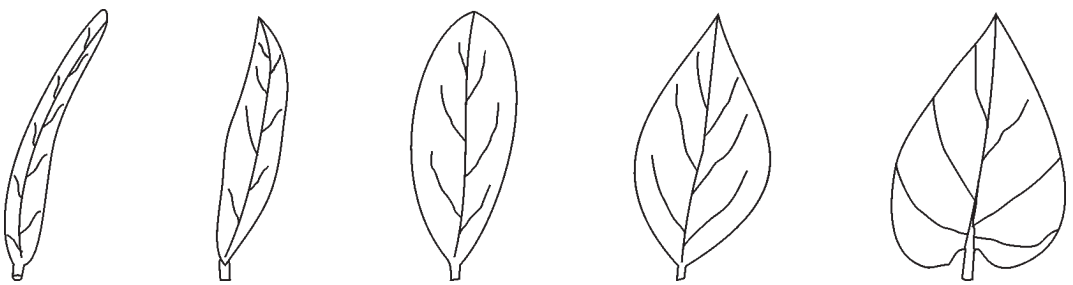

Fig. 12. Leaf shape

7.4.6 Basal leaf profile (4.1.14)

Cross-section at the middle of the leaf blade. (See Fig. 13)

1 Flat
2 Cup shaped (concave)
3 Reverse cup shaped (convex)

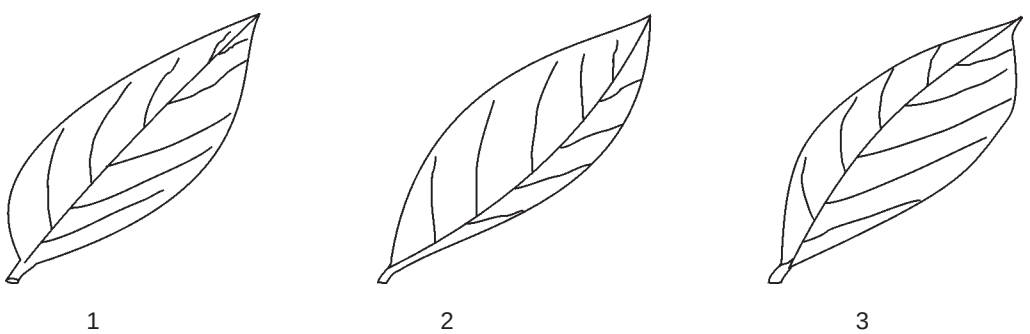

Fig. 13. Basal leaf profile

7.4.7 Basal leaf margin

(See Fig. 14)

1 Entire
2 Serrate
3 Dentate

Fig. 14. Basal leaf margin

7.4.8 Lobe incision of basal leaf (4.1.13)

Recorded on the lower half of the main stem at beginning of flowering based on the most common state. (See Fig. 15)

0 Absent (leaf entire)
3 Weak
5 Medium
7 Strong (three or more lobes)

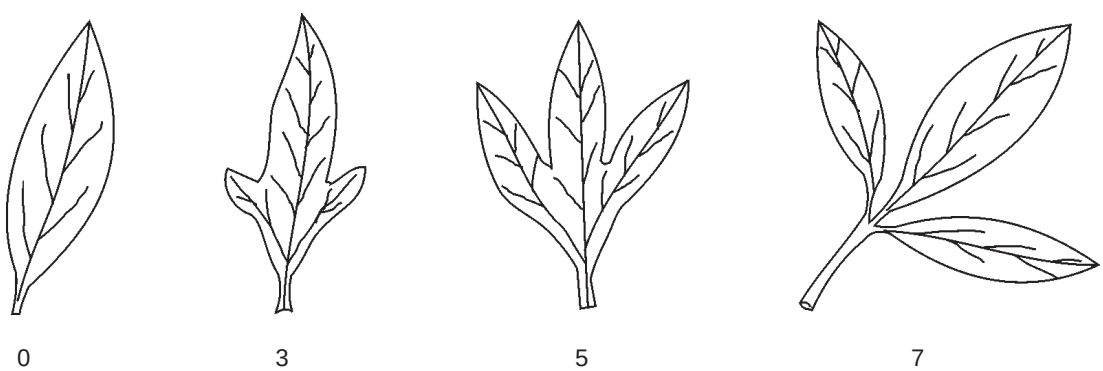

Fig. 15. Lobe incision of basal leaf

7.4.9 Length of basal leaf [cm]
Mean length of five leaves from the basal portion of the main stem

7.4.10 Width of basal leaf [cm]
Mean width of five leaves from the basal portion of the main stem

7.4.11 Length of middle (mid-level/mid-height) leaf [cm]
Mean length of five leaves from the middle portion of the main stem

7.4.12 Width of middle (mid-level/mid-height) leaf [cm]
Mean width measured at the widest point of five leaves from the middle portion of the main stem

7.4.13 Length of top leaf [cm]
Mean length of five leaves from the top of the main stem (five cm below the apex)

7.4.14 Width of top leaf [cm]
Mean width measured at the widest point of five leaves from the top of the main stem (five cm below the apex)

