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OAT DESCRIPTORS

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INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

OAT DESCRIPTORS

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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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CONTENTS

	<u>Page</u>
PREFACE.....	v
DESCRIPTOR LIST FOR OAT.....	1
TABLE 1. A DECIMAL CODE FOR THE GROWTH STAGES OF CEREALS...3	3
PASSPORT.....	5
1. ACCESSION DATA.....	5
2. COLLECTION DATA.....	6
CHARACTERIZATION.....	9
3. SITE DATA.....	9
4. PLANT DATA.....	9
FURTHER CHARACTERIZATION AND EVALUATION.....	13
5. SITE DATA.....	13
6. PLANT DATA.....	13
7. STRESS SUSCEPTIBILITY.....	15
8. PEST AND DISEASE SUSCEPTIBILITY.....	16
9. ALLOENZYME COMPOSITION.....	17
10. CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES.....	17
11. NOTES.....	17
APPENDIX I LIST OF PARTICIPANTS OF ECP/GR.....	19
AVENA WORKING GROUP	
APPENDIX II LIST OF ADDITIONAL CONTRIBUTORS.....	21

PREFACE

This descriptor list for oat (Avena spp.) is based upon a list of descriptors selected by the Oat Working Group of the European Cooperative Programme for Conservation and Exchange of Crop Genetic Resources (ECP/GR) during its first meeting at Aegean Regional Agricultural Research Institute (ARARI), Izmir, Turkey, 25-27 September 1984. List of members of the Working Group is provided in Appendix I. Subsequently it was revised by members of the Working Group in the light of comments and criticisms received from oat scientists (listed in Appendix II). The IBPGR wishes to record its thanks to them for their contributions, which the Working Group has attempted to incorporate in the final text.

This descriptor list for Avena is sufficiently comprehensive and detailed to meet the needs of curators and breeders and to accommodate cultivated, weedy and wild forms and the IBPGR wishes to remind users that descriptors not relevant to their work may be disregarded.

The IBPGR encourages the collection of data on the first four categories of this list: 1. Accession; 2. Collection; 3. and 4. Characterization. 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 for any user.

Although the suggested coding should not be regarded as the definite scheme, this format has the full backing of the IBPGR and is promoted world-wide. 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 the 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 OAT

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 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 DDMMYYYY, where

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

In many characters it is necessary that their expression should be recorded at a particular stage in the development of the plant. Appropriate stages are suggested in sections 4 and 6 using the decimal code of Zadoks, Chang and Konzak ^{1/} and the key to the code is reproduced on pages 3 and 4.

^{1/} Zadoks, J.C., Chang T.T., and Konzak, C.F. 1974. A Decimal Code for the Growth Stages of Cereals. European Association for Research on Plant Breeding (EUCARPIA), Wageningen, Netherlands.

Table 1. A decimal code for the growth stages of cereals

2-digit code	General description	2-digit code	General description
<u>Germination</u>		<u>Stem elongation</u>	
00	Dry seed	30	Pseudo stem erection
01	Start of imbibition	31	1st node detectable
02	-	32	2nd node detectable
03	Imbibition complete	33	3rd node detectable
04	-	34	4th node detectable
05	Radicle emerged from caryopsis	35	5th node detectable
06	-	36	6th node detectable
07	Coleoptile emerged from caryopsis	37	Flag leaf just visible
08	-	38	-
09	Leaf just at coleoptile tip	39	Flag leaf ligule/collar just visible
<u>Seedling growth</u>		<u>Booting</u>	
10	First leaf through coleoptile	40	-
11	First leaf unfolded ^{1/}	41	Flag leaf sheath extending
12	2 leaves unfolded	42	-
13	3 leaves unfolded	43	Boots just visibly swollen
14	4 leaves unfolded	44	-
15	5 leaves unfolded	45	Boots swollen
16	6 leaves unfolded	46	-
17	7 leaves unfolded	47	Flag leaf sheath opening
18	8 leaves unfolded	48	-
19	9 or more leaves unfolded	49	First awns visible
<u>Tillering</u>		<u>Inflorescence emergence</u>	
20	Main shoot only	50	First spikelet of
21	Main shoot and 1 tiller	51	inflorescence just visible
22	Main shoot and 2 tillers	52	1/4 of inflorescence
23	Main shoot and 3 tillers	53	emerged
24	Main shoot and 4 tillers	54	1/2 of inflorescence
25	Main shoot and 5 tillers	55	emerged
26	Main shoot and 6 tillers	56	3/4 of inflorescence
27	Main shoot and 7 tillers	57	emerged
28	Main shoot and 8 tillers	58	Emergence of inflorescence
29	Main shoot and 9 or more tillers	59	completed

