DESCRIPTORS FOR
PEARL MILLET
[*Pennisetum glaucum* (L.) R. Br.]

IBPGR   ICRISAT

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Citation

CONTENTS

PREFACE

Descriptors for pearl millet [Pennisetum glaucum *(L.) R.Br.]* is a revision of the original IBPGR and ICRISAT publication *Descriptors for pearl millet* (1981). This earlier list, based on a joint IBPGR-ICRISAT Advisory Committee on Sorghum and Millets Genetic Resources, was based on a preliminary list prepared by S. Appa Rao, D.J. Andrews and M.H. Mengesha. The current list, though based on the earlier list, has been revised by IBPGR and ICRISAT and reviewed by an international group of pearl millet experts. They are listed in Contributors. The descriptors from the earlier list are cross-referenced with the current list with the descriptor numbers in parentheses beside the current descriptor.

IBPGR encourages the collection of data on the first four categories of this list: 1. Accession; 2. Collection; 3. and 4. Characterization and Preliminary Evaluation. IBPGR endorses the information in categories 1-4 as the minimum that ideally should be available for any one accession. Descriptors given in categories 5 onwards enable the encoding of further characterization and evaluation data and can serve as examples to create additional descriptors in the IBPGR form. Management descriptors are intended for curators of germplasm collections and may act as guidelines for the management of accessions in medium- and long-term storage and for their multiplication/regeneration.

Although the suggested coding should not be regarded as the definitive scheme, this format has the full backing of IBPGR and is promoted worldwide. This descriptor list serves as an international format and thereby produces a universally understood 'language' for all plant genetic resources data. By adopting this scheme to encode data, or producing a method of transformation for converting other schemes to the IBPGR format, a rapid, reliable and efficient means of information storage, retrieval and communication will be produced. This will assist the utilization of germplasm throughout the international plant genetic resources network. It is recommended that data be produced by using this descriptor list's descriptors and descriptor states, with the original order and numbering.

Any suggestions for modifications will be welcomed by IBPGR and ICRISAT.

DEFINITIONS AND USE OF THE DESCRIPTORS

IBPGR now uses the following definitions in genetic resources documentation:

(i)   passport (accession identifiers and information recorded by collectors);

(ii)   characterization (consists of recording those characters which are highly heritable, can be seen by the eye, and are expressed in all environments);

(iii)   preliminary evaluation (consists of recording a limited number of additional traits thought desirable by a consensus of users of the particular crop);

(iv)   further evaluation (consists of recording a number of additional descriptors thought to be useful in crop improvement);

(v)   management (information indispensable for management of accessions in medium- and long-term storage as well as for multiplication/regeneration).

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

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

(a)   the SI system of measurements is used. The units to be applied are given in square brackets following the descriptor;

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

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

is the expression of a character. If the character is not expressed, '0' should be recorded (see also (e)). 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 8 (Biotic stress susceptibility) 1 = very low susceptibility and 8 = high to very high susceptibility;

(c)   for accessions which are not generally uniform throughout the descriptor (e.g. mixed collection, genetic segregation), the mean and standard deviation could be reported where the descriptor is continuous, or where the descriptor is discontinuous up to three codes in the order of frequency can be recorded;

(d)   absence/presence of characters are scored as:

    0   Absent
    +   Present

(e)   when the descriptor is inapplicable, '0' is used as the descriptor value, e.g. if an accession does not have a central leaf lobe, '0' would be scored for the following descriptor:

Shape of central leaf lobe

    3   Toothed
    5   Elliptic
    7   Linear

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

(g)   standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, 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);

(h)   dates should be expressed numerically in the format DDMMYYYY, where

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

PASSPORT

1. ACCESSION DATA

1.1 ACCESSION NUMBER (1.1)

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 is still not available for re-use. Letters should be used before the number to identify the genebank or national system (e.g. MG indicates an accession comes from the genebank at Bari, Italy, PI indicates an accession within the USA system)

1.2 DONOR NAME (2.6)

Name of institution or individual responsible for donating the germplasm

1.3 DONOR NUMBER

Number assigned to accession by the donor

1.4 OTHER NUMBER(S) ASSOCIATED WITH THE ACCESSION (1.2)

Any other identification number known to exist in other collections for this accession, e.g. USDA Plant Inventory number (not COLLECTOR'S NUMBER, see 2.2). Other numbers can be added as 1.4.3, etc.

    1.4.1   Other number 1 (1.3)

    1.4.2   Other number 2 (1.4)

1.5 SCIENTIFIC NAME

    1.5.1   Genus

    1.5.2   Species

    1.5.3   Author(s)

    1.5.4   Subspecies

    1.5.5   Race

1.6   PEDIGREE   (1.6)

Parentage, or nomenclature and designations assigned to breeder's material

1.7   CULTIVAR NAME

Either a registered or other formal cultivar designation given to the accession

1.8   ACQUISITION DATE

Date on which the accession entered the collection (in the format DDMMYYYY)

1.9   DATE OF LAST REGENERATION OR MULTIPLICATION   (1.7)

(in the format DDMMYYYY)

1.10 ACCESSION SIZE

Approximate number or weight of seeds or pods of an accession in the genebank

1.11 NUMBER OF TIMES ACCESSION REGENERATED

Since the date of acquisition

1.12 NUMBER OF PLANTS USED IN EACH REGENERATION

1.13 TYPE OF MAINTENANCE

          1   Vegetative
          2   Seed
          3   Both
          4   Tissue culture

2. COLLECTION DATA

2.1 COLLECTING INSTITUTE(S) (2.1-2.2)

Institute(s) and people collecting/sponsoring the sample collection

2.2 COLLECTOR'S NUMBER (2.4)

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 and should be unique and always accompany subsamples wherever they are sent

2.3 COLLECTION DATE OF ORIGINAL SAMPLE (2.5)

(in the format DDMMYYYY)

2.4 COUNTRY OF COLLECTION (2.10)

Name of the country in which the sample was collected or was bred. Use three letter abbreviations from the *International Standard codes (ISO) for the representation of names of countries*, No. 3166, 1988. Copies of these are available from Beuth Verlag GmbH, Burggrafenstrasse 6, D-1000 Berlin 30, Germany; Tel. 30-2601-2320; Fax 30-2601-1231, Tlx. 1-83-622-bvb-d

