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INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

DESCRIPTORS FOR FINGER MILLET

IBPGR Secretariat
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The International Board for Plant Genetic Resources (IBPGR) is an autonomous international scientific organization under the aegis of the Consultative Group on International Agricultural Research (CGIAR). The IBPGR was established by the CGIAR in 1974 and its Executive Secretariat is provided by the Food and Agriculture Organization of the United Nations. The basic function of the IBPGR is to promote and coordinate an international network of genetic resources centres to further the collection, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. The Consultative Group mobilizes financial support from its members to meet the budgetary requirements of the Board.

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PREFACE

This descriptor list for finger millet (Eleusine coracana (L.) Gaertn.) is based upon lists prepared by Dr. G. Harinarayana and Dr. A. Seetharam.

This descriptor list has been prepared in an IBPGR standard format following advice on descriptors and descriptor states from crop experts throughout the world. The 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. The IBPGR endorses the information in categories 1-4 as the minimum that ideally should be available for any one accession. Other descriptors are given in categories 5 onwards that will enable the simple encoding of further characterization and evaluation data and which can serve as examples for the creation of additional descriptors in the IBPGR form by any user.

Although the suggested coding should not be regarded as the definitive scheme, this format has the full backing of the IBPGR and is promoted worldwide. The descriptor list given here provides an international format and thereby produces a universally understood 'language' for all plant genetic resources data. The adoption of this scheme for all data encoding, or at least the production of a transformation method to convert other schemes to the IBPGR format, will produce a rapid, reliable and efficient means for information storage, retrieval and communication. This will greatly assist the utilization of germplasm throughout the international plant genetic resources network. 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.

Any suggestions for modifications will be welcomed by the IBPGR Secretariat, Rome.

DESCRIPTOR LIST FOR FINGER MILLET

The 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 easily 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).

Characterization and preliminary evaluation will be the responsibility of the curators, while further characterization and evaluation should be carried out by the plant breeder. The data from further evaluation should be fed back to the curator who will maintain a data file.

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

- a) measurements are made according to the SI system. The units to be applied are given in square brackets following the descriptor;
- b) many descriptors which are continuously variable are recorded on a 1-9 scale. 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 (Pest and disease susceptibility) 1 = extremely low susceptibility and 8 = high to extremely high susceptibility;
- c) presence/absence of characters are scored as + (present) and 0 (absent);
- d) for descriptors which are not generally uniform throughout the accession (e.g. mixed collection, genetic segregation) mean and standard deviation could be reported where the descriptor is continuous or mean and 'x' where the descriptor is discontinuous;

- e) when the descriptor is inapplicable, '0' is used as the descriptor value, e.g. if an accession does not form flowers, 0 would be scored for the following descriptor

Flower colour

- 1 White
- 2 Yellow
- 3 Red
- 4 Purple

- 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 Charts for Plant Tissues are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the NOTES descriptor, 11);
- h) dates should be expressed numerically in the format DDMMYY, 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

This number serves as a unique identifier for accessions and is assigned by the curator when an accession is entered into his 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 occur 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

Name of institution or individual responsible for donating the germplasm

1.3 DONOR IDENTIFICATION NUMBER

Number assigned to accession by the donor

1.4 OTHER NUMBERS ASSOCIATED WITH THE ACCESSION (other numbers can be added as 1.4.3 etc.)

Any other identification number known to exist in other collections for this accession, e.g. USDA Plant Introduction number (not collection number, see 2.1)

1.4.1 Other number 1

1.4.2 Other number 2

1.5 SCIENTIFIC NAME

1.5.1 Genus

1.5.2 Species

1.5.3 Subspecies

1.5.4 Race

1.5.5 Sub-race

1.6 PEDIGREE/CULTIVAR NAME

Nomenclature and designations assigned to breeder's material

1.7 ACQUISITION DATE

The date in which the accession entered the collection

1.8 DATE OF LAST REGENERATION OR MULTIPLICATION

1.9 ACCESSION SIZE

Approximate number of seeds of accession in collection

1.10 NUMBER OF TIMES ACCESSION REGENERATED

Number of regenerations or multiplications since original collection

2. COLLECTION DATA

2.1 COLLECTOR'S NUMBER

Original number assigned by collector 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 always accompany sub-samples wherever they are sent

2.2 COLLECTING INSTITUTE

Institute or person collecting/sponsoring the original sample

2.3 DATE OF COLLECTION OF ORIGINAL SAMPLE

2.4 COUNTRY OF COLLECTION OR COUNTRY WHERE CULTIVAR/VARIETY BRED

Use the 3 letter abbreviations supported by the Statistical Office of the United Nations. Copies of these abbreviations are available from the IBPGR Secretariat and have been published in the FAO/IBPGR Plant Genetic Resources Newsletter number 49

