

DESCRIPTORS FOR WHITE CLOVER

(*Trifolium repens* L.)

IBPGR 



INTERNATIONAL
BOARD FOR
PLANT
GENETIC
RESOURCES

DESCRIPTORS FOR WHITE CLOVER (*Trifolium repens* L.)

IBPGR
ROME 1992

The International Board for Plant Genetic Resources (IBPGR) is an autonomous scientific organization under the aegis of the Consultative Group on International Agricultural Research (CGIAR). The basic function of IBPGR is to promote and coordinate an international network of genetic resources centres to foster the collecting, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. Financial support for the core programme is provided by the Governments of Australia, Austria, Belgium, Canada, China, Denmark, France, Germany, India, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK and the USA, the United Nations Environment Programme and the World Bank

Cover illustration

The four-leaf cover is a potent symbol of good luck, in particular to the British people, hence the embellishment of the cover illustration

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PREFACE

The initial list of descriptors for white clover (*Trifolium repens* L.) was developed by Mr M.Z.Z. Jahufer (NSW Agriculture, Australia) and prepared in the IBPGR standard format. A draft version was subsequently sent to a number of experts for their comments and amendments. A full list of the names and addresses of those involved is given in 'Contributors'.

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 germplasm collections curators 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 given here is intended to be comprehensive with regard to the scope of descriptors that it contains. This approach is to assist with the standardization of descriptor definitions for all descriptors. IBPGR does not, however assume that each collection will characterize accessions of their collection utilizing all descriptors given. Descriptors should be used when they are useful to the curator and the users of the collections genetic resources.

This descriptor list 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 IBPGR.

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 the colour chart 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

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. IDG indicates an accession comes from the genebank at Bari, Italy; CGN indicates one accession comes from the genebank at Wageningen, The Netherlands; 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 NUMBER

Number assigned to accession by the donor

1.4 OTHER NUMBER(S) ASSOCIATED WITH THE ACCESSION

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

1.4.2 Other number 2

1.5 SCIENTIFIC NAME

1.5.1 Genus

1.5.2 Species

1.5.3 Subspecies

1.5.4 Authority

1.5.5 Botanical variety

1.5.6 Form

1.6 PEDIGREE

Parentage, or nomenclature and designations assigned to breeders' material

1.7 CULTIVAR NAME

Either a registered or other formal cultivar or synthetic line 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

(in the format DDMMYYYY)

1.10 ACCESSION SIZE

Approximate number of plants or number or weight of seeds of an accession at 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
- 5 Pollen

1.14 NOTES

Specify here any additional information

2. COLLECTION DATA

2.1 COLLECTING INSTITUTE(S)

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

2.2 SITE NUMBER

Number assigned to the physical site by the collector

2.3 COLLECTOR'S NUMBER

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

2.4 COLLECTION DATE OF ORIGINAL SAMPLE

(in the form DDMMYYYY)

2.5 COUNTRY OF COLLECTION

Name of the country in which the sample was collected or was bred. Use three letter abbreviations adopted by the Statistical Office of the United Nations. Copies of these are available from IBPGR Headquarters and have been published in the *FAO/IBPGR Plant Genetic Resources Newsletter*, number 49 (March, 1982)

2.6 PROVINCE/STATE

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

2.7 DEPARTMENT/COUNTY

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

2.8 COLLECTION SITE

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)

2.9 LATITUDE OF COLLECTION SITE

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

2.10 LONGITUDE OF COLLECTION SITE

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

2.11 COLLECTION SOURCE

- 1 Wild habitat (specify type of grasslands)
- 2 Farmer's field (specify type of grasslands)
- 3 Farm store
- 4 Backyard
- 5 Market
- 6 Research organization
- 7 Threshing yard
- 8 Others (specify in the descriptor COLLECTOR'S NOTES, 2.33)

2.12 GENERAL HABITAT

- 1 Forest deciduous
- 2 Forest evergreen
- 3 Forest mixed
- 4 Scrub
- 5 Parkland
- 6 Orchard
- 7 Grassland
- 8 Moorland
- 9 Heath
- 10 Arable
- 11 Wasteland
- 12 Other (specify in the descriptor COLLECTOR'S NOTES, 2.33)

2.12.1 Type of grassland

- 1 Young ley
- 2 Old pasture
- 3 Meadow
- 4 Path
- 5 Verge

2.13 STATUS OF SAMPLE

- 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, 2.33)

2.14 ANNUALITY BEHAVIOUR

- 1 Annual
- 2 Perennial
- 3 Unknown

2.15 MAIN COMPANION SPECIES AT COLLECTION SITE

2.15.1 Was companion species collected?

- 0 No
- + Yes

2.15.2 Taxonomic identity of main companion species2.16 ASSOCIATED *RHIZOBIUM*

Was associated *rhizobium* collected? If yes, provide the collector's number for *rhizobium*, in the descriptor COLLECTOR'S NOTES, 2.33

- 0 No
- + Yes

2.17 SAMPLE TYPE

- 1 Seed
- 2 Stolon cutting
- 3 Rooted plant
- 4 Tissue culture
- 5 Other (specify in the descriptor COLLECTOR'S NOTES, 2.33)

2.18 NUMBER OF PLANTS SAMPLED

2.19 NUMBER OF HEADS (INFLORESCENCES) COLLECTED

2.20 WEIGHT OF SEED COLLECTED [g]

2.21 CULTURAL PRACTICES

- 1 Rainfed
- 2 Irrigated
- 3 Flooded
- 4 River banks
- 5 Transplanted
- 6 Other (specify in the descriptor COLLECTOR'S NOTES, 2.33)

2.22 CROPPING SYSTEM

- 1 Monoculture
- 2 Mixed with grasses (specify main species)
- 3 Mixed with legumes (specify crop)
- 4 Mixed with trees (agroforestry) (specify)
- 5 Mixed with other (specify crop)

2.23 PROPORTION OF WHITE CLOVER IN SWARD [%]

- 1 Very low (1%)
- 9 Very high (100%)

2.24 LOCAL/VERNACULAR NAME

Name given by farmer to crop and cultivar/landrace, population name (variety name). State language and dialect if the ethnic group is not provided