7.4.15 Leaf glands (4.1.15)

0 Absent
1 Present

7.4.16 Leaf angle to main stem (4.1.16)
Measured on the main stem and not on the branches. (See Fig. 16)

1 Acute (<90°)
2 Horizontal (=90°)
3 Drooping (>90°)

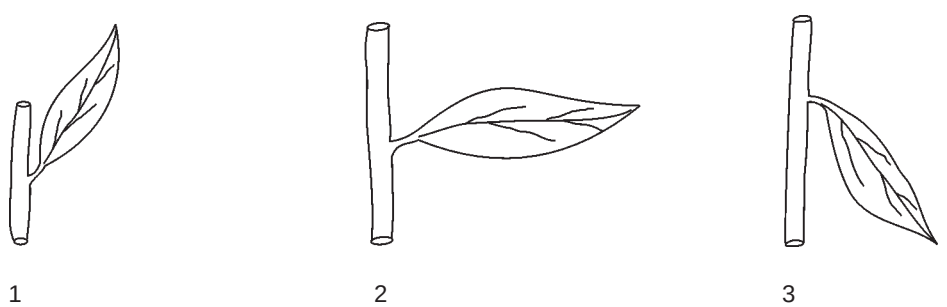

Fig. 16. Leaf angle to main stem

7.4.17 Petiole length of basal leaf [cm]
Mean of five leaves from the basal portion of the main stem

7.4.18 Petiole length at middle (mid-level/mid-height) leaf [cm]
Mean of five leaves from the middle portion of the main stem

7.4.19 Petiole length of top leaf [cm]
Mean of five leaves from the top of the main stem (five cm below the apex)

7.4.20 Petiole colour
Observed on fully-formed, mature, leaves
1 Green
2 Greenish purple
3 Purple
4 Pink
99 Other (specify in descriptor **7.8 Remarks**)

7.4.21 Petiole hairiness
(See Fig. 6 and 10)
0 Glabrous (hair absent)
3 Weak or sparse
5 Medium
7 Strong or profuse

7.4.22 Shape of petiole hair
(See Fig. 7)
1 Short and straight
2 Medium and straight
3 Long and bent

7.5 Inflorescence characters

7.5.1 Days to flower initiation [d]
Number of days from sowing or first irrigation to first flower initiation

7.5.2 Days to 50% flowering [d] (4.2.1)
Number of days from sowing or first irrigation until 50% of the plants in a row initiate flowering

7.5.3 Number of flowers per leaf axil (4.2.9)
1 One
2 More than one

7.5.4 Extra-floral nectary development (4.2.7)
(See Fig. 17)

1 Rudimentary
2 Small
3 Medium
4 Large

Fig. 17. Extra-floral nectary development

7.5.5 Extra-floral nectar colour

1 Light yellow
2 Yellow
3 Purple

7.5.6 Number of nodes to first flower (4.2.10)
Observed on the main stem

7.5.7 Corolla length [mm]
Average of five fully developed flowers

7.5.8 Calyx tip colour

1 Green
2 Purple
99 Other (specify in descriptor **7.8 Remarks**)

7.5.9 Length of calyx lobe [mm]
Average of five fully developed flowers

7.5.10 Calyx hairiness
(See Fig. 6 and 10)
0 Glabrous (hair absent)
3 Weak or sparse
5 Medium
7 Strong or profuse

7.5.11 Shape of calyx hair
(See Fig. 7)
1 Short and straight
2 Medium and straight
3 Long and bent

7.5.12 Corolla hairiness (4.2.8)
(See Fig. 6 and 10)
0 Glabrous (hair absent)
3 Weak or sparse
5 Medium
7 Strong or profuse

7.5.13 Shape of corolla hair
(See Fig. 7)
1 Short and straight
2 Medium and straight
3 Long and bent

7.5.14 Exterior corolla colour (4.2.2)
1 White
2 White with pink shading
3 White with deep pink shading
4 Pink
5 Light violet
6 Dark violet
7 Purple
8 Red
9 Maroon
99 Other (specify in descriptor **7.8 Remarks**)

7.5.15 Interior corolla colour

1 White
2 White with pink shading
3 White with deep pink shading
4 Pink
5 Light violet
6 Dark violet
7 Purple
8 Red
9 Light maroon
99 Other (specify in descriptor **7.8 Remarks**)

7.5.16 Corolla interior pigmentation

(Dark violet/purple/red flakes)

0 Absent
1 Pigmented throughout
2 Pigmentation along the lip region of corolla tube
3 Pigmentation in the supra foveolate region
4 Pigmentation in the infra foveolate region
99 Other (specify in descriptor **7.8 Remarks**)

7.5.17 Lower lip colour (4.2.3)

0 Colourless
1 Coloured

7.5.18 Length of the longest lip [mm]

Length of the longest lip measured in mm

7.5.19 Absence/presence of foveola

Small V or W shaped depression in the interior middle of the corolla below the lower lip. (See Fig. 18)

0 Absent
1 Present

Fig. 18. Absence/presence of foveola

7.5.20 Anther filament colour

1 White
2 White with violet dots
99 Other (specify in descriptor **7.8 Remarks**)

7.5.21 Anther connective tip gland

0 Absent
1 Present

7.5.22 Style length (4.2.6)

1 Short (stigma terminating below the position of anthers)
2 Medium (stigma position at anther's level)
3 Long (stigma protruding outside the position of anthers)