2.5 PROVINCE/STATE

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

2.6 LOCATION OF COLLECTION SITE

Number of kilometres and direction from nearest town, village or map grid reference (e.g. TIMBUKTU7S means 7 km south of Timbuktu)

2.7 LATITUDE OF COLLECTION SITE

Degrees and minutes followed by N (north) or S (south), e.g. 1030S

2.8 LONGITUDE OF COLLECTION SITE

Degrees and minutes followed by E (east) or W (west), e.g. 7625W

2.9 ALTITUDE OF COLLECTION SITE [m]

Elevation above sea level

2.10 COLLECTION SOURCE

- 1 Wild
- 2 Farm land
- 3 Farm store
- 4 Backyard
- 5 Village market
- 6 Commercial market
- 7 Institute
- 8 Other (specify in the NOTES descriptor, 11)

2.11 STATUS OF SAMPLE

- 1 Wild
- 2 Weedy
- 3 Breeder's line
- 4 Primitive cultivar/landrace
- 5 Advanced cultivar (bred)
- 6 Other (specify in the NOTES descriptor, 11)

2.12 LOCAL/VERNACULAR NAME

Name given by farmer to cultivar/landrace/weed

2.13 NUMBER OF PLANTS SAMPLED

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

2.14 PHOTOGRAPH

Was a photograph taken of the accession or environment at collection? If so provide any identification number in the NOTES descriptor, 11

- 0 No
- + Yes

2.15 TYPE OF SAMPLE

- 1 Vegetative
- 2 Seed
- 3 Both

2.16 HERBARIUM SPECIMEN

Was a herbarium specimen collected?

- 0 No
- + Yes

2.17 CULTURAL PRACTICE

If under cultivation:

- 1 Dryland (rainfed)
- 2 Irrigated
- 3 Other (specify in the NOTES descriptor, 11)

2.18 PLANTING PRACTICE

If under cultivation:

- 1 Drilled
- 2 Broadcast
- 3 Transplanted
- 3 Other (specify in the NOTES descriptor, 11)

2.19 CROPPING SYSTEM

If under cultivation:

- 1 Sole crop
- 2 Inter crop
- 3 Mixed crop
- 4 Sequence crop

2.20 SOIL

- 1 Sandy, sand and loam
- 2 Loam and silt loam
- 3 Clay loam, clay and silt
- 4 Highly organic
- 3 Other (specify in the NOTES descriptor, 11)

2.21 TOPOGRAPHY

- 1 Plains
- 2 Hills
- 3 Other (specify in the NOTES descriptor, 11)

2.22 OTHER NOTES FROM COLLECTOR

Collectors will record ecological information. For cultivated crops, cultivation practices such as irrigation, season of sowing, etc. will be recorded

CHARACTERIZATION AND PRELIMINARY EVALUATION

3. SITE DATA

3.1 COUNTRY OF CHARACTERIZATION AND PRELIMINARY EVALUATION

3.2 SITE (RESEARCH INSTITUTE)

3.3 NAME OF PERSON IN CHARGE OF CHARACTERIZATION

3.4 SOWING DATE

3.5 HARVEST DATE

3.6 PLANT DENSITY

Number of plants per square metre at maturity

3.7 FERTILIZATION

3.7.1 Organic fertilizer [t/ha]

3.7.2 Inorganic fertilizer [kg/ha]

N, P₂O₅, and K₂O, e.g.