2.5 PROVINCE/STATE (2.11)

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

2.6 DEPARTMENT/COUNTY

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

2.7 COLLECTION SITE (2.12)

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

2.8	LATITUDE OF COLLECTION SITE	(2.14)

Degrees and minutes followed by N (North) or S (South) (e.g. 01030S)

2.9	LONGITUDE OF COLLECTION SITE	(2.15)

Degrees and minutes followed by E (East) or W (West) (e.g. 07625W)

2.10	ELEVATION OF COLLECTION SITE [m]	(2.13)

Altitude above sea level

2.11	COLLECTION SOURCE	(2.7)

        1   Wild habitat
        2   Farmer's field
        3   Farm store
        4   Backyard
        5   Market
        6   Institute
        7   Threshing yard
        8   Others (specify in the descriptor COLLECTOR'S NOTES, 2.29)

2.12	STATUS OF SAMPLE	(2.9)

        1   Wild
        2   Weedy
        3   Breeding/research material
        4   Landrace
        5   Advanced cultivar
        6   Interspecific derivative
        7   Other (specify in the descriptor COLLECTOR'S NOTES, 2.29)

2.13 NUMBER OF PLANTS SAMPLED

2.14 NUMBER OF HEADS COLLECTED

2.15 WEIGHT OF SEED COLLECTED [g]

2.16 CULTURAL PRACTICES   (2.18)

      1   Rainfed
      2   Irrigated
      3   Flooded
      4   River banks
      5   Transplanted
      6   Other (specify in the descriptor COLLECTOR'S NOTES, 2.29)

2.17 CROPPING SYSTEM   (2.19)

      1   Monoculture
      2   Mixed with cereals (specify crop)
      3   Mixed with legumes (specify crop)
      4   Mixed with other (specify crop)

2.18 PLANT POPULATION, DENSITY

      3   Low
      5   Medium
      7   High

2.19 LOCAL/VERNACULAR NAME   (1.5)

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

2.20 ETHNIC GROUP   (1.5)

Name of the tribe of the farmer donating the sample or of the people living in the area of collection

2.21 USES OF THE ACCESSION

      1   Grain
      2   Flour
      3   Stalk
      4   Forage
      5   Other (specify in the descriptor COLLECTOR'S NOTES, 2.29)

2.22 COLLECTION SOURCE ENVIRONMENT

2.22.1 Growing period (state months)

2.22.2 Maturity

2.22.3 Vigour

2.22.4 Topography   (2.21)

    1 Swamp
    2 Flood plain
    3 Plain level
    4 Undulating
    5 Hilly
    6 Mountainous
    7 Other (specify in the descriptor COLLECTOR'S NOTES, 2.29)

2.22.5 Soil fertility

    3 Poor
    7 Good

2.22.6 Soil pH

Actual value of the soil in the root zone around the accession

2.22.7 Soil moisture

    3 Low
    7 High

2.22.8 Soil drainage

    3 Poor
    7 Good

2.22.9   Soil texture   (2.20)

       1   Highly organic
       2   Clay
       3   Clay silt
       4   Silt
       5   Silt sand
       6   Sandy
       7   Sandy loam
       8   Loam
       9   Gravelly

2.23 CLIMATE OF COLLECTION SITE   (2.16)

2.23.1   Temperature range [°C]

2.23.2   Rainfall range [mm]   (2.17)

2.23.3   Wind [km s^{-1}]

2.23.4   Frost

Number of frost-free days during growing season

2.23.5   Light

       3   Shady
       7   Sunny

2.24 PHOTOGRAPH

Was a photograph taken of the accession or habitat at the time of collection? If so, provide an identification number in the descriptor COLLECTOR'S NOTES, 2.29

       0   No
       +   Yes

2.25 HERBARIUM SPECIMEN

Was a herbarium specimen collected? If so, provide an identification number in the descriptor COLLECTOR'S NOTES, 2.29

   0 No
   + Yes

2.26 ASSOCIATED CROPS

Other dominant crop species, found at and around the collection site

2.27 PREVAILING STRESSES

Information on associated biotic and abiotic stresses and the accession's reaction

2.28 FREQUENCY OF ACCESSION AT COLLECTION SITE

   1 Rare
   3 Occasional
   5 Frequent
   7 Abundant
   9 Very abundant

2.29 COLLECTOR'S NOTES

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

CHARACTERIZATION AND PRELIMINARY EVALUATION

3. SITE DATA

3.1 COUNTRY

(See instructions in COUNTRY OF COLLECTION, 2.4)

3.2 SITE (RESEARCH INSTITUTE)   (4.1)

    3.2.1 Latitude

    (See format under 2.8)

    3.2.2 Longitude

    (See format under 2.9)

    3.2.3 Elevation [m]

    3.2.4 Name of farm or institute

3.3 EVALUATOR'S NAME AND ADDRESS

3.4 SOWING DATE   (4.2)

(in the format DDMMYYYY)

3.5 HARVEST DATE

(in the format DDMMYYYY)

3.6 EVALUATION ENVIRONMENT

Environment in which characterization/preliminary evaluation was carried out

    1 Field (specify in the descriptor NOTES, 3.19)
    2 Screenhouse
    3 Glasshouse
    4 Laboratory
    5 Other (specify in the descriptor NOTES, 3.19)

3.7 PERCENTAGE SEED GERMINATION [%]

3.8   PERCENTAGE FIELD ESTABLISHMENT [%]

3.9   NUMBER OF DAYS TO 50% GERMINATION

3.10 SOWING SITE IN FIELD

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

3.11 FIELD SPACING   (4.3)

    3.11.1   Distance between plants in a row [cm]

    3.11.2   Distance between rows [cm]

3.12 SOIL TEXTURE

        1   Highly organic
        2   Clay
        3   Clay silt
        4   Silt
        5   Silt sand
        6   Sandy
        7   Sandy loam
        8   Loam
        9   Gravelly