7.6 Capsule characters

7.6.1 Number of capsules per plant (4.2.18)

Mean of five randomly selected plants

7.6.2 Number of locules per capsule

Observed on capsules from the middle of main stem

1 Four
2 Six
3 Eight
4 Mixed

7.6.3 Number of carpels per capsule (4.2.15)

1 Bicarpellate
2 Tetracarpellate

7.6.4 Bicarpellate capsule shape (4.2.14)

Capsule from the middle of main stem. (See Fig. 19)

1 Tapered at apex
2 Narrow oblong
3 Broad oblong
4 Square

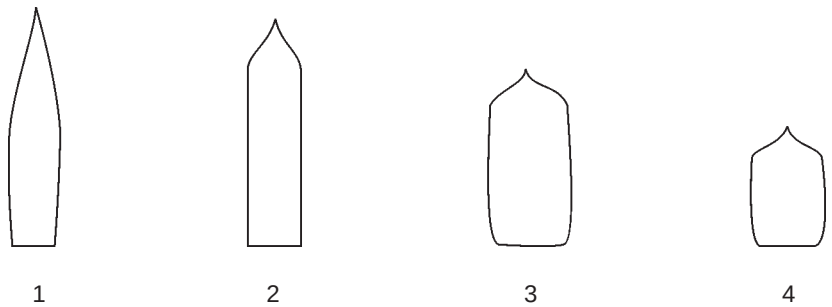

Fig. 19. Bicarpellate capsule shape

7.6.5 Capsule arrangement

(See Fig. 20)

1 Monocapsular
2 Multicapsular (Record the number of capsules per node in descriptor **7.8 Remarks**)

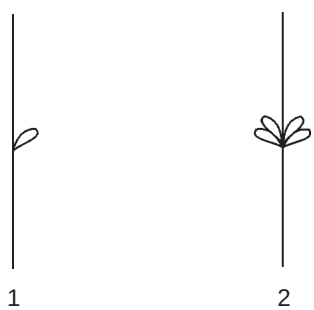

Fig. 20. Capsule arrangement

7.6.6 Capsule hairiness (4.2.16)

(See Fig. 6 and 10)

0 Glabrous (hair absent)
3 Weak or sparse
5 Medium
7 Strong or profuse

7.6.7 Shape of capsule hair
(See Fig. 7)
1 Short and straight
2 Medium and straight
3 Long and bent

7.6.8 Mean capsule length [mm] (4.2.12)
Measured on five randomly selected capsules from the middle of main stem, each from a different plant at physiological maturity

7.6.9 Mean capsule width [mm] (4.2.13)
Measured on five randomly selected capsules from the middle of main stem, each from a different plant at physiological maturity

7.6.10 Mean capsule thickness [mm]
Measured on five randomly selected capsules at physiological maturity, from the middle of main stem, each from a different plant at physiological maturity

7.6.11 Anthocyanin coloration of capsule (4.2.17)
Recorded in immature stage of the capsule
0 Absent
1 Present

7.6.12 Colour of dry capsules
(Sun dried)
1 Green
2 Straw/yellow
3 Brown/tan
4 Purple

7.6.13 Capsule dehiscence at ripening (4.2.21)
1 Non-shattering
2 Partially shattering
3 Completely shattering

7.6.14 Type of capsule beak
1 Short
2 Long
3 Curved
4 Cleft
99 Other (specify in descriptor **7.8 Remarks**)

7.6.15 Thickness of capsule mesocarp (4.2.19)
1 Thin
2 Thick

7.6.16 Seeds per capsule (4.2.20)

Mean number of seeds from five randomly selected capsules from five different plants taken from the middle of the main stem

7.6.17 Seed dormancy

Number of days required for germination to commence after harvest of physiologically matured seeds/capsules

7.7 Seed characters

7.7.1 Seed coat texture (4.3.2)

(See Fig. 21)

1 Smooth
2 Partially rough
3 Radially rough
4 Partially radially rough
5 Reticulately rough
6 Partially reticulately rough
99 Other (specify in descriptor **7.8 Remarks**)

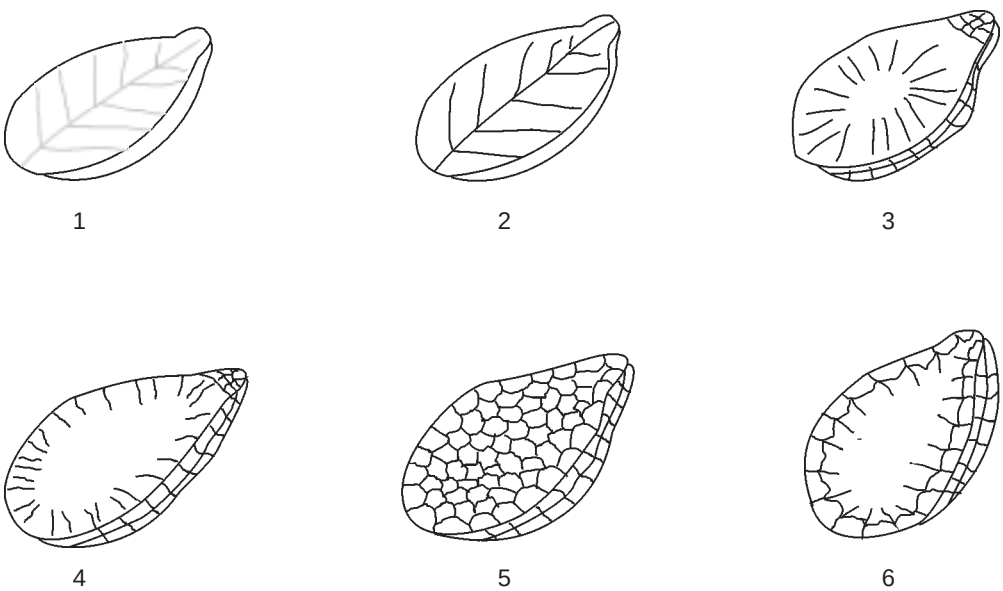

Fig. 21. Seed coat texture

7.7.2 Seed coat colour (4.3.1)

(If the accessions show more than one colour, each colour should be named separately as per the intensity of colour in descending order)