2.25 ETHNIC GROUP

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

2.26 USES OF THE ACCESSION

- 1 Seed
- 2 Conservation
- 3 Grazing
- 4 Other (specify in the descriptor COLLECTOR'S NOTES, 2.33)

2.27 COLLECTION SOURCE ENVIRONMENT

2.27.1 Growing period (state months)

2.27.2 Agricultural potential

Subjective assessment of the agricultural potential of the source location

- 3 Low
- 5 Medium
- 7 High

2.27.3 Aproximative age of grassland [yr]

2.27.4 Height of sward [cm]

- 1 0 - 1 cm
- 2 2 - 3 cm
- 3 4 - 6 cm
- 4 6 - 8 cm
- 5 8 - 10 cm
- 6 > 10 cm

Further descriptors on the Collection Source Environment (2.27.5 -2.27.32) are presented in Appendix I. These are not numbered in the Appendix in this manner, but should be for this section. This has been done in order to reduce the repetition of descriptors in Sections 2, 3 and 5

2.28 OBSERVED THREATS

- 1 Over-exploitation
- 2 Land cleaning
- 3 Environmental pressures (natural)
- 4 Socio-economic activities
- 5 Diseases

2.29 PHOTOGRAPH

Was a photograph(s) taken of the accession or habitat at the time of collection?
If so, provide an identification number(s) in the descriptor COLLECTOR'S
NOTES, 2.33

- 0 No
- + Yes

2.30 HERBARIUM SPECIMEN

Was a herbarium specimen collected? If so, provide an identification number in
the descriptor COLLECTOR'S NOTES, 2.33

- 0 No
- + Yes

2.31 PREVAILING STRESSES

Information on associated biotic and abiotic stresses

2.32 FREQUENCY OF ACCESSION AT COLLECTION SITE

- 1 Rare
- 3 Occasional
- 5 Frequent
- 7 Abundant
- 9 Very abundant

2.33 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, 2.5)

3.2 SITE (RESEARCH INSTITUTE)

3.2.1 Site number

3.2.2 Latitude

(See format under 2.9)

3.2.3 Longitude

(See format under 2.10)

3.2.4 Name of farm or institute

3.3 EVALUATOR'S NAME AND ADDRESS

3.4 SOWING DATE

(in the form DDMMYYYY)

3.4.1 Planting (transplanting) date

3.4.1.1 Number of plants

3.4.1.2 Number of replicates

3.5 HARVEST DATES

(in the form DDMMYYYY)

3.5.1 Frequency of harvest

3.6 EVALUATION ENVIRONMENT

Environment in which characterization/preliminary evaluation was carried out

- 1 Field
- 2 Screenhouse
- 3 Greenhouse
- 4 Glasshouse
- 5 Glasshouse then field
- 6 Laboratory
- 7 Other (specify in the descriptor NOTES, 3.18)

3.7 PERCENTAGE SEED GERMINATION [%]

3.7.1 Hard seed content [%]

3.7.2 Seed scarified prior to germination test

- 0 No
+ Yes

3.8 NUMBER OF DAYS TO 50% GERMINATION

3.9 PERCENTAGE FIELD ESTABLISHMENT [%]

3.10 SOWING PATTERN

- 1 Pots in glasshouse
- 2 Nursery rows
- 3 Nursery spaced plants
- 4 Sown monoculture (type of sowing unknown)
- 5 Broadcast
- 6 Fixed spacing monocultures and mixed sward

3.11 SOWING SITE IN FIELD

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

3.12 FIELD SPACING

3.12.1 Distance between plants in a row [cm]

3.12.2 Distance between rows [cm]

3.12.3 Other (For broadcast sowing, where there are no rows, specify the sowing density [seeds m⁻²])

3.13 ORIGINAL SOWING MATERIAL

- 1 Seed
- 2 Seedling
- 3 Stolon

3.14 ENVIRONMENTAL CHARACTERISTICS OF SITE

Descriptors on the Environmental characteristics of site (3.14.1 - 3.14.28) are presented in Appendix I. These are not numbered in the Appendix in this manner, but should be for this section. This has been done in order to reduce the repetition of descriptors in Sections 2, 3 and 5

3.15 FERTILIZER

(Specify names, doses and frequency of each)

3.16 INOCULATION

(Specify strain methods)

3.17 PLANT PROTECTION

(Specify pesticides used, dose and frequency of each)

3.18 NOTES

Any other site-specific information

4. PLANT DATA

4.1 VEGETATIVE

4.1.1 Vegetative growth

Record the number of days after sowing and the date of observation. All leaf measurements should be made on a fully expanded leaf or on the 3rd leaf if 4th is not fully expanded, from the distal end of a primary stolon. Observed on 10 randomly selected plants. Specify if observations are from the first production year or if they are an average of two production years