^{1/} see next page

Table 1. A decimal code for the growth stages of cereals (Continued)

2-digit code	General description	2-digit code	General description
	<u>Antithesis</u>		<u>Ripening</u>
60 } 61 } 62 - 63 - 64 } 65 } 66 - 67 - 68 } 69 }	Beginning of anthesis { N Beginning of anthesis { S - - Anthesis half-way { N Anthesis half-way { S - - Anthesis complete { N Anthesis complete { S	90 - 91 Caryopsis hard (difficult to divide by thumb-nail) <u>2/</u> 92 Caryopsis hard (can no longer be dented by thumb-nail) <u>3/</u> 93 Caryopsis loosening in daytime 94 Over-ripe, straw dead and collapsing 95 Seed dormant 96 Viable seed giving 50% germination 97 Seed not dormant 98 Secondary dormancy induced 99 Secondary dormancy lost	
	<u>Milk development</u>		
70 - 71 Caryopsis watery ripe 72 - 73 Early milk 74 - 75 Medium milk 76 - 77 Late milk 78 - 79 -			
	<u>Dough development</u>		
80 - 81 - 82 - 83 Early dough 84 - 85 Soft dough 86 - 87 Hard dough 88 - 89 -			

N = non-synchronous crops
S = synchronous

1/ Stage of seedling inoculation with rust in the glasshouse
2/ Ripeness for binder (ca 16% water content); chlorophyll of inflorescence largely lost
3/ Ripeness for combine harvester (16% water content)

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 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

1.5.5 Cultivar group

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

1.11 NUMBER OF PLANTS GROWN DURING LAST REGENERATION

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. 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. 1030S

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 (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 Inbred line
- 6 Hybrid
- 7 Synthetic
- 8 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

Any identification of a photograph of the accession or environment taken at collection. If no photograph was taken, record '0'

2.15 HERBARIUM SPECIMEN

Was a herbarium specimen collected?

0 No
+ Yes

2.16 TOPOGRAPHY OF COLLECTION SITE

1 Swamp
2 Flood plain
3 Plain level
4 Undulating
5 Hilly
6 Mountainous
7 Other (specify in the NOTES descriptor, 11)

2.17 SOIL TEXTURE AT COLLECTION SITE

1 Organic
2 Clay
3 Loam
4 Sand
5 Rocky

2.18 PESTS AND DISEASES AT COLLECTION TIME

Specify using item numbers of pests and diseases (Section 8) and severity of infection on 1-9 scale

2.19 OTHER NOTES FROM COLLECTOR

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

CHARACTERIZATION

3. SITE DATA

- 3.1 COUNTRY OF CHARACTERIZATION
- 3.2 SITE (RESEARCH INSTITUTE)
- 3.3 NAME OF PERSON IN CHARGE OF CHARACTERIZATION
- 3.4 SOWING DATE
- 3.5 HARVEST DATE
- 3.6 CULTIVATION METHOD