40 kg N, 20 kg P₂O₅, 10 kg K₂O/ha

= 040020010

4. PLANT DATA

4.1 VEGETATIVE

4.1.1 Growth habit

40 days after sowing. Tillering attitude

3 Decumbent

5 Erect

7 Prostrate

4.1.2 Plant height [cm]

From ground level to tip of inflorescence (ear). At dough stage

4.1.3 Culm branching

Number of culm branches at maturity

4.1.4 Plant pigmentation

At flowering

0 Not pigmented

+ Pigmented

4.2 INFLORESCENCE AND FRUIT

4.2.1 Productive tillers

Number of basal tillers which bear mature ears

4.2.2 Days to flowering

From sowing to stage when ears have emerged from 50% of main tillers

4.2.3 Ear exertion [mm]

Exsertion of inflorescence at dough stage

4.2.4 Ear shape

At dough stage

1 Droopy (fingers lax and drooping)

2 Open (fingers straight)

3 Semi-compact (tops of fingers curved)

4 Compact (fingers incurved)

5 Fist-like (fingers very incurved)

- 4.2.5 Ear size
At dough stage
3 Small
5 Intermediate
7 Large
- 4.2.6 Finger branching
At dough stage
0 Absent
+ Present
- 4.2.7 Discontinuity of spikelets on finger
Gaps on finger. At dough stage
0 Absent (spikelets continuous)
+ Present (spikelets discontinuous)
- 4.2.8 Finger length [mm]
From base to tip of longest spike (finger) on
main tiller. At dough stage
- 4.2.9 Finger width [mm]
Measured across centre of longest finger. At
dough stage
- 4.2.10 Glume length [mm]
From sessile base to tip of lower glume. At
flowering
3 Short (2.8 - 4.0 mm)
5 Intermediate (5.4 - 6.6 mm)
7 Long (8.0 - 9.2 mm)
- 4.2.11 Spikelet shattering
At maturity
0 Absent
+ Present

4.2.12 Number of grains per spikelet

At maturity

- 3 Low (4 grains)
- 5 Intermediate (6 grains)
- 7 High (8 grains)

4.2.13 Grain covering

By glumes at maturity

- 3 Exposed
- 5 Intermediate
- 7 Enclosed

4.3 SEED (GRAIN)

4.3.1 Grain colour

Post-harvest

- 1 White
- 2 Light brown
- 3 Copper-brown
- 4 Purple-brown
- 5 Other (specify in NOTES descriptor, 11)

FURTHER CHARACTERIZATION AND EVALUATION

5. SITE DATA

5.1 COUNTRY OF FURTHER CHARACTERIZATION AND EVALUATION

5.2 SITE (RESEARCH INSTITUTE)

5.3 NAME OF PERSON IN CHARGE OF EVALUATION

5.4 SOWING DATE

5.5 HARVEST DATE

5.6 PLANTING DENSITY

Number of plants per square metre at maturity

5.7 FERTILIZATION

5.7.1 Organic fertilizer [t/ha]

5.7.2 Inorganic fertilizer [kg/ha]

N, P₂O₅, and K₂O, e.g.
40 kg N, 20 kg P₂O₅, 10 kg K₂O/ha
= 040020010

6. PLANT DATA

6.1 VEGETATIVE

6.1.1 Culm thickness [mm]

Diameter of internode between third and fourth nodes from top. At dough stage

6.1.2 Leaf number

Number of leaves on main tiller. At flowering

6.1.3 Leaf sheath length [mm]

Measured from node to ligule of flag leaf from top. At flowering

6.1.4 Leaf sheath width [mm]

Measured across centre of sheath of flag leaf from top. At flowering

6.1.5 Leaf blade length [cm]

Measured from ligule to tip of fourth leaf blade from top. At flowering

6.1.6 Leaf blade width [cm]

Measured across centre of fourth leaf blade from top. At flowering

6.1.7 Stomata! frequency

Number of stomata per 0.0008 cm².
Determined on fourth leaf from top. At
flowering

3 Low (9-10)

5 Intermediate (13-14)

7 High (17-18)

- 6.1.8 Blade length of flag leaf [cm]
Measured from ligule to leaf tip. At flowering
- 6.1.9 Blade width of flag leaf [cm]
Measured across the centre
- 6.1.10 Lodging susceptibility
At maturity
3 Low
5 Intermediate
7 High
- 6.1.11 Green fodder yield
Consider tillering, height, leafiness, bulk and senescence. At maturity

6.2 INFLORESCENCE AND FRUIT

- 6.2.1 Peduncle length [cm]
From top most node to base of the thumb finger
- 6.2.2 Finger number
On main ear. At dough stage
- 6.2.3 Spikelet density
Number of spikelets per centimetre along middle portion of the rachis of any finger. At dough stage
3 Sparse
5 Intermediate
7 Dense
- 6.2.4 Days to maturity
From sowing to stage when 50% of main tillers have mature ears
- 6.2.5 Synchrony of ear maturity
0 Not synchronous
+ Synchronous

6.3 SEED (GRAIN)

6.3.1 Grain shape

Post-harvest

- 1 Round
- 2 Reniform
- 3 Ovoid
- 4 Other (specify in the NOTES descriptor, 11)

6.3.2 Grain surface

Post-harvest

- 1 Smooth
- 2 Wrinkled

6.3.3 Grain uniformity

Post-harvest

- 0 Not uniform
- + Uniform

6.3.4 Pericarp persistence after threshing

- 0 Not persistent
- 3 Partially persistent
- 7 Persistent

6.3.5 1000 grain weight [g]

6.3.6 Grain yield per plant [g]

Mean of 5 plants, post-harvest

6.3.7 Grain yield potential

Consider finger number, size and density, grain number and size as compared to standard

