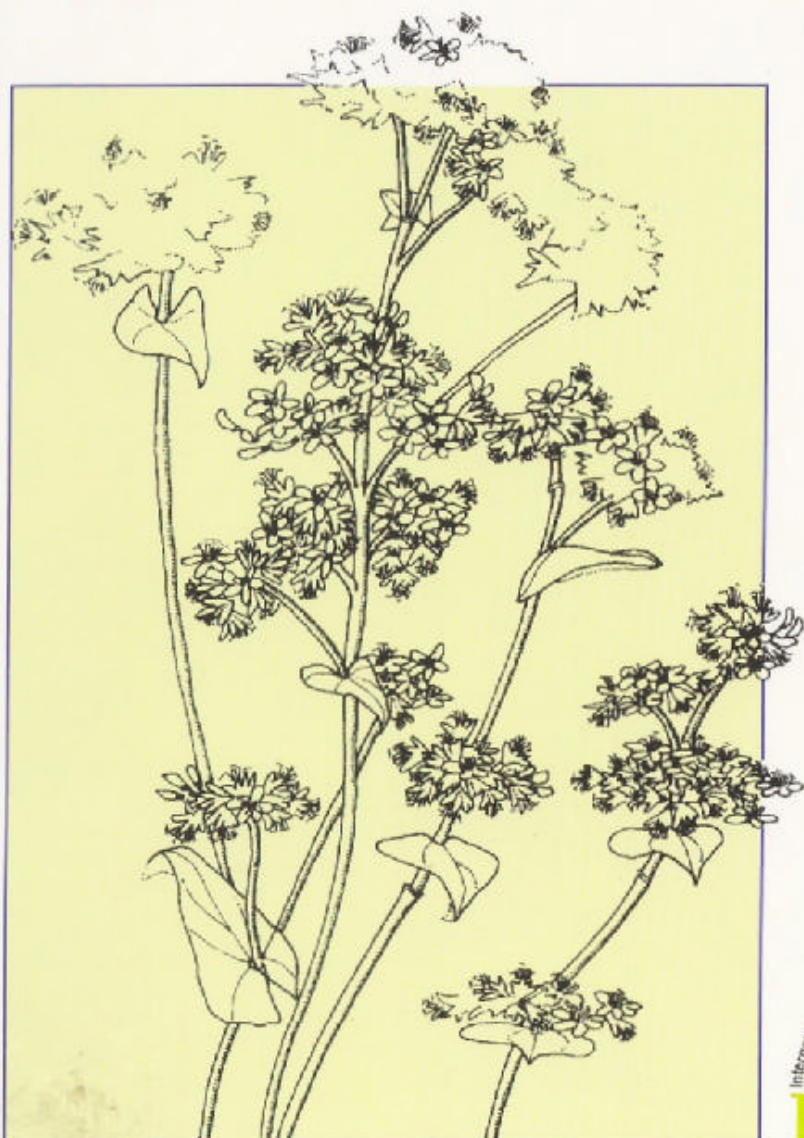


Descriptors for

# Buckwheat

(*Fagopyrum* spp.)



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Descriptors for  
**Buckwheat**

(*Fagopyrum* spp.)

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## PREFACE

*Descriptors for buckwheat* (*Fagopyrum spp.*) was developed by Dr J.M.M. Engels and Dr R.K. Arora, and sent for comments to several scientists around the world. The list was also reviewed during the International Workshop on Buckwheat Genetic Resources in Asia, held at Tsukuba (Japan) in September 1991. A draft version prepared in the IPGRI internationally accepted format for descriptor lists 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'.

IPGRI encourages the collection of data for descriptors on the first four categories of this list: *Passport, Management, Environment and site* and *Characterization*; and endorses data in these categories as those that should be available for any one accession. However, the number of each of the site and environment descriptor types used will depend on the crop and their importance to the crop's description. Descriptors listed under *Evaluation* allow for a more detailed description of the accession's characters, but generally require replicated site and time trials.

