



**DESCRIPTORS
FOR WHEAT
(Revised)**

160
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INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

COMMISSION OF EUROPEAN COMMUNITIES: COMMITTEE ON
DISEASE RESISTANCE BREEDING AND USE OF GENE BANKS

REVISED DESCRIPTOR LIST FOR WHEAT (*Triticum* spp.)

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In 1974 the Council of Ministers of the European Communities established a Standing Committee on Agricultural Research to advise the Commission on a programme of Agricultural Research.

The first programme started in 1975, while a second programme was launched in 1979 for the five year period 1979-1983.

The Standing Committee on Agricultural Research has advised the Commission on both programmes. Within this framework a programme on resistance breeding and use of genebanks has been set-up as one of 10 subjects. This programme (with a limited budget) is managed by a programme committee in which the ten member countries are represented by their nominees, one per country. The programme committee started work in 1978 by selecting priorities for crops and subjects. Several working groups have been set-up to prepare descriptor lists as a basis for future work.

CEC - Programme Committee on Disease Resistance Breeding and Use
of Gene Banks
Second Programme on Agricultural Research of the CEC

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PREFACE

This wheat descriptor list was initiated and developed with full support from the Commission of the European Communities (CEC) Programme Committee for Plant Disease Resistance Breeding and the Use of Genebanks.

This descriptor list has been prepared to the IBPGR standard format following advice on descriptors and descriptor states from the crop experts on the IBPGR Wheat Advisory Committee and the CEC. 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.

The suggested coding should not be regarded as the definitive scheme, although 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 this descriptor list with regard to: ordering and numbering descriptors; using the descriptors specified; and using the descriptor states recommended.

Errors and omissions are the responsibility of the editors. Any suggestions for modifications will be welcomed by the IBPGR Secretariat, Rome, and by the editors, especially before encoding new descriptors.

DESCRIPTOR LIST FOR WHEAT

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 to be 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 in metric units;

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 the extension of the codes given or by interpolation between them - e.g. in 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 information does not exist (descriptor is inapplicable), "0" is used;

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.

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 of the 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 the institution or individual responsible for donating the germplasm

1.3 DONOR IDENTIFICATION NUMBER

Number assigned to the 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 Inventory 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 Botanical variety (convariety)

1.6 PEDIGREE/CULTIVAR NAME

Nomenclature and designation assigned to breeders' material

1.6.1 Pedigree number

1.6.2 Cultivar name

1.7 ACQUISITION DATE

The month and year in which the accession entered the collection, expressed numerically, e.g. June = 06, 1981 = 81

1.7.1 Month

1.7.2 Year

1.8 DATE OF LAST REGENERATION OR MULTIPLICATION

The month and year expressed numerically, e.g. October = 10, 1978 = 78

1.8.1 Month

1.8.2 Year

1.9 ACCESSION SIZE

Approximate number of seeds of or quantity in gm of accession in collection (if quantity is given specify 100 seed weight)

1.10 NUMBER OF TIMES ACCESSION REGENERATED

Number of regenerations (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

Expressed numerically, e.g. March = 03, 1980 = 80

2.3.1 Month

2.3.2 Year

2.4 COUNTRY OF COLLECTION OR COUNTRY WHERE CULTIVAR/VARIETY WAS BRED (=Origin)

Use of the three 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 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. TIMBUKTU 7S means 7 km south of Timbuktu)

2.7 LATITUDE OF COLLECTION SITE

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

2.8 LONGITUDE OF COLLECTION SITE

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

2.9 ALTITUDE OF COLLECTION SITE

Elevation above sea level in metres

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 Breeders' 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 in the NOTES descriptor, 11

0 = No
+ = Yes

2.15 HERBARIUM SPECIMEN

0 = No
+ = Yes

2.16 OTHER NOTES FROM COLLECTOR

Collectors will record ecological/climatic information. For cultivated crops, cultivation practices such as irrigation, season of sowing, etc. should 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