4.1.2 Plant habit

See Fig. 1

- 1 Erect
- 2 Semi-erect
- 3 Prostrate

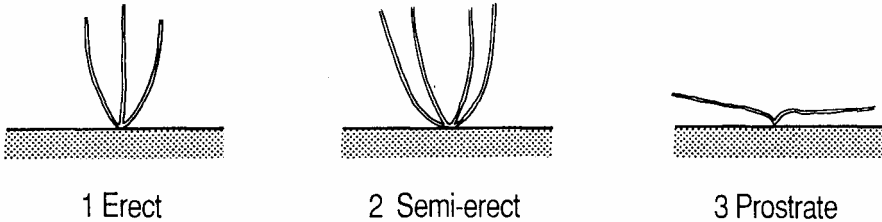


Fig. 1 Plant habit

4.1.3 Growth rate

- 3 Slow
- 5 Normal
- 7 Rapid

4.1.4 Lodging

- 3 Light
- 5 Intermediate
- 7 Heavy

4.1.5 Leaflet shape

Middle leaflet. See Fig. 2

- 1 Round
- 2 Oval
- 3 Obovate
- 4 Obcordate

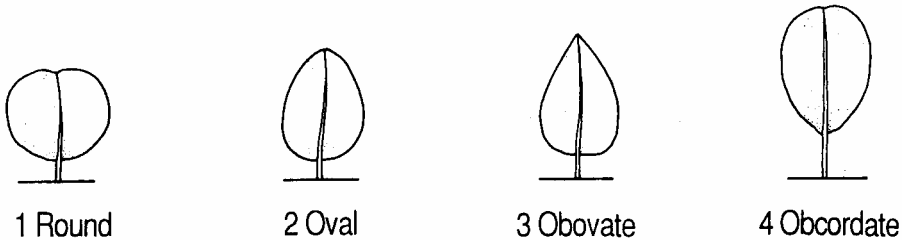


Fig. 2 Leaflet shape

4.1.6 Leaflet apex shape

- 1 Truncate
- 2 Rounded
- 3 Emarginate

4.1.7 Terminal leaflet length [mm]

Average of 20 randomly selected plants

4.1.8 Terminal leaflet width [mm]

Average of 20 randomly selected plants

4.1.9 Leaf shape ratio [Length:width]

4.1.10 Leaf colour

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

- 1 Light green
- 2 Dark green
- 3 Variable

4.1.11 White/yellow 'V' marks

4.1.12 Leaf markings uniformity

- 1 Uniform
- 2 Variable

4.1.13 Anthocyanin marking association with 'V' allele

4.1.14 Independent anthocyanin marks

It is recommended that observations should be done in the winter at locations with hot summers since the red markings (in hot temperatures) tend to fade or disappear

4.1.15 Markings type

- 1 V-shaped
- 2 Both (V-shaped and another type)
- 3 Other (specify in the NOTES descriptor, 4.3)

The reference for a further characterization of V-shaped markings (if needed), is:

Brewbaker, J.L. and Carnahan, H.L. 1956. Leaf markings alleles in white clover. In: *The Journal of Heredity*. 47:103-104

4.1.16 Leaf hairiness

- 0 Absent
- + Present

4.1.17 Leaf margin

- 1 Smooth
- 2 Faintly toothed
- 3 Distinctly toothed
- 4 Variable

4.1.18 Anthocyanin discolouration of stipule

- 3 Weak
- 7 Strong

4.1.19 Petiole hairiness

- 3 Sparse
- 5 Intermediate
- 7 Dense

4.1.20 Plant height [cm]

Measure from soil surface to top of leaf canopy. Average of 20 randomly selected plants. At early flowering

4.1.21 Plant spread [cm]

Average of 20 randomly selected plants. Mean of 2 or more measurements on each plant

4.1.22 Number of stolons

From primary stem which may be observed at first flower initiation stage

- 1 Sparse (<15)
- 2 Medium (15-25)
- 3 Dense (>25)

4.1.23 Anthocyanin discolouration of stolon

- 3 Weak
- 7 Strong

4.2 INFLORESCENCE AND SEED

4.2.1 Number of days from sowing to flower initiation

First flowering period (when 50% florets open), postemergence. Observed on 10 randomly selected plants

4.2.2 Average number of heads per plant

One month after first flower appears. Observed on 10 randomly selected plants

4.2.3 Petal colour of florets

Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states. It is recommended that observations should be done in the winter at locations with hot summers since the red markings (in hot temperatures) tend to fade or dissappear

- 1 White
- 2 Whitish-pink
- 3 Other (specify in the NOTES descriptor, 4.3)

4.2.4 Colour of seed coat

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

- 1 Yellow
- 2 Reddish-brown
- 3 Brown
- 4 Other (specify in the NOTES descriptor, 4.3)

4.2.5 Seed width [mm]

Average of 10 randomly selected plants

4.2.6 Seed shape

- 1 Round
- 2 Oval
- 3 Obovate
- 4 Obcordate
- 5 Other (specify in the NOTES descriptor, 4.3)

4.2.7 Vernalization requirement

Length of cold period required to induce flowering

4.2.8 Seed dormancy

- 0 Absent
- + Present

4.3 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, 2.5)

5.2 SITE (RESEARCH INSTITUTE)

5.2.1 Site number

5.2.2 Latitude

(See format under 2.9)

5.2.3 Longitude

(See format under 2.10)

5.2.4 Name of farm or institute

5.3 EVALUATOR'S NAME AND ADDRESS

5.4 SOWING DATE

(in the form DDMMYYYY)

5.4.1 Planting (transplanting) date

5.4.1.1 Number of plants

5.4.1.2 Number of replicates

5.5 HARVEST DATES

(in the form DDMMYYYY)

5.5.1 Frequency of harvest

5.6 EVALUATION ENVIRONMENT

Environment in which characterization/preliminary evaluation was carried out

- 1 Field
- 2 Screenhouse
- 3 Greenhouse
- 4 Glasshouse
- 5 Glasshouse then field
- 6 Laboratory
- 7 Other (specify in the descriptor NOTES, 5.18)

5.7 PERCENTAGE SEED GERMINATION [%]

5.7.1 Hard seed content [%]

5.7.2 Seed scarified prior to germination test

- 0 No
- + Yes

5.8 NUMBER OF DAYS TO 50% GERMINATION

5.9 PERCENTAGE FIELD ESTABLISHMENT [%]

5.10 SOWING PATTERN

- 1 Pots in glasshouse
- 2 Nursery rows
- 3 Nursery spaced plants
- 4 Sown monoculture (type of sowing unknown)
- 5 Broadcast
- 6 Fixed spacing monocultures and mixed sward

5.11 SOWING SITE IN FIELD

Give block, strip and/or row/plot numbers as applicable. If plots are grazed, record:

5.11.1 Grazing pressure

- 1 Sheep (Number of animals by hectare)
- 2 Cattle (Number of animals by hectare)

5.12 FIELD SPACING

5.12.1 Distance between plants in a row [cm]

5.12.2 Distance between rows [cm]

5.12.3 Other (For broadcast sowing, where there are no rows, specify the sowing density [seeds m²])

5.13 ORIGINAL SOWING MATERIAL

- 1 Seed
- 2 Seedling
- 3 Stolon

5.14 ENVIRONMENTAL CHARACTERISTICS OF SITE

Descriptors on the Environmental characteristics of site (5.14.1 - 5.14.28) are presented in Appendix I. These are not numbered in the Appendix in this manner, but should be for this section. This has been done in order to reduce the repetition of descriptors in Sections 2, 3 and 5

5.15 FERTILIZER

(Specify names, doses and frequency of each)

5.16 INOCULATION

(Specify strain methods)

5.17 PLANT PROTECTION

(Specify pesticides used, dose and frequency of each)

5.18 NOTES

Any other site-specific information

6. PLANT DATA

For a better use of the following plant descriptor scores and values, planting a widely used commercial cultivar (e.g. Haifa in Australia) and characterizing it together with every batch of germplasm accessions is recommended. Data obtained will provide information on the morphology and agronomic performance of individual accessions and the relationship of their characteristics to those of a known and recognized cultivar.