Although the suggested coding should not be regarded as the definitive scheme, this format has the full backing of IPGRI and is promoted worldwide. This descriptor list is intended to be comprehensive for the descriptors that it contains. This approach assists with the standardization of descriptor definitions. IPGRI does not, however, assume that each curator will characterize accessions of their collection utilizing all descriptors given, minimum highly discriminating descriptors are in bold and marked with an asterisk. Descriptors should be used when they are useful to the curator for the management and maintenance of the collection and/or to the users of the plant genetic resources.

This descriptor list provides an international format and thereby produces a universally understood 'language' for plant genetic resources data. The adoption of this scheme for data encoding, or at least the production of a transformation method to convert other schemes to the IPGRI format, will produce a rapid, reliable, and efficient means for information storage, retrieval, and communication, and will assist with the utilization of germplasm. 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 on this descriptor list will be appreciated by IPGRI.



## DEFINITIONS AND USE OF THE DESCRIPTORS

IPGRI now uses the following definitions in genetic resources documentation:

- (i) **Passport** descriptors: These provide the basic information used for the general management of the accession (including the registration at the genebank and other identification information) and describe parameters that should be observed when the accession is originally collected
- (ii) **Management** descriptors: These provide the basis for the management of accessions in the genebank and assist with their multiplication and regeneration
- (iii) **Environment and site** descriptors: These describe the environmental and site specific parameters that are important when characterization and evaluation trials are held. They can be important for the interpretation of the results of those trials. Germplasm collecting site descriptors are also included here
- (iv) **Characterization** descriptors: These enable an easy and quick discrimination between phenotypes. They are generally highly heritable, can be easily seen by the eye and are equally expressed in all environments. In addition, these may include a limited number of additional traits thought desirable by a consensus of users of the particular crop
- (v) **Evaluation** descriptors: Many of the descriptors in this category are susceptible to environmental differences but are generally useful in crop improvement and others may involve complex biochemical or molecular characterization. They include yield, agronomic performance, stress susceptibilities and biochemical and cytological traits

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

Minimum descriptors highly discriminating are in bold and marked with an asterisk.

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

- (a) the Système International d'Unités (SI system) is used. The units to be applied are given in square brackets following the descriptor name;
- (b) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, or Munsell Color Chart for Plant Tissues, are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the section where it is used);

## 2 DESCRIPTORS FOR BUCKWHEAT

- (c) 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. 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 10 (Biotic stress susceptibility) 1 = very low susceptibility and 9 = very high susceptibility;

- (d) (i) when a descriptor is scored using a 1-9 scale, such as in (c), '0' would be scored when the character is not expressed; (ii) when a descriptor is inapplicable. In the following example, '0' will be recorded if an accession does not form awns:

### Lemma awn barbs

3	Smooth (few barbs at tip)
5	Intermediate (small barbs on upper half)
7	Rough

- (e) absence/presence of characters are scored as in the following example:

### Absence/presence of terminal leaflet

0	Absent
1 (or +)	Present

- (f) blanks are used for information not yet available;
- (g) for accessions which are not generally uniform for a 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 could be recorded; or other publicized methods can be utilized, such as van Hintum (1993), that clearly states a method for scoring heterogeneous accessions;



(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

#### 4 DESCRIPTORS FOR BUCKWHEAT

,

## PASSPORT

### 1. ACCESSION DESCRIPTORS

#### \* 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 numbers known to exist in other collections for this accession, e.g. USDA Plant Inventory number (not COLLECTING NUMBER, see 2.3). 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

## 6 DESCRIPTORS FOR BUCKWHEAT

### 1.5.4 Cultivar group

### 1.5.5 Botanical variety

## 1.6 PEDIGREE

Parentage or nomenclature and designations assigned to breeders' material

## 1.7 CULTIVAR NAME

### 1.7.1 Cultivar name

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

### 1.7.2 Translation/transliteration

Provide translation of the local cultivar name into English

### 1.7.3 Synonyms

## 1.8 ACQUISITION DATE

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

## 1.9 TYPE OF MATERIAL RECEIVED

- 1 Zygotic embryo
- 2 Seed
- 3 Plant (including seedling)
- 4 Somatic tissue
- 5 Pollen
- 6 Other (specify in the descriptor NOTES, 1.12)