1 White
2 Cream
3 Beige
4 Light brown
5 Medium brown
6 Dark brown
7 Brick red
8 Tan
9 Olive
10 Grey
11 Dull black
12 Bright black
99 Other (specify in descriptor **7.8 Remarks**)

7.7.3 Seed shape

(See Fig. 22)

1 Oval with convex side
2 Oval with concave side
3 Elongated
4 Winged
99 Other (specify in descriptor **7.8 Remarks**)

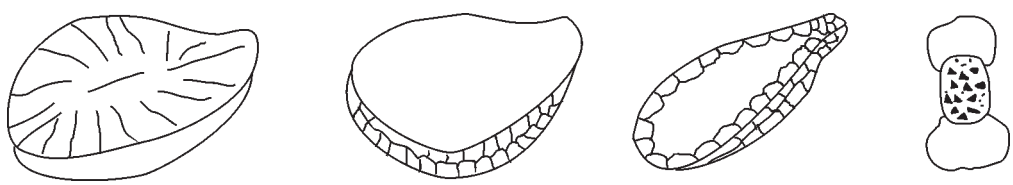

Fig. 22. Seed shape

7.7.4 Seed coat percentage (4.3.3)

Weight of seed coat as a percentage of seed weight on dry weight basis

7.7.5 1000-seed weight [g] (4.3.4)

Weight in grams of 1000 random seeds taken from the bulk harvest

7.8 Remarks

Any additional information, especially in the category of 99= 'Other' under various descriptors above, may be specified here

EVALUATION

8. Plant descriptors

8.1 Agronomic characters

8.1.1 Days to emergence [d] (6.1.1)
Number of days from planting or first irrigation until 50% seedling emergence

8.1.2 Days to physiological maturity [d] (6.1.2)
Number of days from planting or first irrigation until 75% of plants reaching physiological maturity

8.1.3 Stem height from base to first branch [cm]
Mean height of five random plants from the middle of the plot

8.1.4 Distance from base of lowest branch to first capsule [cm]
Mean of five random plants from the middle of the plot

8.1.5 Lodging susceptibility [%] (6.1.4)
Scored at seed maturity (percentage of plants lodged)

0 None (all plants standing)
3 Low
5 Medium
7 High

8.1.6 Biomass yield per plant [g] (6.1.5)
Mean yield from five randomly selected plants at physiological maturity

8.1.7 Seed yield per plant [g] (6.1.6)
Average seed yield from five randomly selected plants

8.1.8 Harvest index [%]
Ratio of total grain to total biological yield taken from randomly selected plants in a row

8.2 Quality characters of seeds

8.2.1 Seed crude protein content [g/100g DW] (6.3.4)

8.2.2 Amino acid composition [µg/g DW]
Estimate essential amino acids in seed sample [FAO 1991]

8.2.3 Oil content [% DW] (6.3.1)
Briefly indicate the method used for the estimation with relevant reference(s)

8.2.4 Oil composition (6.3.2)
Ratio of oleic-linoleic fatty acids

8.2.5 Oil stability [%] (6.3.3)
Percentage of anti-oxidants (sesamin, sesamolin, lignans)

8.3 Chemical analysis of seeds

8.3.1 Dry matter content [g/100g DW]

8.3.2 Micronutrients content
(e.g. Manganese, Zinc, Copper, etc.)

8.3.3 Analysis of anti-nutritional factors
(e.g. Tannin, Trypsin inhibitors, Chymotrypsin inhibitor, Lectins, Amylase inhibitors, Saponins, Phytic acid, etc.)

8.4 Remarks
Specify here any other additional information

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

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

9.1 Reaction to low temperature (7.1)

9.2 Reaction to higher temperature (7.2)

9.3 Reaction to drought (7.3)

9.4 Reaction to high soil moisture (7.4)

9.5 Reaction to soil salinity (7.5)

9.6 Reaction to high soil acidity (pH, 4.5) (7.6)

9.7 Reaction to sunscald

9.8 Reaction to constant winds
Expressed as the degree of lodging

9.9 Remarks
Specify any additional information here

10. Biotic stress susceptibility
In each case, it is important to state the origin of the infestation or infection, i.e. natural, field inoculation, and laboratory. Also specify the causal organism and the corresponding symptoms. Record such information in descriptor **10.6 Remarks**. 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

The growth stage, coded according to the list below at which each reaction was recorded should be appended to the record of that reaction:

1 Seed
2 Seedling
3 Pre-flowering
4 Early flowering
5 Mid-flowering
6 Late-flowering
7 Maturity

	Causal organism	Common name
10.1 Insect		
10.1.1	*Acherontia styx*	Hawk moth
10.1.2	*Antigastra catalaunalis*	Web rollers
10.1.3	*Asphondylia sesame*	Gall fly
10.1.4	*Bemisia tabaci*	White fly
10.1.5	*Chartoicetes terminifera*	Plague locusts
10.1.6	*Cyrtozemia disper*	Black weevil
10.1.7	*Frankliniella schultzei*	Thrips
10.1.8	*Heliothis armigera*	Pod borers
10.1.9	*Monomorium destructor*	Ant
10.1.10	*Myzus persicae*	Aphids
10.1.11	*Nezara viridula*	Green vegetable bug
10.1.12	*Orosius albicinctus*	Jassid
10.1.13	*Pyrilla perpusilla*	Leaf hoppers
10.1.14	*Polyphagotarso nemus latus*	Mite
10.1.15	*Spilostethus pandurus*	Bug
10.1.16	*Spodoptera* spp.	Army worms
10.1.17	*Thrips palmi*	Thrips
10.2 Fungi		
10.2.1	*Alternaria sesami*	Leaf spot and blight
10.2.2	*Cercospora sesami*	Leaf spot
10.2.3	*Colletotrichum* spp.	Anthracnose
10.2.4	*Fusarium vasinfectum*	Fusarium wilt
10.2.5	*Macroiphomina phaseolina*	Root and stem rot
10.2.6	*Phytophthora parasitica*	Phytophthora stem rot/blight
10.2.7	*Erysiphe orontii*	Powdery mildew
10.3 Bacteria		
10.3.1	*Pseudomonas sesami*	Bacterial black rot
10.3.2	*Xanthomonas campestr*is pv. Sesame	Bacterial blight
10.4 Nematodes		
10.4.1	*Heterodera cajani*	Cyst nematode
10.5 Virus and mycoplasma		
10.5.1	*Nicotinia 10 virus*	Leaf curl
10.5.2	MLO transmitted by *Orosius albicintus*	Phyllody

10.6 Remarks

Specify here any additional information

11. Biochemical markers

Specify methods used and cite reference(s). 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

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.)

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

Alercia, A., S. Diulgheroff and T. Metz. 2001. Multicrop Passport Descriptors. Food and Agricultural Organization of the United Nations and International Plant Genetic Resources Institute. Http://www.ipgri.cgiar.org/publications/indexpub.htm.

Bedigian, D.1988. *Sesamum indicum* L. (Pedaliaceae): Ethnobotany in Sudan, crop diversity, lignans, origin, and related taxa. Pp. 315-321 *in* Modern Systematic Studies in African Botany: AETFAT Monographs in Systematic Botany (P. Goldblatt and P.P. Lowry, eds.), Missouri Botanical Garden, St. Louis. Volume 25.

Bedigian, D. 1991. Genetic diversity of traditional sesame cultivars and cultural diversity in Sudan. Pp. 25-36 *in* Biodiversity: Culture, Conservation and Ecodevelopment (M.L. Oldfield and J.B. Alcorn, eds.). Westview Press, Boulder, Co.

Bedigian, D. 2003a. Evolution of Sesame Revisited: Domestication, Diversity and Prospects. Genetic Resources and Crop Evolution, 50:779-787.

Bedigian, D. 2003b. Sesame in Africa: Origin and Dispersals. Pp. 17-36 *in* Food, Fuel and Fields - Progress in African Archaeobotany (K. Neumann, A. Butler and S. Kahlheber, eds.). Africa Praehistorica. Heinrich-Barth-Institute, Cologne.

Bedigian, D. 2004a. Assessment of Sesame and its Wild Relatives in Africa. *In* Proceedings, Association pour l'Etude Taxonomique et Floristique in Afrique Tropicale [AETFAT] Congress, Addis Ababa, September 21-26, 2003. Royal Botanic Gardens, Kew.

Bedigian, D. 2004b. History and Lore of Sesame in Southwest Asia. Economic Botany, 58(3): 329-353.

Bedigian, D. 2005. The Taxonomy and Ecology of *Sesamum* L. Blumea. Volume: 50.

Bedigian, D. and J. R. Harlan. 1983. Nuba agriculture and ethnobotany with particular reference to sesame and sorghum. Economic Botany, 37:384-395.

Bedigian, D., D. S. Seigler and J. R. Harlan. 1985. Sesamin, sesamolin and the origin of sesame. Biochemical Systematics and Ecology, 13:133-139.

Bedigian, D., C. A. Smyth and J. R. Harlan. 1986. Patterns of morphological variation in sesame. Economic Botany, 40:353-365.

Bhat, K.V., P. P. Babrekar and S. Lakhanpaul. 1999. Study of genetic diversity in Indian and exotic sesame (*Sesamum indicum* L.) germplasm using random amplified polymorphic DNA (RAPD) markers. Euphytica, 110:21-33.

Bose, K. and A.K. Biswas. 1994. Further studies in interspecific hybridization in *Sesamum*. Proceedings of the Indian Science Congress Association, 81(3:VIII): 104.

Brar, G.S. and K.L. Ahuja. 1979. Sesame: its culture, genetics, breeding and biochemistry. Pp. 245-303 *in* Annu. Rev. of Plant Sci (C.P. Malik, ed.). Kalyani publishers, New Delhi.

Candolle, A. de. 1886. Origin of cultivated plants. Hafner, New York.