- 3 Low
- 5 Intermediate
- 7 High

6.3.8 Malting quality

- 3 Low
- 5 Average
- 7 High

- 6.3.9 Protein content [%]
 Percentage of dry grain weight
- 6.3.10 Lysine content [%]
 Percentage of dry grain weight
- 6.3.11 Methionine content [%]
 Percentage of dry grain weight
- 6.3.12 Mineral content [%]
 Percentage of dry grain weight
- 6.3.13 Calcium content [%]
 Percentage of dry grain weight

7. STRESS SUCEPTIBILITY

Scored on a 1-9 scale, where:

- 3 Low susceptibility
- 5 Medium susceptibility
- 7 High susceptibility

7.1 LOW TEMPERATURE

At flowering

7.2 HIGH TEMPERATURE

At flowering

7.3 DROUGHT

7.4 HIGH SOIL MOISTURE

7.5 SOIL SALINITY

8. PEST AND DISEASE SUSCEPTIBILITY

Pest and disease susceptibility scores should only be made in designated trials with relevant check varieties. Indicate date of sowing, date of scoring and whether the infestation or infection was natural or artificial

Scored on a 1-9 scale, where:

- 3 Low susceptibility
- 5 Medium susceptibility
- 7 High susceptibility

8.1 PESTS

- 8.1.1 Shoot flies (Atherigona spp.)
- 8.1.2 White grubs (Holotrichia spp.)
- 8.1.3 Armyworms (Mythimna spp.)
- 8.1.4 Hairy caterpillars (Amsacta albistriga (Walk),
Estigmene lactinea G.)
- 8.1.5 Bollworms (Heliothis armigera (Hub.))
- 8.1.6 Stem borers (Busseola spp.),
(Chilo spp.),
(Sesamia spp.)
- 8.1.7 Aphids (Hysteroneura setariae
Thomas),
(Rhopalosiphum maidis
Fitch),
(Tetraneura spp.)
- 8.1.8 Earhead caterpillars (Cacoecia spp.),
(Cryptoblades spp.),
(Eublemna spp.),
(Stenachroia elongella
Hamps.)
- 8.1.9 Beetles (Epicauta spp.),
(Epilachna similis
Thunb.),
(Monolepta signata O.)
- 8.1.10 Earhead bugs (Calocoris angustatus
Leth.),
(Dolycoris indicus Slal.),
(Menida histrio Fabr.),
(Nezara viridula (L.))

- 8.1.11 Midges (Contarinia spp.)
- 8.1.12 Weevils (Myloccerus spp.),
(Nematocerus spp.)
- 8.1.13. Crain moth (Sitotroga cerealella
(Oliv.))
- 8.1.14 Grasshoppers
- 8.1.15 Locusts
- 8.1.16 Birds
- 8.1.17 Others (specify in the NOTES descriptor, 11)
- 8.2 FUNGI
- 8.2.1 Blast on foliage (Pyricularia sp.)
At 30 days
- 8.2.2 Blast on neck (Pyricularia sp.)
At maturity
- 8.2.3 Blast on finger (Pyricularia sp.)
At maturity
- 8.2.4 Foot rots (Cochliobolus nodulosus
Ltrr.),
(Drechslera nodulosa
(Berk. & Curt.) Subram. &
Jain) = Helminthosporium
nodulosum Berk. & Cirt. =
H. leucostylum Drechs.),
(Cochliobolus sativus
(Ito & Kurib.) Drechs.),
(Drechslera sorokiniana
(Sacc.) Subram. & Jain) =
Helminthosporium sativum
Pammel. (King & Bake)),
(Sclerotium rolfsii Sacc.),
(Corticium rolfsii Curzi)
- 8.2.5 Wilts (Ozonium texanum var.
parasiticum)

- 8.2.6 Leaf spots (Cercospora spp.),
 (Collectotrichum
 graminicola (Ces.) Wilson),
 (Drechslera rostrata
 (Drechs.) Richard & Fraser)
 = Exserohilum rostratum
 Drechs.),
 (Phyllachora eleusines
 Speg.)
- 8.2.7 Downy mildews (Sclerophthora macrospora
 (Sacc.) Thirum., Shaw &
 A'. dough stage Naras.)
- 8.2.8 Smuts (Melanosichium eleusinis
 (Kulk.) Mundk. & Thirum.)
 At dough stage
- 8.2.9 Grain moulds (Curvularia lunata (Walk.)
 Bold.)
- 8.2.10 Others (specify in the NOTES descriptor, 11)

9. ALLOENZYME COMPOSITION

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

10. CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES

11. NOTES

Give additional information where the descriptor state is noted as 'Other' as, for example, in descriptors 2.10, 4.3.1, etc. Also include here any further relevant information

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