3.13 SOIL TAXONOMIC CLASSIFICATION

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

3.14 WATERING

        1   Irrigated
        2   Rainfed
        3   Both/alternate

3.15 SOIL pH

Actual value of the soil in the root zone around the accession

3.16 FERTILIZER

(Specify name and dose)

3.17 PLANT PROTECTION

(Specify pesticides used and dose of each)

3.18 CLIMATE (during growing season)

    3.18.1   Temperature range [°C]

    3.18.2   Heat unit during crop season

    3.18.3   Rainfall range [mm]

    3.18.4   Sunshine hours

3.19 NOTES

Any other site-specific information

4. PLANT DATA

4.1   VEGETATIVE

    4.1.1   Plant height [cm]   (4.11)

          From the ground level to the tip of the spike. At dough stage

    4.1.2   Stem diameter [mm]   (3.1)

          Between the 3rd and 4th node from the top. At dough stage

    4.1.3   Early vigour   (4.4)

          Recorded after thinning to avoid the effect of plant number. Scored 18 days after emergence

          3 Low
          5 Intermediate
          7 High

4.1.4   Tillering attitude   (4.5.1)

At head emergence

3   Erect
5   Intermediate
7   Spreading

4.1.5   Total number of tillers   (4.5.2)

Total number of culms, including the main stem. At dough stage

4.1.6   Number of productive tillers   (4.5.3)

Number of spikes which bear seed at dough stage. Spikes younger than the dough stage are not counted

4.1.7   Number of nodal tillers   (4.5.4)

At dough stage

3   Few
5   Intermediate
7   Many

4.1.8   Plant aspect   (4.18)

Overall agronomic desirability of accession. At dough stage

3   Poor
5   Intermediate
7   Good

4.1.9   Lodging susceptibility   (4.19)

At dough stage

3   Low
5   Intermediate
7   High

4.1.10   <u>Green fodder yield potential</u>   (4.10)

Consider tillering, leafiness and bulk. At flowering

3   Poor
5   Intermediate
7   Good

4.2   INFLORESCENCE

4.2.1   <u>Spike shape</u>   (3.2)

At dough stage (See Fig. 1)

1   Cylindrical - spike thickness more or less uniform throughout its length
2   Conical - spike thickness maximum at the base, gradually tapering toward the apex
3   Spindle - spike thickness maximum in the middle, gradually tapering toward both ends
4   Club - maximum thickness of the spike at the apex, gradually tapering toward base
5   Candle - intermediate between cylindrical and conical. About 3/4 the length of the spike is cylindrical, gradually tapering toward the apex
6   Dumb-bell - the characteristic spike of the Souna type from Mali. Maximum spike thickness is at the base, gradually tapering to 2/3 of the spike and then increasing slightly
7   Lanceolate - intermediate between spindle and conical. Maximum spike thickness is near the middle which tapers more toward apex than base
8   Oblanceolate - the opposite of lanceolate, maximum spike thickness is near the middle which tapers more toward the base
9   Globose - almost spherical, spike length not more than twice the diameter
10 Other (specify in the descriptor NOTES, 4.5)