## 1.10 ACCESSION SIZE

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

## 1.11 TYPE OF MAINTENANCE

- 1 Clonal
- 2 Grafted
- 3 Seed
- 4 Vegetative and seed
- 5 Tissue culture
- 6 Pollen

## 1.12 NOTES

Any additional information may be specified here

**2. COLLECTING DESCRIPTORS**

## 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 COLLECTING 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 COLLECTING DATE OF ORIGINAL SAMPLE

(in the format DDMMYYYY)

## 2.5 COUNTRY OF COLLECTING

Use the three letter abbreviations from the *International Standard (ISO) Codes for the representation of names of countries*, No. 3166, 1988. Copies of these are available from Beuth Verlag GmbH, Burggrafenstrasse 6, D-10772 Berlin 30, Germany; Tel. 30-2601-2320; Fax 30-2601-1231, Tlx. 1-84-273-din-d

## **8 DESCRIPTORS FOR BUCKWHEAT**

### **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 LOCATION OF COLLECTING 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) and the name of the farm or other location and the farmer or other individual on whose land the sample was collected

### **2.9 LATITUDE OF COLLECTING SITE**

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

### **2.10 LONGITUDE OF COLLECTING SITE**

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

### **\* 2.11 ELEVATION OF COLLECTING SITE [m]**

Altitude above sea level

### **2.12 COLLECTING SOURCE**

- 1 Wild habitat
- 2 Rubbish, waste or disturbed habitats
- 3 Farmer's field
- 4 Threshing yard
- 5 Farm store
- 6 Backyard
- 7 Village market (local)
- 8 Commercial market (seed trade)
- 9 Research organization
- 10 Other (specify in the descriptor COLLECTOR'S NOTES, 2.26)

## 2.13 COLLECTING SOURCE ENVIRONMENT

Descriptors for Collecting Source Environment (2.13.1 - 2.13.26) are given in Section 6. These are numbered in Section 6 as 6.1.1 - 6.1.26, but should be used for this section. This has been done in order to reduce the repetition of descriptors in Sections 2 and 5

## 2.14 STATUS OF SAMPLE

- 1 Wild
- 2 Weedy
- 3 Landrace/primitive cultivar
- 4 Breeding/research material
- 5 Advanced cultivar
- 6 Other (specify in the descriptor COLLECTOR'S NOTES, 2.26)

## 2.15 TYPE OF SAMPLE

Form of sample collected. If different types of material were collected from the same source, each sample type should be designated with a unique collecting number and a corresponding unique accession number

- 1 Vegetative
- 2 Seed
- 3 Pollen
- 4 Tissue culture

## 2.16 LOCAL/VERNACULAR NAME

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

## 2.17 ETHNIC GROUP

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

## 2.18 POPULATION SIZE

Number of plants sampled. If estimated provide method used (i) row per column count; (ii) area per plant density; for both, allow for missing stands

## 10 DESCRIPTORS FOR BUCKWHEAT

### 2.19 PLANT POPULATION DENSITY

- 3 Low
- 5 Intermediate
- 7 High

### 2.20 CROPPING SYSTEM AND ASSOCIATED FLORA

- 1 Monoculture
- 2 Mixed with cereals (specify crop)
- 3 Mixed with legumes (specify crop)
- 4 Intercropped (specify crop(s) in the descriptor COLLECTOR'S NOTES, 2.26)

### 2.21 CULTURAL PRACTICES

#### 2.21.1 Sowing date

(in the format DDMMYYYY)

#### 2.21.2 Harvest date

(in the format DDMMYYYY)

#### 2.21.3 Irrigation

Specify amount, frequency, and method of application

### 2.22 USES OF THE ACCESSION

- 1 Seed/grain (as food or cereal)
- 2 Leaf (as vegetable)
- 3 Plant (as fodder/forage/green manure)
- 4 Medicine
- 5 Beverage
- 6 Honey plant (flowers)
- 7 Other (specify in the descriptor COLLECTOR'S NOTES, 2.26)