- 3.4.1 Day
- 3.4.2 Month
- 3.4.3 Year

3.5 HARVEST DATE

- 3.5.1 Day
- 3.5.2 Month
- 3.5.3 Year

PLANT DATA

4.1 VEGETATIVE

4.1.1 Growth class (seasonality)

- 1 Winter
- 2 Facultative (intermediate)
- 3 Spring

4.1.2 Plant height

Height of plant at maturity, measured in cm from ground to top of spike, excluding awns

4.2 INFLORESCENCE

4.2.1 Days to flower

Counted as days from sowing to 50% of plants in flower. However, when planting in dry soils in dryland areas it is counted from the first day of rainfall or irrigation which is sufficient for germination

4.2.2 Spike density (see Fig. 1)

A visual measure of the density of a spike measured on a 1-9 scale. (NB. Spike density is not the same as spike shape.)

- 1 Very lax
- 3 Lax
- 5 Intermedite
- 7 Dense
- 9 Very dense

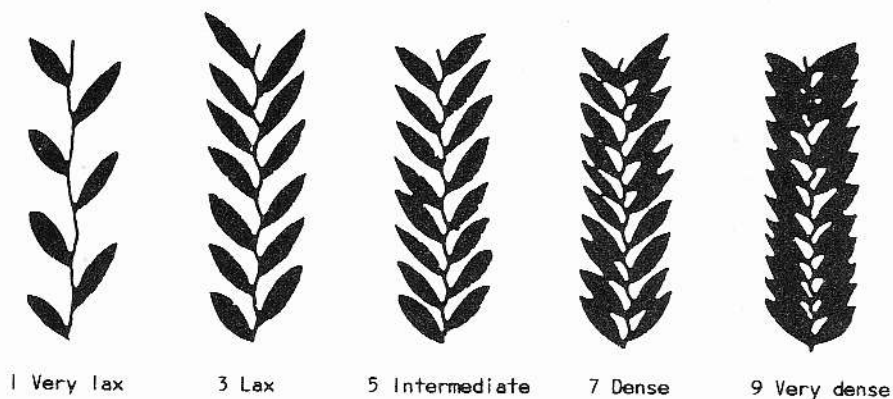


Fig. 1. Spike density

4.2.3 Awedness

- 0 Awnless
- 3 Awnletted (short awns)
- 7 Awned (conspicuous awns)

4.2.4 Glume colour

Observed on the outer glume

- 1 White
- 2 Red to brown
- 3 Purple to black

4.2.5 Glume hairiness

Measured on outer side of sterile glume

- 0 Absent
- 3 Low
- 7 High

4.2.6 Number of spikelets per spike

The average number of spikelets per spike from five typical spikes selected from a growing accession

4.2.7 Number of seeds per spikelet

The average number of seeds from a spikelet - obtained from the central portion of the spike - using the five typical spikes coded in 4.2.6

4.3 SEED

4.3.1 Seed colour

- 1 White
- 2 Red
- 3 Purple

(if this is difficult to decide then the sodium hydroxide test can be used. Place grains in a petri-dish and add 25 ml of a 5% solution of NaOH for 60-90 minutes. Original red grains will be dark brownish orange, and white grains will be straw yellow.)

4.3.2 Seed size (See Fig. 2)

- 3 Small
- 5 Intermediate
- 7 Large
- 9 Very large (only applies to some **turgidum** types)

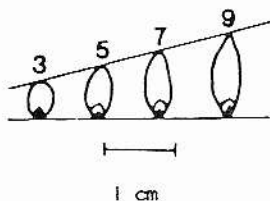


Fig. 2. Seed size

4.3.3 Seed vitreousness

Glass-like appearance when seeds are transversely sectioned.

- 3 Not vitreous (soft)
- 5 Partly vitreous
- 7 Vitreous

FURTHER CHARACTERIZATION AND EVALUATION

The descriptors included here were included in "Descriptors for Wheat and Aegilops" (1976) and in a preliminary CEC wheat descriptors list.