1 Cylindrical   2 Conical   3 Spindle   4 Club   5 Candle

6 Dumb-bell   7 Lanceolate   8 Oblanceolate   9 Globose
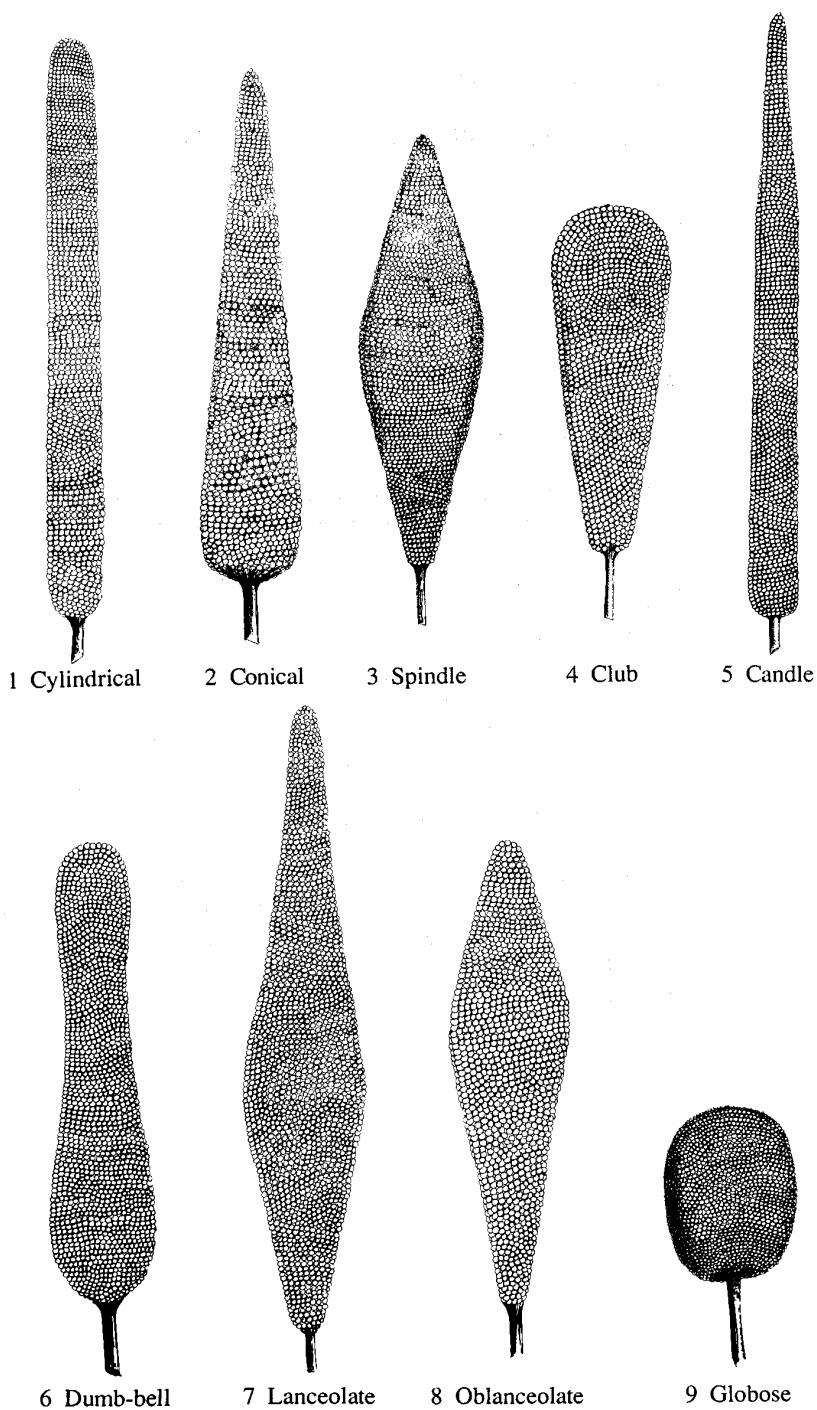
Fig. 1. Spike shape

4.2.2   <u>Spikelet shattering/threshing</u>   (3.3)

At maturity

1   Spontaneous shattering
2   Shattering at touch
3   Non-shattering and free threshing
4   Non-shattering and difficult to thresh

4.2.3   <u>Bristle length</u>   (3.4)

At dough stage

3   Short (bristles below the level of the apex of the seed)
5   Medium (bristle length between 0 and 2 cm above the seed)
7   Long (bristles longer than 2 cm above the seed)

4.2.4   <u>Days to flowering</u>   (4.6)

Number of days from field emergence to when 50% of plants flower. Stigma
emergence on the main spike is considered as flowering

4.2.5   <u>Sensitivity to photoperiod</u>   (4.20)

In respect of flowering being influenced by length of day

3   Insensitive
5   Partly sensitive
7   Highly sensitive

4.2.6   <u>Flowering range</u>   (4.7)

At flowering (see flowering definition in 4.2.4)

1   Short, continuous flowering, duration less than 7 days
2   Long, continuous flowering, duration more than 7 days
3   Discontinuous flowering, two or more groups flowering

4.2.7   <u>Synchrony of ear maturity</u>   (4.8)

At maturity

3   Non-synchronous
5   Intermediate
7   Synchronous

4.2.8   <u>Restoration response</u>   (4.9)
(Cytoplasmic male sterility A-1 type)

At harvest

1   Non-restoration (maintainer)
2   Partial restoration (all plants shed poor pollen)
3   Complete restoration
4   Segregating for restoration

4.2.9   <u>Ear exsertion type</u>   (4.12)

Observed on the primary tiller. At dough stage

1   Negative exsertion
2   Positive exsertion

4.2.10   <u>Ear exsertion distance</u> [cm]   (4.12)

Observed on the primary tiller. Recorded as the distance between the ligule
of the flag leaf and the base of the spike. At dough stage

4.3   SPIKE

4.3.1   <u>Spike length</u> [cm]   (4.13.1)

At dough stage

4.3.2   <u>Spike thickness</u> [mm]   (4.13.2)

Maximum diameter of the spike, excluding bristles. At dough stage

4.3.3   <u>Spike density</u>   (4.13.3)

At maturity

3   Loose
5   Intermediate
7   Compact

4.4   SEED

4.4.1   <u>Seed colour</u>   (3.7)

After threshing. Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1   Ivory (yellow-white group 158A)
2   Cream (orange-white group 159A)
3   Yellow (yellow group 8C)
4   Grey (grey group 201)
5   Deep grey (black group 202B)
6   Grey brown (brown group 199)
7   Brown (brown group 200)
8   Purple (purple group 79B)
9   Purplish black
10 A mixture of white and grey grains (on the same spike)

4.4.2   <u>Seed covering</u>   (3.5)

See Fig. 2

3   Exposed
5   Intermediate
7   Enclosed

3 Exposed   5 Intermediate   7 Enclosed

Fig. 2. Seed covering

4.4.3   <u>Seed shape</u>   (3.6)

See Fig. 3

1   Obovate
2   Oblanceolate
3   Elliptical
4   Hexagonal
5   Globular

4.4.4   <u>Seed weight per spike</u> [g]   (4.14.1)

At 12% moisture content

4.4.5   <u>Seed weight</u> [g]   (4.14.2)

At 12% moisture content of 1000 seeds

4.4.6   <u>Seed volume</u> [cm^3]   (4.14.3)

Of 1000 seeds determined using alcohol

4.4.7   <u>Endosperm texture</u>   (4.15)

3   Mostly corneous
5   Partly corneous
7   Mostly starchy

4.4.8   <u>Yellow endosperm</u>   (4.16)

0   Absent
+   Present

4.4.9   <u>Yield potential</u>   (4.17)

Consider spike number, size and density, seed number, and size compared with
a standard control