**2.23 PHOTOGRAPH**

Were photograph(s) taken of the accession or habitat at the time of collecting? If so, provide an identification number(s) in the descriptor COLLECTOR'S NOTES, 2.26

0	No
1	Yes

**2.24 HERBARIUM SPECIMEN**

Was a herbarium specimen collected? If so, provide an identification number in the descriptor COLLECTOR'S NOTES, 2.26

0	No
1	Yes

**2.25 PREVAILING STRESSES**

Information on associated biotic and abiotic stresses. Indicate if disease indexing was done at the time of collecting

**2.26 COLLECTOR'S NOTES**

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

## MANAGEMENT

### 3. SEED MANAGEMENT DESCRIPTORS

- 3.1 ACCESSION NUMBER (Passport 1.1)
- 3.2 POPULATION IDENTIFICATION (Passport 2.3)
- Collecting number, pedigree, cultivar name, etc. depending on the population type
- 3.3 STORAGE ADDRESS
- (Building, room, shelf numbers/location in medium- and/or long-term storage)
- 3.4 STORAGE DATE
- (in the format DDMMYYYY)
- 3.5 GERMINATION AT STORAGE (INITIAL) [%]
- 3.6 DATE OF LAST GERMINATION TEST
- (in the format DDMMYYYY)
- 3.7 GERMINATION AT THE LAST TEST [%]
- 3.8 DATE OF NEXT TEST
- Date when the accession should next be tested (estimate) (in the format DDMMYYYY)
- 3.9 MOISTURE CONTENT AT HARVEST [%]
- 3.10 MOISTURE CONTENT AT STORAGE (INITIAL) [%]
- 3.11 AMOUNT OF SEED IN STORAGE(S) [g or number] (Passport 1.10)
- 3.12 DUPLICATION AT OTHER LOCATION(S) (Passport 1.4)

#### 4. MULTIPLICATION/REGENERATION DESCRIPTORS

- 4.1 ACCESSION NUMBER (Passport 1.1)
- 4.2 POPULATION IDENTIFICATION (Passport 2.3)
  - Collecting number, pedigree, cultivar name, etc. depending on the population type
- 4.3 FIELD PLOT NUMBER
- 4.4 LOCATION
- 4.5 MULTIPLICATION/REGENERATION SITE LOCATION
- 4.6 COLLABORATOR(S)
- 4.7 SOWING DATE
  - (in the format DDMMYYYY)
- 4.8 TRANSPLANTING DATE
  - If applicable (in the format DDMMYYYY)
- 4.9 SOWING DENSITY [%]
- 4.10 CULTURAL PRACTICES (Passport 2.21)
- 4.11 FERTILIZER APPLICATION
- 4.12 GERMINATION IN THE FIELD [%]
- 4.13 SEEDLING VIGOUR
  - Assessed 18 days after emergence
- 4.14 NUMBER OF PLANTS ESTABLISHED
  - Indicate the unit area

## 14 DESCRIPTORS FOR BUCKWHEAT

### 4.15 HARVEST DATE

(in the format DDMMYYYY)

### 4.16 NUMBER OF PLANTS POLLINATED

### 4.17 POLLINATION METHOD

100 or more flowers are recommended

- 1 Selfing
- 2 Chain cross
- 3 Pair crossing
- 4 Bulk pollen
- 5 Isolation
- 6 Cluster bagging
- 7 In cage with the help of bees

### 4.18 NUMBER OF POLLINATED SPIKES REPRESENTED IN STORE(S)

### 4.19 NUMBER OF TIMES ACCESSION REGENERATED

### 4.20 PREVIOUS MULTIPLICATION AND/OR REGENERATION

#### 4.20.1 Location

#### 4.20.2 Sowing date

(in the format DDMMYYYY)

#### 4.20.3 Plot number

#### 4.20.4 Other

Frequently the characterization and evaluation data (see Sections 7 and 8) are taken during regeneration/multiplication