Record the number of days after sowing and the date of observation. Each descriptor should be an average value/score for a particular plant character in the population being characterized. If seasonal herbage production is measured, this should be carried out over a period of minimum two years

6.1 VEGETATIVE

All leaf measurements should be made on the 4th leaf from the distal end of a primary stolon. Average of 10 randomly selected plants

6.1.1 Leaf area [cm²]

6.1.2 Petiole length [mm]

6.1.3 Petiole thickness [mm]

At midpoint

For the following descriptors (6.1.4 - 6.1.7), counts and measurements are carried out on 10 cm sections of primary stolons measured from the 1st developed node at the distal end. Average of 10 randomly selected plants

6.1.4 Stolon thickness diameter [mm]

At middle internode of the measured section

6.1.5 Stolon length [mm]

6.1.6 Number of nodes

Within measured section

6.1.7 Internode length [mm]

Measure the length of stolons divided by the number of nodes on them

6.1.8 Number of rooted nodes

Within measured section

6.1.9 Position of first branched node

Measured from distal end

6.1.10 Stolon density

Total length of stolon present per unit area of sward. Measured at four months using a core (a circular sample of the sward (15 cm in diameter) taken at a distance of +/- 5 cm from the centre of the plant). The centre of the plant should be marked for orientation or using stolon intersection with a 0.5 - 1 meter stick. Average of 10 randomly selected plants

6.1.10.1 Stolon unit weight

(Weight/unit length)

6.1.10.2 Number of branched nodes in core

6.1.11 Degree of stolon branching

Number of branches per unit area. This can be obtained by counting the number of branches found in 15 cm core

3 Low

5 Intermediate

7 High

6.1.12 Primary root system

- 1 Tap root
- 2 Fibrous root

6.1.13 Root depth [cm]

Measure the tap root and adventitious root depth at the same time

6.2 HERBAGE YIELD [DW - drying temperature 80°C]

6.2.1 Description of cultivation

- 1 Monoculture
- 2 Mixture sowing with grass

6.2.2 Method used

- 1 Defoliation (specify height of defoliation) [cm]
- 2 Probe (Electronic capacitance meter)
- 3 Other (specify in the NOTES descriptor, 6.6)

The season of the first yield measurement will vary according to the time of sowing. This herbage yield schedule should be adjusted accordingly

6.2.3 Herbage yield during autumn 1st year [kg ha⁻¹]6.2.4 Herbage yield during winter 1st year [kg ha⁻¹]6.2.5 Total herbage yield in 1st year [kg ha⁻¹]6.2.6 Herbage yield during spring 2nd year [kg ha⁻¹]6.2.7 Herbage yield during summer 2nd year [kg ha⁻¹]6.2.8 Herbage yield during autumn 2nd year [kg ha⁻¹]6.2.9 Herbage yield during winter 2nd year [kg ha⁻¹]6.2.10 Total herbage yield in 2nd year [kg ha⁻¹]

6.3 RESPONSE TO GRAZING [DW - drying temperature 80°C]

Herbage accumulated 30 days after grazing

6.3.1 Immediate post-grazing response (sheep) [kg ha⁻¹]

6.3.2 Immediate post-grazing response (cattle) [kg ha⁻¹]

6.3.3 Grazing pressure applied

Specify number of sheep/cattle by hectare

6.3.4 Season/month of response

Indicate when it was measured

6.4 INFLORESCENCE AND SEED

6.4.1 Inflorescence diameter (Head) [mm]

Average of 10 randomly selected plants

6.4.2 Peduncle length [mm]

Average of 10 randomly selected plants

6.4.3 Peduncle thickness [mm]

At midpoint. Average of 10 randomly selected plants

6.4.4 Average number of florets per head

Average of one head/plant. Average of 10 randomly selected plants

6.4.5 Pod length [mm]

Average of 20 or more randomly selected pods

6.4.6 Average number of seeds per pod

Average of 20 or more pods

6.4.7 1000-seeds weight [g]6.4.8 Ungerminated fresh seed [%]

According to ISTA recommendations

6.4.9 Hard seed content [%]

According to ISTA recommendations

6.4.10 Seed yield per plant

Average of 10 randomly selected plants

6.4.11 Seedling vigour [%]

3 Low

5 Intermediate

7 High

6.5 NUTRITIVE VALUE

6.5.1 Organic matter [g/kg dry wt.]6.5.2 Nitrogen [g/kg DW]6.5.3 Phosphorus [g/kg DW]6.5.4 Calcium [g/kg DW]6.5.5 Potassium [g/kg DW]6.5.6 Magnesium [g/kg DW]6.5.7 In vitro digestibility [%]6.5.8 Undegraded protein [%]6.5.9 Water soluble carbohydrates [g/kg DW]