Record row spacing and other management practices

4. PLANT DATA

Stage

4.1 VEGETATIVE

4.1.1 Chromosome number

4.1.2 Growth class (seasonality)

- 1 Autumn sown
- 2 Facultative
- 3 Spring sown

4.1.3 Vernalization requirement

- 0 Vernalization not required
- + Vernalization required

4.1.4 Growth habit

25-29

At juvenile stage, angle of the tillers from the vertical

- 3 Erect
- 5 Semiprostrate
- 7 Prostrate

4.1.5 Plant height

80-92

Relative to specified reference varieties

- 3 Short
- 5 Medium
- 7 Tall

	<u>Stage</u>
4.1.6 <u>Stem thickness</u>	80-92
Relative to specified reference varieties	
3 Thin	
5 Intermediate	
7 Thick	
4.1.7 <u>Nodes hairiness</u>	60-69
0 Glabrous	
3 Slightly pubescent	
5 Moderately pubescent	
7 Highly pubescent	
4.1.8 <u>Angle of flag leaf to culm</u>	50-53
3 Acute	< 90°
5 Intermediate	about 90°
7 Obtuse	> 90°
4.1.9 <u>Rigidity of flag leaf</u>	50-53
3 Bent	
5 Slightly bent	
7 Stiff	
4.1.10 <u>Angle to culm of leaves (other than flag leaf)</u>	50-53
3 Acute	< 90°
5 Intermediate	about 90°
7 Obtuse	> 90°
4.1.11 <u>Rigidity of leaves (other than flag leaf)</u>	50-53
3 Bent	
5 Slightly bent	
7 Stiff	
4.1.12 <u>Hairiness of leaf sheath (lower leaves)</u>	25-29
0 Glabrous	
3 Slightly pubescent	
5 Moderately pubescent	
7 Highly pubescent	

	<u>Stage</u>
4.1.13 <u>Hairiness of leaf margin</u> (leaf below flag leaf)	40-4
0 Glabrous	
3 Slightly pubescent	
5 Moderately pubescent	
7 Highly pubescent	
4.2 INFLORESCENCE AND FRUIT	
4.2.1 <u>Shape of panicle</u>	65
1 Unilateral	
2 Equilateral	
4.2.2 <u>Erectness of panicle</u>	70-79
3 Drooping	
5 Semi-erect	
7 Erect	
4.2.3 <u>Angle of panicle branches to the main axis</u>	70-79
1 Extremely low (panicle branches erect)	
3 Acute	
5 Intermediate	
9 Obtuse	
4.2.4 <u>Erectness of spikelets</u>	60-65
3 Drooping	
5 Semi-erect	
7 Erect	
4.2.5 <u>Waxiness of the panicle</u>	64-69
0 Absent	
+ Present	
4.3 SEED	
4.3.1 <u>Lemma colour</u>	92
1 White	
2 Yellow	
3 Grey	
4 Red	
5 Black	
6 Other (specify in the NOTES descriptor, 11)	

	<u>Stage</u>
4.3.2 <u>Hairiness of lemma</u>	92
0 Glabrous	
3 Slightly pubescent	
5 Moderately pubescent	
7 Highly pubescent	
4.3.3 <u>Kernel covering</u> (cultivated forms)	92
0 Grains naked	
+ Grains covered	
4.3.4 <u>Awedness</u>	92
Recorded on basal floret	
0 No awns	
3 Weak awns	
7 Strong awns	
4.3.5 <u>Awn type</u> (for wild and weedy species)	92
Recorded on basal floret	
1 Straight	
2 Genuiculate	
3 Other (specify in the NOTES descriptor, 11)	
4.3.6 <u>Position of awn insertion</u> (for wild and weedy species)	92
Recorded on basal floret	
1 1/4 from base	
2 1/3 from base	
3 1/2 from base	
4 > 1/2 from base	
4.3.7 <u>Dispersal unit</u> (for wild and weedy species)	92
1 Spikelet, minus glumes (abscission layer at base of the lowest floret only)	
2 Floret (abscission layer at base of each floret)	
4.3.8 <u>Hairiness at basal part of the primary grain</u>	92
0 Glabrous	
3 Slightly pubescent	
5 Moderately pubescent	
7 Highly pubescent	