Darlington, C. D. 1963. Chromosome botany and the origin of cultivated plants. 2nd ed. Allen and Unwin, Ltd., London.

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

FAO. 1990. *In* 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. 70 Pp.

FAO. 1991. FAO/WHO food and Nutrition paper 1991. Protein quality evaluation. Report of joint FAO/WHO expert consultation. FAO. Bethesda, USA. 51: 1-66.

FAO. 2003. Production Yearbook 2002. Table 42: Sesame Seed. FAO Statistics Series No. 176. FAO, Rome. 56: 125-126.

FAOSTAT data. 2004. URL http://apps.fao.org/faostat/collections?version=ext&hasbulk=0&subset=agriculture

FAO and IPGRI. 1994. Genebank Standards. Food and Agriculture Organization of the United Nations, Rome, International Plant Genetic Resources Institute, Rome.

Hiltebrandt, V. M. 1932. *Sesamum indicum* L. Bull. Appl. Bot. Gen. and Plant Breeding series IX, No:2, 3-107.

Hiremath, S. C. and C. G. Patil. 1999. Genome homology and the putative progenitor of sesame. Journal of Cytology and Genetics, 34:69-74.

IBPGR. 1981. Descriptors for sesame. International Board for Plant Genetic Resources, Rome, Italy (AGP:IBPGR/80/71, March, 1981).

IBPGR. 1985. Sesame Descriptors. International Board for Plant Genetic Resources, Rome, Italy (AGPG:IBPGR/85/132, November 1985).

Ihlenfeldt, H.D. and U. Grabow-Seidensticker. 1979. The genus *Sesamum* L. and the origin of the cultivated sesame. Pp. 53-60 *in* Taxonomic Aspects of African Economic Botany: Proceedings of the IX plenary meeting of AETFAT. Excmo, (G. Kunkel, ed.). Las Palmas de Gran Canaria.

John, C.M. and U.N. Rao. 1941. Chromosome number of *Sesamum radiatum* Schum and Thonn. Beskr. Current Science, 10: 364-365.

Johnson, L.A., T.M. Suleiman and E.W. Lusas. 1979. Sesame protein: A review and prospectus. J. Amer. Oil Chem. Soc., 56:463-468.

Kamal-Eldin, A. 1993. Seed oils of *Sesamum indicum*, L. and some wild relatives. A compositional study of the fatty acids, acyl lipids, sterols, tocopherols and lignans. Ph.D thesis, Swedish University of Agricultural Sciences, Uppsala.

Kawase, M. 2000. Genetic relationships of the ruderal weed type and the associated weed type of *Sesamum mulayanum* Nair distributed in the Indian subcontinent to cultivated sesame, *S. indicum* L. Japan. J. Trop. Agr., 44: 115-122.

Kedharnath, S. 1950. A note on the chromosome numbers of some plants. Indian Journal of Genetics and Plant Breeding, 10: 96.

Manning, S. 1991. The genera of Pedaliaceae in the southeastern United States. Journal of the Arnold Arboretum Supplementary Series, I: 313-347.

Mitra, A.K. 1985. Interspecific crossing between *Sesamum indicum* and *S. laciniatum*. Proceedings of the Indian Science Congress Association, 72(3): 42.

Mitra, A.K. and A.K. Biswas. 1983. New record of *Sesamum mulayanum* Nair in West Bengal. Science and Culture, 49: 40-408.

Morinaga, T., E. Fukushima, T. Kano, Y. Maruyama and Y. Yamasaki. 1929. Chromosome numbers of cultivated plants II. Botanical Magazine (Tokyo), 43: 589-594.

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, Maryland 21218, USA.

Nanthakumar, G.K., N. Singh and P. Vaidyanathan. 2000. Relationships between cultivated sesame (*Sesamum* sp.) and the wild relatives based on morphological characters, isozymes and RAPD markers. Journal of Genetics and Breeding, 54:5-12.

Nair, N.C. 1963. A new species of *Sesamum* Linn. from northern India. Bulletin of the Botanical Survey of India, 5: 251-253.

Nakamura, H. and T. Sato. 1956. Etude et amelioration des sesames. 1. Classification morphologique du genre *Sesamum*. Hyogo Noka Daigaku, Kenkyn Hokoku Sasyama, Japan. 2(2): 149-156.

Nayar N.M. 1995. Sesame, *Sesamum indicum* L. (Pedaliaceae). Pp. 404-407 *in* Evolution of Crop Plants 2nd ed. (J. Smartt and N.W. Simmonds, eds.). Wiley, New York.

Nayar N. M. and K. L. Mehra. 1970. Sesame: its uses, botany, cytogenetics and origin. Economic Botany, 24:20-31.

Nicolson, D. H., and J. H. Wiersema. 2004. Proposal to conserve *Sesamum indicum* against *Sesamum orientale* (Pedaliaceae). Taxon, 53(1):210-211.

Nohara, S. 1933. Genetical studies on *Sesamum indicum* L. Jour. Coll. Agric. Tokyo Imp. Univ., 12: 227-386.

Nohara, S. 1934. Gametogenesis and embryogeny of *Sesamum indicum* L. Jour. Coll. Agric. Tokyo Imp. Univ., 13: 9-25.

Prabakaran, A. J. 1996. Autotetraploids of *Sesamum indicum* and *S. alatum*: cytogenetics and crossability. Journal of Cytology and Genetics, 31(1): 31-36.