6.5.10 Total non-structural carbohydrates [g/kg DW]

6.5.11 Condensed tannins [%]

6.5.12 Acid detergent fibre [g/kg]

6.5.13 Neutral detergent fiber [g/kg]

6.5.14 Acid detergent lignin [g/kg]

6.5.15 Hydrogen cyanide [%]

6.5.16 Nitrogen fixing capability [%]

Indicate method used for determining each nutritive value descriptor

6.6 NOTES

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

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 LOW TEMPERATURE

7.2 SNOW ENDURANCE

7.3 HIGH TEMPERATURE

7.4 DROUGHT

7.5 SALINITY

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 INSECT PESTS

	Causal organism	Pest or common name
8.1.1	<u>Agrotis spp.</u>	Cutworm
8.1.2	<u>Sminthurus viridis</u>	Lucerne flea
8.1.3	<u>Deroceras spp.</u> <u>Agrion ater</u>	Slug
8.1.4	<u>Pteronemobius spp.</u>	Pygmy cricket
8.1.5	<u>Halotydeus destructor</u>	Red-legged earth mite
8.1.6	<u>Penthaleus major</u>	Blue oat mite
8.1.7	<u>Sitona hispidulus</u>	Clover rot curculio
8.1.8	<u>Sitona lineatus</u>	Pea leaf weevil
8.1.9	<u>Sitona flavescens</u>	Yellow clover weevil

8.2 SEED CROP PESTS

	Causal organism	Disease name
8.2.1	<u>Helicoverpa punctigera</u>	Native budworm
8.2.2	<u>Coleophora frischella</u>	Clover seed moth
8.2.3	<u>Acrythosiphon kondoi</u>	Blue-green aphid

8.3 FUNGAL DISEASES

8.3.1	<u>Colletotrichum dematium f.sp. truncata</u>	Stem & stolon rot
8.3.2	<u>Cercospora zebrina</u> <u>Stagonospora meliloti</u>	Angular leaf spot
8.3.3	<u>Leptosphaerulina trifolii</u>	Pepper or leaf spot
8.3.4	<u>Fusarium spp.</u>	Root, stem & crown rot
8.3.5	<u>Peronospora trifoliorum</u>	Downy mildew
8.3.6	<u>Physoderma trifolii</u>	Leaf gall
8.3.7	<u>Cymadothea trifolii</u>	Sooty blotch
8.3.8	<u>Rhizoctonia leguminicola</u>	Black patch
8.3.9	<u>Pseudopeziza trifolii</u>	Common leaf spot
8.3.10	<u>Sclerotinia minor</u>	Stem rot
8.3.11	<u>Sclerotinia sclerotiorum</u>	White mould
8.3.12	<u>Sclerotinia trifoliorum</u>	Sclerotinia rot, crown rot, clover rot
8.3.13	<u>Uromyces trifolii-repentis</u> <u>Uromyces trifolii (nervophilus)</u>	Rust
8.3.14	<u>Botrytis cinerea</u>	Grey mould

8.4 NEMATODES

	Causal organism	Disease name
8.4.1	<u>Heterodera trifolii</u> <u>Meloidogyne arenaria</u> <u>Meloidogyne hapla</u> <u>Meloidogyne incognita</u> <u>Meloidogyne javanica</u>	Root cyst gall, root knot
8.4.2	<u>Ditylenchus dipsacii</u>	Stem nematode
8.4.3	<u>Xyphinema krugi</u> <u>Xyphinema denoudeni</u>	

8.5 BACTERIAL DISEASES

8.5.1	<u>Pseudomonas stizolobii</u>	Leaf spot
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8.6 VIRAL DISEASES

8.6.1	<u>Alfalfa mosaic virus</u> (AMV)
8.6.2	<u>Rugose leaf curl virus</u> (RLC)
8.6.3	<u>White clover mosaic virus</u> (WCMV)
8.6.4	<u>Virescence</u>
8.6.5	<u>Bean yellow mosaic virus</u> (BYMV)
8.6.6	<u>Beet western yellow virus</u>
8.6.7	<u>Clover yellow vein virus</u> (CYVV)
8.6.8	<u>Cucumber mosaic virus</u> (CMV)
8.6.9	<u>Lucerne (Australian) latent virus</u>
8.6.10	<u>Subterranean clover red leaf virus</u> (SCRLV)

8.6.11 Subterranean clover stunt virus (SCSV)

8.6.12 Peanut stunt virus (PSV)

8.7 NOTES

Specify here any additional information

9. ALLOZYME COMPOSITION

Electrophoresis of isozymes or seed proteins and Restriction Fragment Length Polymorphism analysis may be used for identification and documenting lines

10. CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES

10.1 CHROMOSOME NUMBER

10.2 GENE MARKERS

- 0 Absent
- + Present

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 form DDMMYYYY)

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

M1.6 DATE OF LAST GERMINATION TEST

(in the form DDMMYYYY)

M1.7 GERMINATION AT THE LAST TEST [%]

M1.8 DATE OF NEXT TEST

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

M1.9 MOISTURE CONTENT AT HARVEST [%]

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

Wet weight basis, modified ISTA high constant temperature oven method

M1.11 AMOUNT OF SEED IN STORAGE(S) [g or number] (Passport 1.10)

M1.12 DUPLICATION AT OTHER LOCATION(S) (Passport 1.4)

M1.13 CONDITIONS OF POLLINATION

- 1 Without isolation
- 2 Under isolation using bel cages

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 form DDMMYYYY)

M2.7 SOWING DENSITY

M2.8 FERTILIZER APPLICATION

M2.9 GERMINATION IN THE FIELD [%]

M2.10 SEEDLING VIGOUR

Assessed at 18 days after emergence

M2.11 NUMBER OF PLANTS ESTABLISHED

M2.12 NUMBER OF PLANTS POLLINATED

M2.13 POLLINATION AGENT

M2.14 ISOLATION STANDARDS

- 1 Polythene or glasshouse enclosures
- 2 Spatial isolation in field

M2.15 POLLINATION METHOD

100 or more flowers are preferred

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

M2.16 NUMBER OF POLLINATED FLOWERS REPRESENTED IN STORE(S)

M2.17 AGRONOMIC EVALUATION

M2.18 PREVIOUS MULTIPLICATION AND/OR REGENERATION

M2.18.1 Location

M2.18.2 Sowing date

(in the form DDMMYYYY)

M2.18.3 Plot number

APPENDIX I

A. COLLECTION SOURCE ENVIRONMENT

A.1 Topography

This refers to the differences in elevation of the land surface on a broad scale

The reference is:

FAO, 1990. In: *Guidelines For Soil Profile Description*, 3rd Edition (Revised), Rome, p.70

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 range of elevation		
8 Mountainous	>30%, great range of elevation (>300 m)		
9 Other (specify in the appropriate Section's NOTES)			