3   Low
5   Intermediate
7   High

1 Obovate   2 Oblanceolate   3 Elliptical

4 Hexagonal

5 Globular
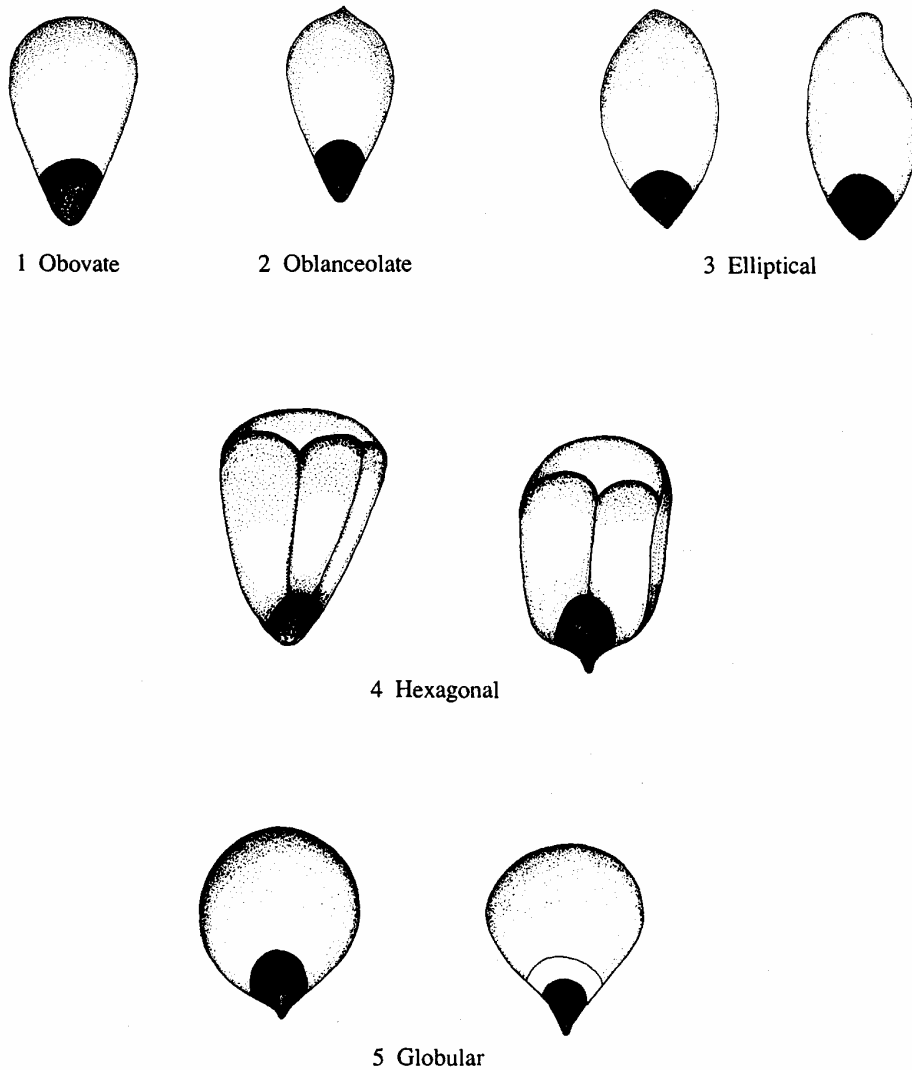
Fig. 3. Seed shape

4.5   NOTES

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

FURTHER CHARACTERIZATION AND EVALUATION

5. SITE DATA

5.1 COUNTRY

(See instructions in COUNTRY OF COLLECTION, 2.4)

5.2 SITE (RESEARCH INSTITUTE)   (5.1)

    5.2.1 Latitude

    (See format under 2.8)

    5.2.2 Longitude

    (See format under 2.9)

    5.2.3 Elevation [m]

    5.2.4 Name of farm or institute

5.3 EVALUATOR'S NAME AND ADDRESS

5.4 SOWING DATE   (5.2)

(in the format DDMMYYYY)

5.5 HARVEST DATE

(in the format DDMMYYYY)

5.6 EVALUATION ENVIRONMENT

Environment in which further characterization and evaluation was carried out

    1 Field (specify in the descriptor NOTES, 5.19)
    2 Screenhouse
    3 Glasshouse
    4 Laboratory
    5 Other (specify in the descriptor NOTES, 5.18)

5.7 PERCENTAGE SEED GERMINATION [%]

5.8   PERCENTAGE FIELD ESTABLISHMENT [%]

5.9   NUMBER OF DAYS TO 50% GERMINATION

5.10 SOWING SITE IN FIELD

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

5.11 FIELD SPACING

    5.11.1   <u>Distance between plants in a row</u> [cm]

    5.11.2   <u>Distance between rows</u> [cm]

5.12 SOIL TEXTURE

        1   Highly organic
        2   Clay
        3   Clay silt
        4   Silt
        5   Silt sand
        6   Sandy
        7   Sandy loam
        8   Loam
        9   Gravelly

5.13 SOIL TAXONOMIC CLASSIFICATION

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

5.14 WATERING

        1   Irrigated
        2   Rainfed
        3   Both/alternate

5.15 SOIL *p*H

Actual value of the soil in the root zone around the accession

5.16 FERTILIZER

(Specify name and dose)

5.17 PLANT PROTECTION

(Specify pesticides used and dose of each)

5.18 CLIMATE

5.18.1   Temperature range [°C]

5.18.2   Heat unit during crop season

5.18.3   Rainfall range [mm]

5.18.4   Sunshine hours

5.19 NOTES

Any other site-specific information

6. PLANT DATA

Unless otherwise noted, descriptors should be scored at plant flowering/maturity

6.1   VEGETATIVE

6.1.1   Leaf length [cm]   (5.3.1)

From ligule to tip of the leaf on the 4th node below the head on the main tiller. At head emergence

6.1.2   Leaf width [mm]   (5.3.2)

At the widest point of the leaf on the 4th node of the main tiller. At head emergence

6.1.3   <u>Leaf attitude</u>   (5.3.3)

At head emergence

3   Erect
5   Intermediate
7   Pendant

6.1.4   <u>Leaf colour</u>   (5.3.4)

At head emergence. Royal Horticultural Society (RHS) colour codes are given
in parentheses beside descriptor states

1   Light green (yellow-green group 146A)
2   Green (yellow-green group 147A)
3   Dark green (green group 137A)
4   Yellow (yellow group 9B)
5   Red (greyed-red group 181A)
6   Purple (purple group 79B)
7   Variegated

6.1.5   <u>Sheath length</u> [cm]   (5.3.5)

From node to base of the ligule of the leaf on the 4th node below the head of
the main stem. At head emergence

6.1.6   <u>Sheath pigmentation</u>   (5.3.6)

At dough stage. Royal Horticultural Society (RHS) colour codes are given in
parentheses beside descriptor states

1   Green (yellow-green group 147A)
2   Red (greyed-red group 181A)
3   Purple (purple group 79B)
4   Variegated

6.1.7   Blade pigmentation   (5.3.7)

At dough stage. Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1   Green (yellow-green group 147A)
2   Red (greyed-red group 181A)
3   Purple (purple group 79B)
4   Variegated