Ramanujam, S. 1941. Chromosome number of *S. prostratum* Retz. Currrent Science, 10: 439-440.

Ramanujam, S. and A.B. Joshi. 1948. Chromosome number of *Sesamum laciniatum* Klein. Nature (London), 161: 99-100.

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. 188 Pp.

Raghavan, T.S. and K.V. Krishnamurty. 1945. Chromosome number of *Sesamum laciniatum* Klein. Current Science, 14(6): 152-153.

Renard, R., J. Lambinon, M. Reekmans, P. Van der Veken and M. Govaert. 1983. Nombres chromosomiques de quelques Angiospermes du Rwanda, du Burundi et du Kenya. Bull. Jard. Bot. Nat. Belg., 53: 34-371.

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

Seegeler, C.J.P. 1989. *Sesamum orientale* L. (Pedaliaceae): Sesame's correct name. Taxon, 38:656-659.

Van Hintum, Th. J.L. 1993. A computer compatible system for scoring heterogenous populations. Genetic Resources and Crop Evolution, 40: 133-136.

Vavilov, N.I. 1926. Studies on the origin of cultivated plants. Bull. Appl. Bot., 16; 1-248.

Yermanos, D.M., S. Hemstreet, W. Saeeb, and C.K.Huszar. 1972. Oil content and composition of the seed in the world collection of sesame introductions. J. Amer. Oil Chem. Soc., 49:20-23.

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ANNEX I. List of minimum highly discriminating descriptors for Sesame

Descriptor IPGRI

Number	Name
2.19.5	Plant uses
6.1.17	Soil texture classes
6.1.23.1	Temperature [°C]
6.1.23.3	Rainfall [mm]
7.2.2	Plant growth habit
7.3.1	Plant height [cm]
7.3.7	Stem branching
7.3.8	Branching pattern
7.3.9	Internode length [cm]
7.4.1	Leaf colour
7.4.2	Leaf hairiness
7.4.4	Leaf arrangement
7.4.5	Leaf shape
7.4.6	Basal leaf profile
7.4.8	Lobe incision of basal leaf
7.4.16	Leaf angle to main stem
7.5.2	Days to 50% flowering [d]
7.5.3	Number of flowers per leaf axil
7.5.14	Exterior corolla colour
7.5.15	Interior corolla colour
7.6.1	Number of capsules per plant
7.6.2	Number of locules per capsule
7.6.4	Bicarpellate capsule shape
7.6.5	Capsule arrangement
7.6.8	Mean capsule length [mm]
7.6.9	Mean capsule width [mm]
7.6.10	Mean capsule thickness [mm]
7.6.13	Capsule dehiscence at ripening
7.6.16	Seeds per capsule
7.7.2	Seed coat colour
7.7.3	Seed shape
7.7.5	1000-seed weight [g]
8.1.2	Days to physiological maturity [d]
8.1.3	Stem height from base to first branch [cm]
8.1.7	Seed yield per plant [g]

ANNEX II. COLLECTING FORM for *Sesamum* spp.

SAMPLE IDENTIFICATION

GENUS (1.6): SPECIES (1.7):

COLLECTING INSTITUTE (2.1):

COLLECTING No. (2.3): COLLECTING DATE [YYYY/MM/DD] (2.4):

PHOTOGRAPH IDENTIFICATION No. (2.23):

COLLECTING SITE LOCATION

COUNTRY OF ORIGIN (2.5):

PROVINCE/STATE (2.6):

LOCATION (2.8): km: direction: from:

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

COLLECTING SITE ENVIRONMENT

COLLECTING SOURCE (2.12):
10 Wild habitat 20 Farm or cultivated habitat 30 Market or Shop
40 Institute/ Experimental station/ Research organization/ Genebank 50 Seed company
60 Weedy, disturbed or ruderal habitat 99 Other (specify):

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

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

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

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

SOIL FERTILITY (6.1.22): (code: 3=Low; 5=Moderate; 7=High)

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

RAINFALL (6.1.23.3): Annual mean: |___| mm

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly mean [mm]:	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|

TEMPERATURE (6.1.23.1): Seasonal mean: |___| °C

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Monthly mean [°C]:	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|	|___|

SAMPLE

BIOLOGICAL STATUS OF ACCESSIONS (2.14):
100 Wild 200 Weedy 300 Traditional cultivar/landrace
400 Breeding/research material 500 Advanced/improved cultivar 999 Other (specify):

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

NUMBER OF PLANTS SAMPLED (2.16):

PREVAILING STRESSES (2.22):
Mention the types of major stresses, i.e. abiotic (drought), biotic (pests, diseases, etc.)