A.2 Elevation of collection site [m]

Altitude above sea level

A.3 Higher level landform (General physiographic features)

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

- 1 Mountain
- 2 Hill
- 3 Upland
- 4 Plain
- 5 Plateau
- 6 Basin
- 7 Valley

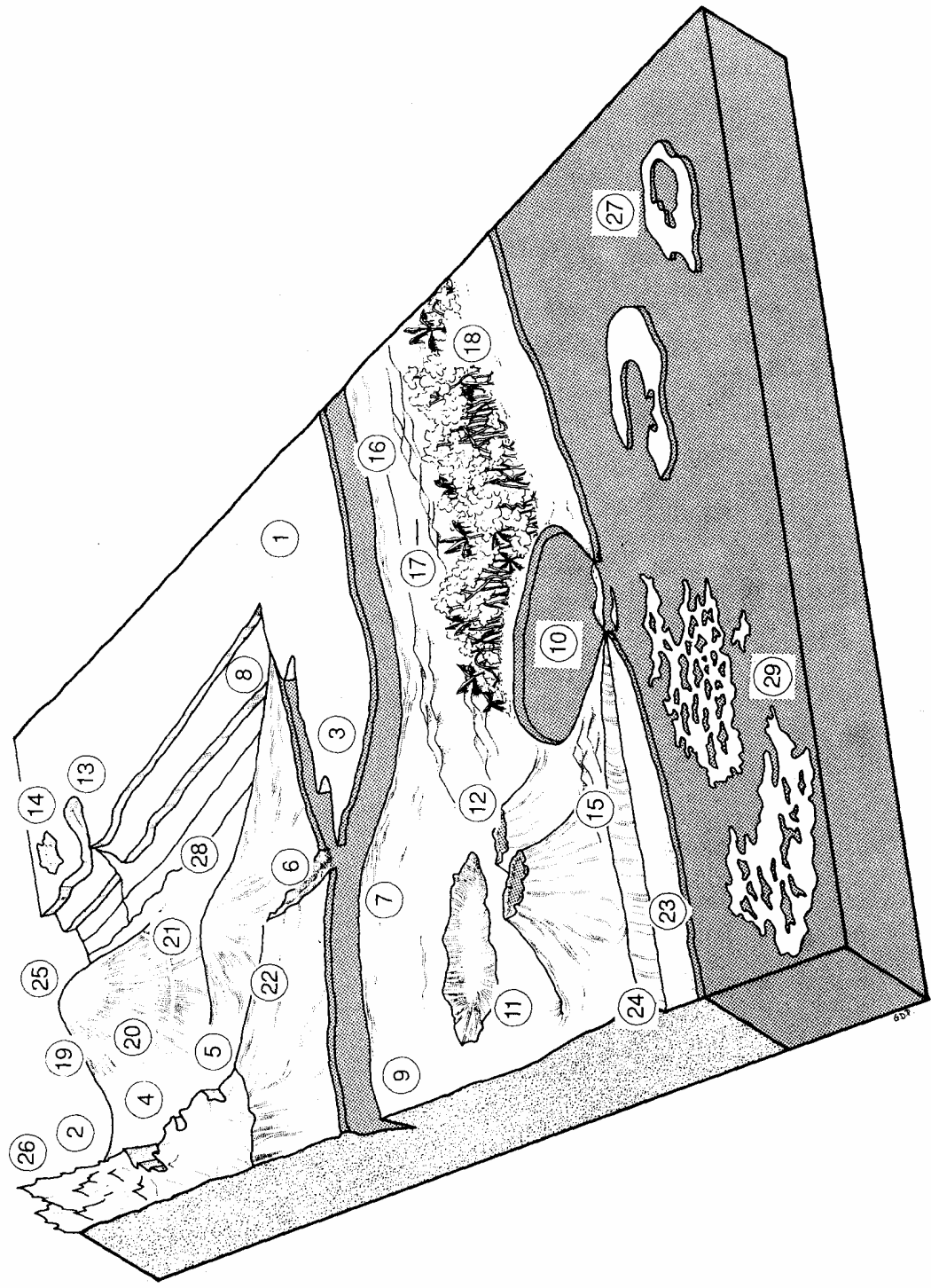
A.4 Second level landform (Adapted from *FAO, 1990*)

- 1 Alluvial plain (A plain formed from the deposition of alluvium usually adjacent to a river that periodically overflows (aggraded valley plain, river plain, wash plain, waste plain))
- 2 Coastal plain
- 3 Lacustrine plain
- 4 Glacial plain
- 5 Peneplane (Base-leveled plain) (Any land surface changed almost to a plain by subaerial erosion)
- 6 Pediment (A piedmont slope formed from a combination of processes which are mainly erosional; the surface is chiefly bare rock but may have a covering veneer of alluvium or gravel (conoplain, piedmont interstream flat))
- 7 Volcano
- 8 Dunefield
- 9 Delta
- 10 Tidal flat (A marshy, sandy, or muddy nearly horizontal coastal flatland which is alternately covered and exposed as the tide rises and falls)
- 11 Playa (A small, generally sandy land area at the mouth of a stream or along the shore of a bay)
- 12 Cay (A flat coral island)
- 13 Other (specify in the appropriate Section's NOTES)

A.5 Land element and position

Description of the geomorphology of the immediate surroundings of the collection site (Adapted from *FAO, 1990*). See Fig. 3

- | | | |
|----------------|--------------------------|--------------------------|
| 1 Plain level | 13 Open depression | 25 Rounded summit |
| 2 Escarpment | 14 Closed depression | 26 Summit |
| 3 Interfluv | 15 Dune | 27 Coral atoll |
| 4 Valley | 16 Longitudinal dune | 28 Drainage line |
| 5 Valley floor | 17 Interdunal depression | (bottom position in |
| 6 Channel | 18 Mangrove | flat or almost flat |
| 7 Levee | 19 Upper slope | terrain) |
| 8 Terrace | 20 Mid slope | 29 Coral reef |
| 9 Floodplain | 21 Lower slope | 30 Other (specify in the |
| 10 Lagoon | 22 Ridge | appropriate Section's |
| 11 Pan | 23 Beach | NOTES) |
| 12 Caldera | 24 Beachridge | |