6.1.8   Sheath pubescence   (5.3.8)

At head emergence

3   Glabrous
5   Sparsely hairy
7   Densely hairy

6.1.9   Senescence   (5.3.9)

At maturity

3   Slow
5   Intermediate
7   Fast

6.1.10   Separation [cm]   (5.3.10)

Distance between two successive (3rd and 5th) leaf blades, ligule to ligule divided by two. At dough stage

6.1.11   Number of leaves   (5.3.11)

On primary tiller. At dough stage

6.1.12   Stem internode length [cm]   (5.4.1)

Distance between 3rd and 4th nodes. At harvest

6.1.13   <u>Stalk juiciness</u>   (5.4.2)

At dough stage

0   Absent
+   Present

6.1.14   <u>Juice quality</u>   (5.4.3)

At dough stage

3   Insipid
5   Intermediate
7   Sweet

6.1.15   <u>Node pigmentation</u>   (5.4.4)

At dough stage

1   Green
2   Red
3   Purple
4   Brown

6.1.16   <u>Internode pigmentation</u>   (5.4.5)

At dough stage

1   Green
2   Red
3   Purple
4   Brown
5   White

6.1.17   <u>Node pubescence</u>   (5.4.6)

At flowering

0   Absent
+   Present

6.1.18   <u>Internode pubescence</u>   (5.4.7)

At flowering

0   Absent
+   Present

6.2   INFLORESCENCE

Unless otherwise noted, descriptors should be scored at flowering/maturity

6.2.1   <u>Rachis diameter</u> [mm]   (5.5.1)

At rachis mid-point

6.2.2   <u>Rachis pubescence</u>   (5.5.2)

3   Sparse
5   Intermediate
7   Dense

6.2.3   <u>Rachis tip</u>   (5.5.3)

1   Covered
2   Exposed

6.2.4   <u>Involucre stalk length</u> [mm]   (5.6.1)

At mid-point of the rachis

6.2.5   <u>Number of fertile spikelets per involucre</u>   (5.6.2)

Average number recorded at the middle of the spike

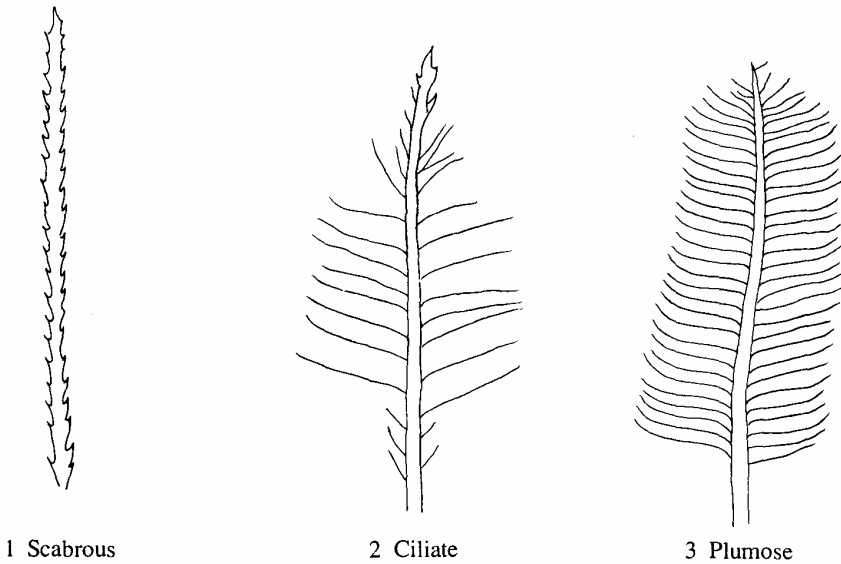6.2.6   Bristle colour   (5.6.3)

At dough stage. Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1   Green (yellow-green group 147A)
2   Tan tips
3   Light red
4   Red (greyed-red group 181A)
5   Purple (purple group 79B)

6.2.7   Bristle ornamentation   (5.6.4)

See Fig. 4

1   Scabrous (rough)
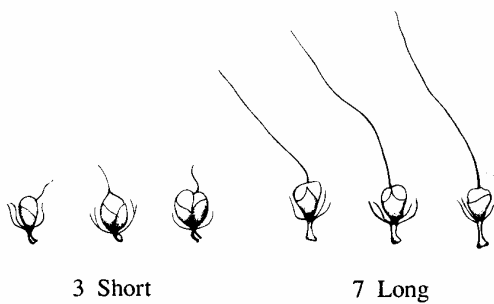2   Ciliate (with fine hairs)
3   Plumose (feathery)

1 Scabrous   2 Ciliate   3 Plumose

Fig. 4. Bristle ornamentation

6.2.8 <u>Mono-aristation length</u>   (5.6.5)

See Fig. 5

3   Short
5   Intermediate
7   Long

3 Short   7 Long

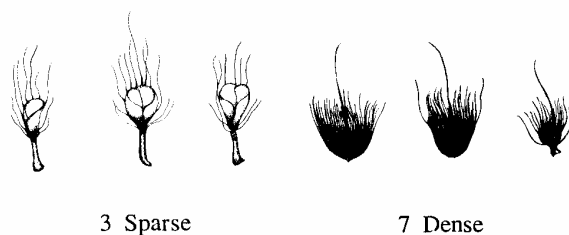**Fig. 5. Mono-aristation length**

6.2.9 <u>Poly-aristation density</u>   (5.6.5)

See Fig. 6

3   Sparse
5   Intermediate
7   Dense

3 Sparse   7 Dense

Fig. 6. Poly-aristation density

6.2.10   <u>Spikelet glume colour</u>   (5.7.1)

At dough stage. Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1   Light green (yellow-green group 146A)
2   Tips red
3   Red (greyed-red group 181A)
4   Tips purple
5   Purple (purple group 79B)

6.2.11   <u>Anther colour</u>   (5.7.2)

Before anther dehiscence. Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

1   Green (yellow-green group 147A)
2   Cream yellow
3   Yellow (yellow group 9B)
4   Brown (brown group 200)
5   Purple (purple group 79B)

6.2.12   <u>Stigma pigmentation</u>   (5.7.3)

At flowering

0   Absent
+   Present

6.2.13   <u>Florets per spikelet</u>   (5.7.4)