==========

ETHNOBOTANICAL DATA

ETHNIC GROUP (2.19.1):

LOCAL/VERNACULAR NAME (2.19.2):

PLANT USES (2.19.5):

1 Seed	2 Oil	3 Oil cake	4 Medicinal
5 Ornamental	6 Feed	99 Other (specify):	

ASSOCIATED FLORA (2.21):

==========

CHARACTERIZATION

Plant growth habit (7.2.2):

Plant height (7.3.1):

Stem branching (7.3.7):

Leaf hairiness (7.4.2):

Leaf arrangement (7.4.4):

Leaf shape (7.4.5):

Lobe incision of basal leaf (7.4.8):

Number of capsules per plant (7.6.1):

Number of locules per capsule (7.6.2):

Bicarpellate capsule shape (7.6.4):

Capsule arrangement (7.6.5):

Capsule dehiscence at ripening (7.6.13):

Seed coat colour (7.7.2):

Seed shape (7.7.3):

==========

EVALUATION

Days to physiological maturity (8.1.2):

Stem height from base to first branch (8.1.3):

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COLLECTOR'S REMARKS:

ANNEX III. Conspectus of *Sesamum*

Distribution and characteristics

Species (Bold) Synonym (unbold)	**Wild (W), Partially cultivated (PC) or cultivated** (C)	**Chromo-some No. (2n)**	**Distribution**	**Description**
S. abbreviatum Merxm.		Unknown		
S. alatum Thonn. *S. ekambaramii* Naidu *S. gracile* Endl. *S. pterospermum* R. Br. *S. rostratum* Hochst *S. sabulosum* A. Chevalier	W	26	Nigeria, Sudan, Mozambique	Erect, branched, leaves foliolate, corolla pink to carmine, nectary sessile, seed winged, blackish
S. angolense Welw. *S. macranthum* Oliver	W	32	Angola	Erect, simple or branched, leaves entire, corolla violet-purple, nectary sessile, long capsule, seed blackish, rugose
S. angustifolium Engl. *S. calycinum* ssp. *angustifolium* *S. indicum var. angustifolium*	PC	32	Congo, Mozambique, Uganda	Erect, simple or branched, leaves entire, corolla rose, nectary sessile, long capsule
S. calycinum Welw. **ssp.*calycinum*** *S. repens* Engl. & Gilg		unknown		
S. calycinum* ssp *baumii (Stapf.) Seidenst. Ex Ihlenf.	PC	unknown	Angola	Erect, slender, leaves entire, corolla pale rose, nectary subsessile, seed rugose
S. calycinum* ssp. *pseudoangolense Seidenst. Ex Ihlenf.				
S. capense Burm.f. *S. gibbosum* Brem. & Oberm. *S. grandiflorum* Schinz *S. pentaphyllum* E. Mey. *S. schenckii*		26	South Africa	Erect, branched, leaves foliolate, corolla violet-purple, nectary sessile, seed winged, blackish

Species (Bold) Synonym (unbold)	**Wild (W), Partially cultivated (PC) or cultivated** (C)	**Chromo-some No. (2n)**	**Distribution**	**Description**
S. capense Burm. f. **ssp. *lepidotum*** Schinz *S. digitaloides*	W	unknown	Africa	
S. indicum *L.* *S. africanum* *S. auriculatum* *S. brasiliense* Vell. *S. edule* Hort ext Steud. *S. hopkinsii* *S. javanicum* *S. lamiifolium* Engl. *S. luteum* Retz. *S. occidentale* Heer & Regel *S. oleiferum* Moench *S. orientale* L. *S. somalense* *Anthadenia sesamoides* Van Houtte *Dysosmon amoenum* Rafinesque *Volkameria sesamoides* O. Kuntze.	C	26	Tropical to temperate zone	Erect, simple or branched, leaves variable, corolla companulate-whitish to pink, nectary sessile, seed- coloured to white, smooth, edible
S. laciniatum Willd.		32	India (Deccan hills), Africa	
S. latifolium Gillett		32	East Africa	
S. malabaricum Burm. *S. mulayanum* Nair	PC	26	India (Malabar)	Fertile in crosses with *S. indicum*
S. marlothii Engl. *S. dinterii* Schinz	W	unknown	S.W. Africa, East Indies	Erect, lower leaves 3-foliolate, nectary sessile, seed blackish
S. parviflorum Grabow-Seidensticker		unknown		
S. pedalioides Hiern *S. microcarpum* Engl.	W	unknown	Angola	Erect, branched, leaves entire, sessile, seed narrowly winged

Species (Bold) Synonym (unbold)	**Wild (W), Partially cultivated (PC) or cultivated** (C)	**Chromo-some No. (2n)**	**Distribution**	**Description**
S. prostratum Retz.	PC	32	India, Africa	Prostrate
S. radiatum Schum. & Thonn. *S. biapiculatum* de Wild. *S. caillei* A. Chev. *S. foetidum* Afzel *S. mombazense* De Wild. & Th. Dur. *S. occidentale* Heer & Regel *S. talbotii* Wernham *S. thonneri*	PC	64	Africa, Upper Guinea, Sri Lanka	Erect, simple or branched, leaves entire, corolla purple, nectary sessile short capsule, seed blackish smooth
S. rigidum Peyr. **ssp. *rigidum***		Unknown	Angola	Erect, branched, leaves entire, corolla pale-rose, seed oblique flat or convex
S. rigidum* ssp *merenksyanum Ihlenf. & Seidenst. *S. digitaloides* Welw. ex-Schinz				
S. schinzianum Aschers. ex Schinz *S. antirrhinoides* Welw.	W	Unknown	S.W. Africa (Damaraland), East Indies	Erect, branched, leaves oblong-lanceolate, corolla pale-rose, long capsule, nectary stipitate, seed large
S. triphyllum Welw. ex-Aschers.	W	Unknown	Africa, East Indies	
S. triphyllum Welw. ex Asch. **var. *grandiflorum*** (Schinz) Merxm.				

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