A.6 Slope [°]

Estimated slope of the collection site

A.7 Slope form

It refers to the general shape of the slope in both the vertical and horizontal directions (*FAO, 1990*)

- 1 Straight
- 2 Concave
- 3 Convex
- 4 Terraced
- 5 Complex (Irregular)

A.8 Aspect

The direction of the slope on which the accession was collected. Describe the direction with symbols N, S, E, W (e.g. a slope that faces a southwestern direction has an aspect of SW)

A.9 Crop agriculture (*FAO, 1990*)A.9.1 Annual field cropping

- 1 Shifting cultivation
- 2 Fallow system cultivation
- 3 Ley system cultivation
- 4 Rainfed arable cultivation
- 5 Wet rice cultivation
- 6 Irrigated cultivation

A.9.2 Perennial field cropping

- 1 Non-irrigated cultivation
- 2 Irrigated cultivation

A.9.3 Tree and shrub cropping

- 1 Non-irrigated tree crop cultivation
- 2 Irrigated tree crop cultivation
- 3 Non-irrigated shrub crop cultivation
- 4 Irrigated shrub crop cultivation

A.10 Overall vegetation surrounding and at collection site (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)

A.11 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

A.11.1 Unconsolidated material

- | | |
|----------------------------------|--------------------------------|
| 1 Aeolian deposits (unspecified) | 9 Unconsolidated (unspecified) |
| 2 Aeolian sand | 10 Volcanic ash |
| 3 Litoral deposits | 11 Loess |
| 4 Lagoonal deposits | 12 Pyroclastic deposits |
| 5 Marine deposits | 13 Glacial deposits |
| 6 Lacustrine deposits | 14 Organic deposits |
| 7 Fluvial deposits | 15 Colluvial deposits |
| 8 Alluvial deposits | 16 <i>In situ</i> weathered |
| | 17 Saprolite |

A.11.2 Rock type

- | | |
|---|-------------------------|
| 1 Acid igneous/
metamorphic
rock | 14 Volcanic rock |
| 2 Granite | 15 Sedimentary rock |
| 3 Gneiss | 16 Limestone |
| 4 Granite/Gneiss | 17 Dolomite |
| 5 Quartzite | 18 Sandstone |
| 6 Schist | 19 Quartzitic sandstone |
| 7 Andesite | 20 Shale |
| 8 Diorite | 21 Marl |
| 9 Basic igneous/
metamorphic
rock | 22 Travertine |
| 10 Ultra basic rock | 23 Conglomerate |
| 11 Gabbro | 24 Siltstone |
| 12 Basalt | 25 Tuff |
| 13 Dolerite | 26 Pyroclastic rock |
| | 27 Evaporite |
| | 28 Gypsum rock |
| | 29 Not known |

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A.12 Stoniness/rockiness/hardpan/cementation

Differentiate between permeable coral rocks and other impermeable rocks

- 1 Tillage unaffected
- 2 Tillage affected
- 3 Tillage difficult
- 4 Tillage impossible
- 5 Essentially paved

A.13 Soil drainage (FAO, 1990)

- 1 Very poorly drained
- 2 Poorly drained
- 3 Somewhat poorly (imperfectly) drained
- 4 Moderately well drained
- 5 Well drained
- 6 Somewhat excessively drained
- 7 Excessively drained

A.14 Flooding (FAO, 1990)

Flooding or temporary inundation is described according to its estimated frequency, duration and depth. Information may be obtained from records of past flooding or from local enquiry. The frequency and duration classes should give an indication of the average occurrence of inundation

A.15 Soil depth to groundwater table [cm]
(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 Very shallow	0	- 25 cm
3 Shallow	26	- 50 cm
5 Moderately deep	51	- 100 cm
7 Deep	101	- 150 cm
9 Very deep		> 150 cm

A.16 Quality of the groundwater (FAO, 1990)

- 1 Saline
- 2 Brackish
- 3 Fresh
- 4 Polluted
- 5 Oxygenated
- 6 Stagnating

A.17 Soil salinity

- | | |
|-------------|---------------------------|
| 1 Low | (160 ppm dissolved salts) |
| 2 Medium | (161-480 ppm) |
| 3 High | (481-1440 ppm) |
| 4 Very high | (>1440 ppm) |

- 5 Well drained
- 6 Somewhat excessively drained
- 7 Excessively drained

A.18 Soil moisture (FAO, 1990)

Moisture conditions prevailing in the soil at the time of collection should be given together with the depth. Attention should be paid to unusual moisture conditions caused by inseasonal weather, prolonged exposure of the profile, flooding, etc.

- 1 Dry
- 3 Slightly moist
- 5 Moist
- 7 Wet

A.19 Soil pH

Distilled water extraction. (State procedure used clearly)

A.20 Soil matrix colour (Adapted from FAO, 1990)

The colour of the soil matrix material in the root zone around the access 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, 1975). 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 categories may be used

- | | |
|-------------------|--------------------|
| 1 White | 9 Yellow |
| 2 Red | 10 Reddish yellow |
| 3 Reddish | 11 Greenish, green |
| 4 Yellowish red | 12 Grey |
| 5 Brown | 13 Greyish |
| 6 Brownish | 14 Blue |
| 7 Reddish brown | 15 Bluish-black |
| 8 Yellowish brown | 16 Black |

A.21 Soil texture classes (FAO, 1990)

For convenience in determining the texture classes of the following list and the particle size classes are given for each of the fine earth fraction below. See Fig. 4

1	Clay	12	Coarse sandy loam
2	Loam	13	Loamy sand
3	Clay loam	14	Loamy very fine sand
4	Silt	15	Loamy fine sand
5	Silty clay	16	Loamy coarse sand
6	Silty clay loam	17	Very fine sand
7	Silt loam	18	Fine sand
8	Sandy clay	19	Medium sand
9	Sandy clay loam	20	Coarse sand
10	Sandy loam	21	Sand, unsorted
11	Fine sandy loam	22	Sand, unspecified

Soil particle size classes (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