Number and types of florets per spikelet at mid-point of the rachis (with dissection of the florets). At stigma emergence

1   One floret-perfect
2   Two florets-one perfect
3   Two florets-one perfect and one male
4   Two florets-two perfect
5   More than two perfect florets

6.3   SEED

At post-harvest

6.3.1   <u>Apex shape</u>   (5.8.1)

1   Non-mucronate
2   Mucronate

6.3.2   <u>Surface</u>   (5.8.2)

1   Smooth
2   Wrinkled

6.3.3   <u>Protein content</u> [% DW]   (6.1.1)

6.3.4   <u>Lysine content</u> [% DW]   (6.1.2)

6.3.5   <u>Methionine content</u> [% DW]   (6.1.3)

6.3.6   <u>Tryptophane content</u> [% DW]   (6.1.4)

7. 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

7.1 REACTION TO DROUGHT (6.2)

7.2 REACTION TO SALINITY (6.5)

8. 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 the NOTES descriptor, 8.7. 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

8.1 FOLIAR DISEASES

	Causal organism	Disease or common name	
8.1.1	*Sclerospora graminicola* (Sacc. Schroet.)	Downy mildew	(7.3)
8.1.2	*Puccinia penniseti* Zimm.	Rust	(7.6)

8.2 PANICLE DISEASES

8.2.1	*Claviceps fusiformis* Lov. (See Fig. 7)	Ergot	(7.4)
8.2.2	*Tolyposporium penicillariae* Bref. (See Fig. 8)	Smut	(7.5)

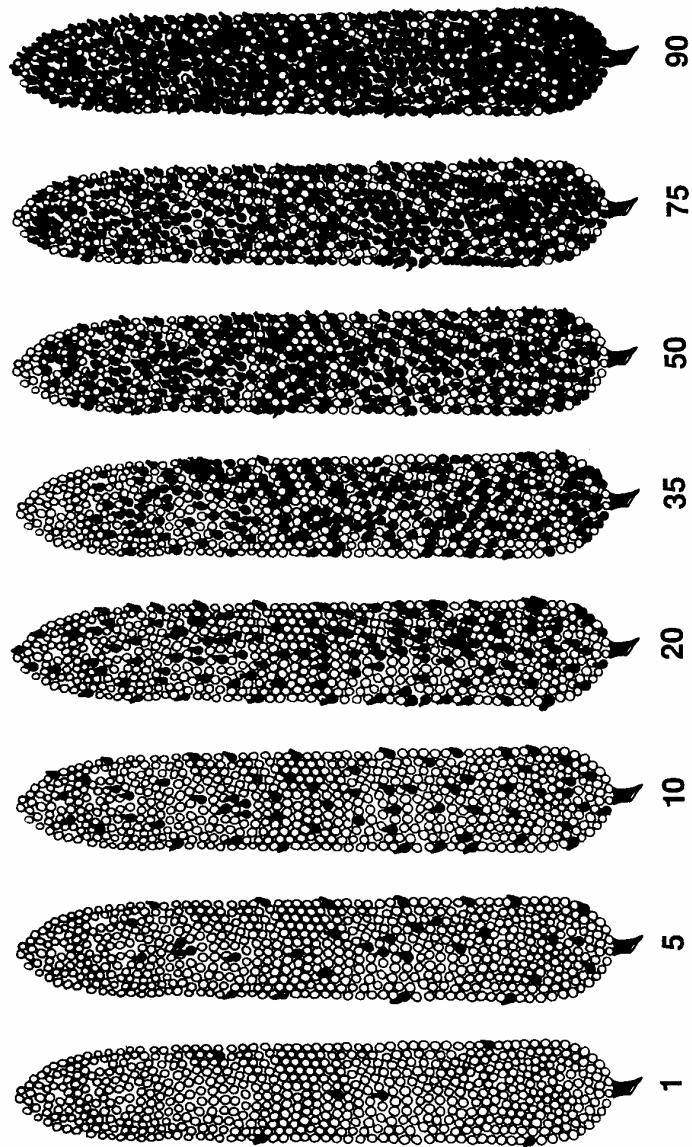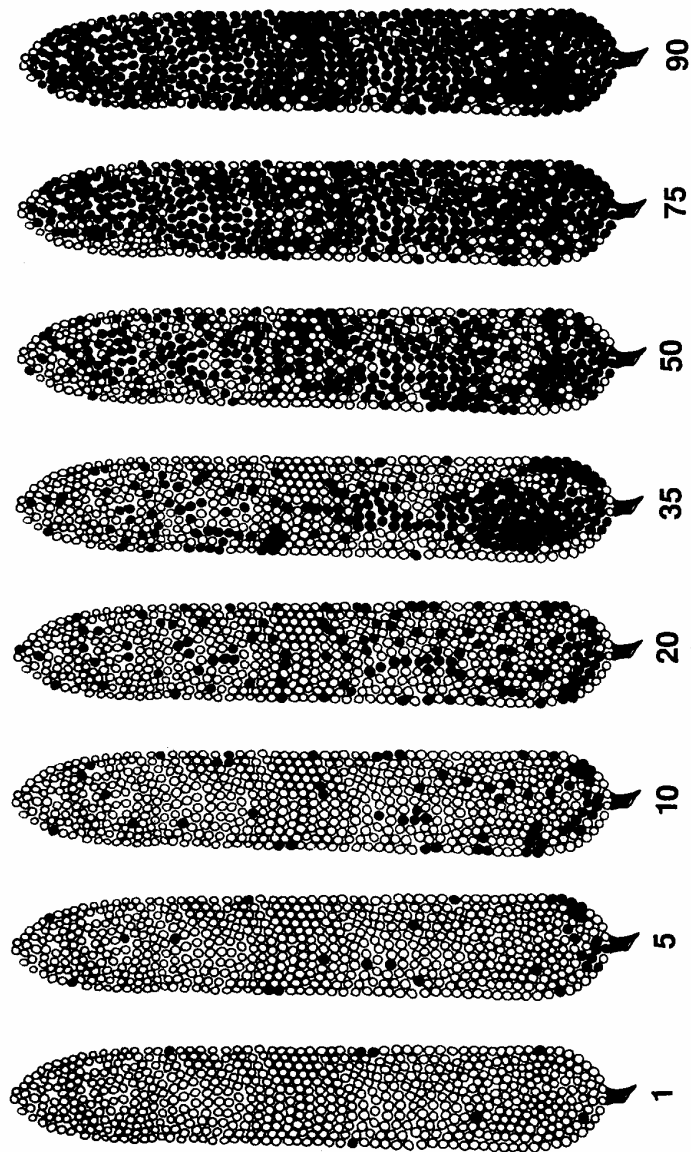**Fig. 7. Percentage ergotted grains**