### 4.21 NUMBER OF PLANTS USED IN EACH REGENERATION/MULTIPLICATION

## ENVIRONMENT AND SITE

### 5. SITE DESCRIPTORS

#### 5.1 COUNTRY OF CHARACTERIZATION AND/OR EVALUATION

(See instructions in COUNTRY OF COLLECTING, 2.5)

#### 5.2 SITE (RESEARCH INSTITUTE)

##### 5.2.1 Latitude

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

##### 5.2.2 Longitude

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

##### 5.2.3 Elevation [m]

Altitude above sea level

##### 5.2.4 Name of farm or institute

#### 5.3 EVALUATOR'S NAME AND ADDRESS

#### 5.4 SOWING DATE

(in the format DDMMYYYY)

#### 5.5 HARVEST DATE

(in the format DDMMYYYY)

#### 5.6 EVALUATION ENVIRONMENT

Environment in which characterization/evaluation was carried out

- 1 Field
- 2 Screenhouse
- 3 Glasshouse
- 4 Laboratory
- 5 Other (specify in the descriptor NOTES, 5.16)

## 16 DESCRIPTORS FOR BUCKWHEAT

### 5.7 PERCENTAGE SEED GERMINATION [%]

Specify number of days over which germination is measured

### 5.8 PERCENTAGE FIELD ESTABLISHMENT [%]

### 5.9 NUMBER OF DAYS TO 50% FIELD EMERGENCE

### 5.10 SOWING SITE IN FIELD

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

### 5.11 FIELD SPACING

5.11.1 Distance between plants in a row [cm]

5.11.2 Distance between rows [cm]

### 5.12 ENVIRONMENTAL CHARACTERISTICS OF SITE

Descriptors for the Environmental characteristics of site (5.12.1 - 5.12.26) are given in Section 6. These are numbered in Section 6 as 6.1.1 - 6.1.26, but should be used for this section. This has been done in order to reduce the repetition of descriptors in Sections 2 and 5

### 5.13 FERTILIZER

(Specify types, doses, frequency of each, and method of application)

### 5.14 PLANT PROTECTION

(Specify pesticide types used, doses, frequency of each, and method of application)

### 5.15 STANDARD CHECK CULTIVAR

The applied characteristics to be scored require standardization by comparison with recognized cultivars, which in this crop would be the local popular widely grown type. The cultivar(s) used will be constant at a given evaluation site or group of sites and used over different growing seasons. Different *Fagopyrum* species may require a range of standard varieties/locally prevalent cultivars for each of the site/group of sites

### 5.16 NOTES

Any other site-specific information

## 6. ENVIRONMENT DESCRIPTORS

### 6.1 COLLECTING AND/OR CHARACTERIZATION/EVALUATION SITE ENVIRONMENT

#### 6.1.1 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)		

#### 6.1.2 Higher level landform (General physiographic features)

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

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

6.1.3 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 Peneplain        | (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)   |

6.1.4 Land element and position

Description of the geomorphology of the immediate surroundings of the collecting site (Adapted from *FAO, 1990*). See Fig. 1