Evaluating for all these characters is beyond the resources of many collections and they are included here solely as a guide to what might be done. For the general principles of scoring characters not covered here see page 1

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

5.4.1 Day

5.4.2 Month

5.4.3 Year

5.5 HARVEST DATE

5.5.1 Day

5.5.2 Month

5.5.3 Year

6. PLANT DATA

6.1 VEGETATIVE

6.1.1 Growth habit of young plant

Appearance during tillering, but before jointing

3 Upright

7 Prostrate

6.1.2 Tillering capacity

Subjective assessment of number of tillers per plant at low densities

3 Low

7 High

6.1.3 Daylength sensitivity

Extent to which long days hasten flowering

- 0 Insensitive
- 3 Low
- 7 High

6.2 INFLORESCENCE

6.3 SEED

6.3.1 Pre-harvest sprouting tendency

Tendency of grains to sprout in the ear as a result of high moisture near harvest. Recorded on a 1-9 scale

- 3 Low sprouting
- 7 High sprouting

6.3.2 Degree of seed shrivelling

Appearance of dry seed after harvest

- 3 Plump
- 5 Intermediate
- 7 Shrivelled

6.3.3 Percentage protein content

Measured as percentage of dry weight (seed moisture equal to or less than 12%). Indicate the conversion factor used as either $N \times 6.25$ or $N \times 5.6$

6.3.4 Lysine (protein ratio)

Percentage of lysine per unit of protein (absolute)

6.3.5 Quality in food processing

Performance in tests for making the products listed below

- 3 Good
- 7 Poor

6.3.5.1 Bread

6.3.5.2 Biscuits

6.3.5.3 Pasta

7. STRESS SUSCEPTIBILITY

These reactions are coded on a 1-9 scale where

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

7.1 LOW TEMPERATURE

7.1.1 Winter susceptibility

Measured as a loss of plants in a sowing

7.1.2 Cold susceptibility

Damage caused by cold to aerial parts of plants; not associated with death of plants in winter

7.2 HIGH TEMPERATURE

7.3 EXCESS SOIL MOISTURE

7.4 DROUGHT

7.5 SOIL ACIDITY

7.6 HIGH SOLUBLE ALUMINIUM

7.7 SALINITY

7.8 LOW NITROGEN

7.9 LODGING

8. PEST AND DISEASE SUSCEPTIBILITY

In each case it is important to state the origin of the infestation or infection, i.e., natural, field inoculation, laboratory test (specify). Indicate if information on physiological specialization is available. Record such information in the NOTES descriptor, 11. Other organisms may be added using a similar coding system.

These are coded on a 1-9 scale, where

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

- 8.1 PESTS
 - 8.1.1 Nematode spp.
 - 8.1.2 Hessian fly **Mayetiola destructor**
- 8.2 FUNGI
 - 8.2.1 Stripe rust **Puccinia striiformis**
 - 8.2.2. Stem rust **Puccinia graminis**
 - 8.2.3 Leaf rust **Puccinia recondita**
 - 8.2.4 Powdery mildew **Erysiphe graminis**
 - 8.2.5 Glume blotch **Septoria nodorum**
 - 8.2.6 Eye spot **Pseudocercospora herpotrichoides**
 - 8.2.7 **Fusarium spp.**
 - 8.2.8 Take all **Ophiobolus graminis**
- 8.3 BACTERIA
- 8.4 VIRUSES AND MYCOPLASMA
 - 8.4.1 Barley yellow dwarf virus

9. GEL ELECTROPHORETIC PATTERNS AND ALLOENZYME COMPOSITION

These may be useful tools for monitoring grain quality aspects and for identifying duplicate accessions

10. CYTOLOGICAL CHARACTERISTICS AND IDENTIFIED GENES

For the protocol for symbols for genes, and for a listing of those so far identified refer to: McIntosh R.A., A Catalogue of Gene Symbols for Wheat (1983 Edition) Proc. 6th Int. Wheat Genetics Symp., Kyoto, Japan 1197-1254. Annual Supplements also appear in Wheat Information Service, Cereal Research Communications and Annual Wheat Newsletter

11. NOTES

Give additional information where descriptor state is noted as "Other" as, for example, in descriptors 2.10, 8. etc. Also include here any further relevant information