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 CULTIVATION METHOD

Record row spacing and other management practices

6. PLANT DATA

- 6.1 VEGETATIVE Stage
 - 6.1.1 Length of second leaf from top 50-69

Relative to specified reference varieties

 - 3 Short
 - 5 Medium
 - 7 Long
 - 6.1.2 Width of second leaf from top 50-69

At widest point. Relative to specified reference varieties

 - 3 Narrow
 - 5 Medium
 - 7 Broad
 - 6.1.3 Number of tillers

Relative to specified reference varieties

 - 3 Few
 - 5 Intermediate
 - 7 Many
 - 6.1.4 Number of fertile tillers 92

An average of 10 plants

	<u>Stage</u>
6.1.5 <u>Lodging at immature stage</u>	60-79
0 Upright (all plants)	
3 Minor lodging	
5 Intermediate	
7 Lodged	
9 Extremely lodged (all plants)	
6.1.6 <u>Lodging at mature stage</u>	92
0 Upright (all plants)	
3 Minor lodging	
5 Intermediate	
7 Lodged	
9 Extremely lodged (all plants)	
6.2 INFLORESCENCE AND FRUIT	
6.2.1 <u>Days to heading</u>	54-55
Counted as days from sowing to 50% of panicles fully emerged	
6.2.2 <u>Days to harvest</u>	92
Counted as days from sowing to harvest ripeness	
6.2.3 <u>Relation between maturity of grains and straw</u>	80-89
3 Grain ripe before straw	
5 Simultaneous	
7 Straw ripe before grain	
6.2.4 <u>Number of seeds in panicle</u>	92
An average of 10 panicles	
6.2.5 <u>Number of grains in spikelet</u>	92
An average of 5 spikelets	
6.3 SEED	
6.3.1 <u>Grain shedding at maturity (cultivated forms)</u>	92
3 Low	
5 Intermediate	
7 High	

	<u>Stage</u>
6.3.2 <u>1000 grain weight</u> (g)	92
6.3.3 <u>Test weight</u> (kg/hl)	92
6.3.4 <u>Percentage of husk</u> (%)	92
6.3.5 <u>Percentage protein content of caryopsis</u> (%)	92
Record details of analytical method used in the NOTES descriptor, 11	
6.3.6 <u>Percentage oil content of caryopsis</u> (%)	92
Record details of analytical method used in the NOTES descriptor, 11	
6.3.7 <u>Sprouting</u>	
Tendency of grains to sprout in the ear before harvest as a result of late rainfall	
0 No sprouting	
9 All sprouting	

7. STRESS SUSCEPTIBILITY

Scored on a 1-9 scale, where

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

7.1 LOW TEMPERATURE DAMAGE

Damage caused by cold to aerial parts of plants (distinct from winter kill of whole plants, see descriptor 7.5)

- 0 No damage
- 3 Slightly damaged
- 5 Moderately damaged
- 7 Highly damaged
- 9 All aerial parts killed

7.2 HIGH TEMPERATURE

7.3 DROUGHT

7.4 HIGH SOIL MOISTURE

7.5 WINTER KILL

Susceptibility to winter stress measured as a loss of plants in a sowing

- 0 No loss
- 9 All plants dead

7.6 SALINITY

7.7 LOW PH

8. PEST AND DISEASE SUSCEPTIBILITY

These reactions are coded on a 1-9 scale with 9 representing maximum susceptibility. In each case, it is important to state the origin of the infection or infestation, i.e. natural, field inoculation, laboratory test, and pathotype or physiologic race used. Record such information in the NOTES descriptor, 11

8.1 PESTS

- 8.1.1 Ditylenchus dipsaci Stem and bulb eelworm
- 8.1.2 Heterodera avenae Root eelworm
- 8.1.3 Lama melanopa Leaf beetle
- 8.1.4 Oscinella frit Fruit fly

8.2 FUNGI

- 8.2.1 Erysiphe graminis avenae Powdery mildew
- 8.2.2 Drechslera spp.
- 8.2.3 Puccinia coronata avenae Crown rust
- 8.2.4 Puccinia graminis avenae Stem rust
- 8.2.5 Septoria avenae
- 8.2.6 Ustilago avenae Loose smut
- 8.2.7 Ustilago kolleri Covered smut

8.3 BACTERIA

8.4 VIRUS

8.4.1 Barley yellow dwarf virus (BYDV)

8.4.2 Oat sterile dwarf virus

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 descriptor is noted as "Other" as, for example, in descriptor 4.3.1. Also include here any further relevant information

APPENDIX I

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