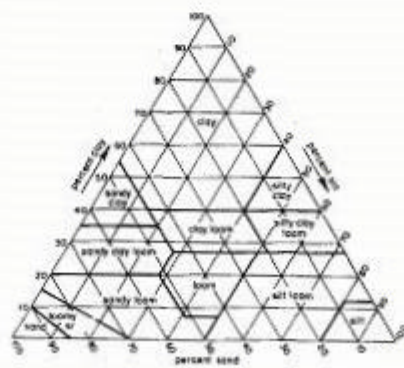


Fig. 4 Soil texture classes

A.22 Soil organic matter content

- 1 Nil (as on arid zones)
- 2 Low (as in long-term cultivation in a 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

A.23 Rock fragments

Large rock and mineral fragments (>2 mm) are described according to abundance (Adapted from *FAO, 1990*)

1 Very few	0	- 2%
2 Few	2	- 5%
3 Common	5	- 15%
4 Many	15	- 40%
5 Abundant	40	- 80%
6 Dominant		> 80%

A.24 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.)

A.25 Water availability

- 1 Rainfed
- 2 Irrigated
- 3 Flooded
- 4 River banks
- 5 Sea coast
- 6 Other (specify in the appropriate Section's NOTES)

A.26 Soil fertility

- 3 Low
- 5 Moderate
- 7 High

A.27 Climate of collection site

Should be assessed as close to the collection as possible. During growing season

A.27.1 Temperature range [°C yr]A.27.1.1 Average temperature (1st year) [°C yr]A.27.1.2 Average temperature (2nd year) [°C yr]A.27.1.3 Average temperature (3rd year) [°C yr]A.27.2 Rainfall range [mm yr]A.27.2.1 Total rainfall (1st year) [mm yr]A.27.2.2 Total rainfall (2nd year) [mm yr]A.27.2.3 Total rainfall (3rd year) [mm yr]A.27.2.4 Total summer rainfall (1st year) [mm yr]A.27.2.5 Total summer rainfall (2nd year) [mm yr]A.27.2.6 Total summer rainfall (3rd year) [mm yr]A.27.3 Total evaporation [mm yr]A.27.4 Wind [km s⁻¹]

Annual average (state number of years recorded)

A.27.4.1 Frequency of typhoons or hurricane force windsA.27.4.2 Date of most recent typhoons or hurricane force winds

(in the format DDMMYYYY)

A.27.5 FrostA.27.5.1 Date of most recent frost

(in the format DDMMYYYY)

A.27.5.2 Lowest temperature

Specify seasonal average and minimum survived

A.27.5.3 Duration of temperature below freezingA.27.6 Relative humidityA.27.6.1 Relative humidity diurnal range [%]A.27.6.2 Relative humidity seasonal range [%]A.27.7 Light

3 Shady

7 Sunny

A.28 Other (specify in the appropriate Section's NOTES)

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REFERENCES

- Brewbaker, J.L. and Carnahan, H.L. 1956. Leaf markings alleles in white clover. In: *The Journal of Heredity*. 47:103-104
- 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. Rome, p.70

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Ms Adriana Alercia prepared the text for publication under the coordination of Mr Paul Stapleton. Illustrations were drawn by Pina di Pilla. Scientific direction was supervised by Dr Mark Perry.

1. The first part of the paper discusses the importance of the environment in the development of the human mind and body. It argues that the environment plays a crucial role in shaping the child's cognitive and emotional development.

2. The second part of the paper explores the impact of the environment on the child's social and emotional development. It highlights the importance of a supportive and nurturing environment for the child's well-being.

3. The third part of the paper discusses the role of the environment in the child's physical development. It emphasizes the importance of a healthy and safe environment for the child's growth and development.

4. The fourth part of the paper discusses the role of the environment in the child's cognitive development. It highlights the importance of a stimulating and enriching environment for the child's learning and development.

5. The fifth part of the paper discusses the role of the environment in the child's emotional development. It emphasizes the importance of a supportive and nurturing environment for the child's emotional well-being.

6. The sixth part of the paper discusses the role of the environment in the child's social development. It highlights the importance of a supportive and nurturing environment for the child's social skills and relationships.

7. The seventh part of the paper discusses the role of the environment in the child's overall development. It emphasizes the importance of a holistic and integrated approach to the child's development.

8. The eighth part of the paper discusses the role of the environment in the child's future development. It highlights the importance of a supportive and nurturing environment for the child's long-term well-being.

9. The ninth part of the paper discusses the role of the environment in the child's development. It emphasizes the importance of a supportive and nurturing environment for the child's growth and development.

10. The tenth part of the paper discusses the role of the environment in the child's development. It highlights the importance of a supportive and nurturing environment for the child's well-being.

11. The eleventh part of the paper discusses the role of the environment in the child's development. It emphasizes the importance of a supportive and nurturing environment for the child's growth and development.

12. The twelfth part of the paper discusses the role of the environment in the child's development. It highlights the importance of a supportive and nurturing environment for the child's well-being.

13. The thirteenth part of the paper discusses the role of the environment in the child's development. It emphasizes the importance of a supportive and nurturing environment for the child's growth and development.

14. The fourteenth part of the paper discusses the role of the environment in the child's development. It highlights the importance of a supportive and nurturing environment for the child's well-being.

15. The fifteenth part of the paper discusses the role of the environment in the child's development. It emphasizes the importance of a supportive and nurturing environment for the child's growth and development.

16. The sixteenth part of the paper discusses the role of the environment in the child's development. It highlights the importance of a supportive and nurturing environment for the child's well-being.

17. The seventeenth part of the paper discusses the role of the environment in the child's development. It emphasizes the importance of a supportive and nurturing environment for the child's growth and development.

18. The eighteenth part of the paper discusses the role of the environment in the child's development. It highlights the importance of a supportive and nurturing environment for the child's well-being.

19. The nineteenth part of the paper discusses the role of the environment in the child's development. It emphasizes the importance of a supportive and nurturing environment for the child's growth and development.

20. The twentieth part of the paper discusses the role of the environment in the child's development. It highlights the importance of a supportive and nurturing environment for the child's well-being.