Fig. 8. Percentage smutted grains

8.3   PLANTS

Causal organism	Disease or common name
8.3.1 *Striga asiatica* (L.) O. Kuntze *Striga hermonthica* Benth.	Witchweed

8.4   ROOT FEEDING INSECTS

8.4.1 *Holotrichia* spp. *Apogonia* sp.	White grub (8.3.1)
8.4.2 *Gonocephalum* spp.	Wire worm
8.4.3 *Stibaropus minor* Fabr.	Root aphid

8.5   FOLIAGE AND STEM FEEDING INSECTS

8.5.1 *Atherigona approximata* Malloch	Pearl millet shoot fly
8.5.2 *Coniesta (Acigona) ignefusalis* Hmps.	Pearl millet stem borer (8.5.3)
8.5.3 *Chilo partellus* Swin.	Spotted stem borer
8.5.4 *Amsacta* sp.	Hairy caterpillars (8.6.1)
8.5.5 *Locusta migratoria migratorioides* L.	Locust
8.5.6 *Hieroglyphus* sp. *Oedaleus senegalensis* Kraus.	Grasshopper (8.9)
8.5.7 *Schistocerea gregaria* Forsk.	Desert locust
8.5.8 *Rhopalosiphum maidis* Fitch.	Corn leaf aphid (8.10.1)
8.5.9 *Mythimna separata* Wlk.	Oriental armyworm (8.7.1)
8.5.10 *Spodoptera exempta* Wlk.	African armyworm (8.7.2)
8.5.11 *Spodoptera frugiperda* J.E. Smith	Fall armyworm (8.7.3)
8.5.12 *Agrotis* sp.	Cutworm (8.8.1)

8.6 PANICLE FEEDING INSECTS

Causal organism   **Disease or common name**

8.6.1 *Helicoverpa armigera* Hb.   Head caterpillars (8.14.2)
Cryptoblabes gnidiella Mill.   (8.14.3)
Eublemma spp.

8.6.2 *Heliocheilus (Raghuva) albipunctella*   Pearl millet head caterpillars (8.14.4)
De Joannis

8.6.3 *Mylabris pustulata* Thunb.   Blister beetles (8.15.1)
Psallydolytta sp.   (8.15.2)

8.6.4 *Pachnoda* spp.

8.6.5 *Geromyia penniseti* Felt   Pearl millet midge (8.12.1)

8.6.6 *Calocoris angustatus* Leth.   Head bug (8.13.1)

8.6.7 *Dysdercus* sp.   Cotton stainer (8.13.2)

8.6.8 *Haplothrips* sp.   Thrips (8.16.1)
Thrips sp.   (8.16.2)

8.6.9 *Rhinyptia infuscata* Burm.   Scarabaeid beetle

8.7 NOTES

Specify here any additional information

9. ALLOZYME COMPOSITION

This may prove to be a useful tool for identifying duplicate accessions

10. CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES

MANAGEMENT

M1. SEED MANAGEMENT DATA

M1.1 ACCESSION NUMBER   (Passport 1.1)

M1.2 POPULATION IDENTIFICATION   (Passport 2.2)

   Collector's number, pedigree, cultivar name, etc., depending on
   the population type

M1.3 STORAGE ADDRESS

   (building, room, self numbers/location in medium and/or long-term storage)

M1.4 STORAGE DATE

   (in the format DDMMYYYY)

M1.5 GERMINATION AT STORAGE (INITIAL) [%]

M1.6 DATE OF LAST GERMINATION TEST

   (in the format DDMMYYYY)

M1.7 GERMINATION AT THE LAST TEST [%]

M1.8 DATE OF NEXT TEST

   Date (estimate) when the accession should next be tested (in the format
   DDMMYYYY)

M1.9 MOISTURE CONTENT AT HARVEST [%]

M1.10 MOISTURE CONTENT AT STORAGE (INITIAL) [%]

M1.11 AMOUNT OF SEED IN STORAGE(S) [g or number]

M1.12 DUPLICATION AT OTHER LOCATION(S)

M2. MULTIPLICATION/REGENERATION DATA

M2.1 ACCESSION NUMBER   (Passport 1.1)

M2.2 POPULATION IDENTIFICATION   (Passport 2.2)

   Collector's number, pedigree, cultivar name, etc., depending on the population type

M2.3 FIELD PLOT NUMBER

M2.4 LOCATION

M2.5 COLLABORATOR

M2.6 SOWING DATE

   (in the format DDMMYYYY)

M2.7 SOWING DENSITY

M2.8 FERTILIZER APPLICATION

M2.9 GERMINATION IN THE FIELD [%]

M2.10 SEEDLING VIGOUR

   Assessed 18 days after emergence

M2.11 NUMBER OF PLANTS ESTABLISHED

M2.12 NUMBER OF PLANTS POLLINATED

M2.13 POLLINATION METHOD

100 or more flowers are preferred

      1   Selfing
      2   Chain cross
      3   Pair crossing
      4   Bulk pollen
      5   Isolation
      6   Cluster bagging

M2.14 NUMBER OF POLLINATED SPIKES REPRESENTED IN STORE(S)

M2.15 AGRONOMIC EVALUATION

M2.16 PREVIOUS MULTIPLICATION AND/OR REGENERATION

    M2.16.1   <u>Location</u>

    M2.16.2   <u>Sowing date</u>

    M2.16.3   <u>Plot number</u>

M2.17 OTHERS

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