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



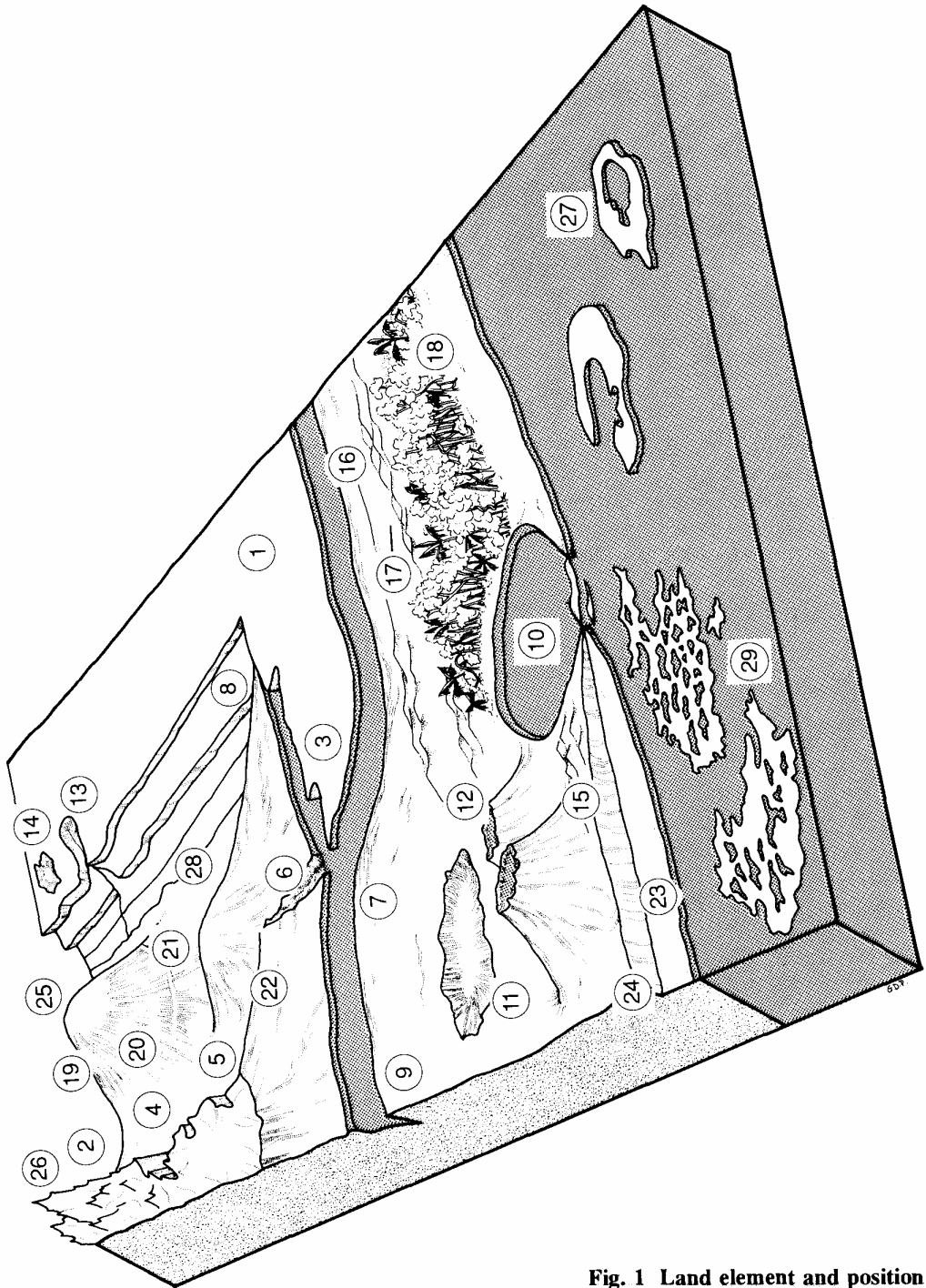


Fig. 1 Land element and position

6.1.5 Slope [°]

Estimated slope of the collecting site

6.1.6 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)

6.1.7 Slope aspect

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

6.1.8 Crop agriculture (*FAO, 1990*)

6.1.8.1 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

6.1.8.2 Perennial field cropping

- 1 Non-irrigated cultivation
- 2 Irrigated cultivation

6.1.8.3 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

6.1.9 Overall vegetation surrounding and at collecting 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)

6.1.10 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

6.1.10.1 Unconsolidated material

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

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### 6.1.10.2 Rock type

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

### 6.1.11 Stoniness/rockiness/hardpan/cementation

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

### 6.1.12 Soil drainage (Adapted from *FAO, 1990*)

- 1 Very poorly drained
- 3 Poorly drained
- 5 Moderately drained
- 7 Well drained
- 9 Excessively drained

#### 6.1.13 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

#### 6.1.14 Soil depth to groundwater table (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 (0 - 25 cm)
- 2 (25.1 - 50 cm)
- 3 (50.1 - 100 cm)
- 4 (100.1 - 150 cm)
- 5 (>150 cm)

#### 6.1.15 Quality of the groundwater (FAO, 1990)

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

#### 6.1.16 Soil salinity

- 1 (<160 ppm dissolved salts)
- 2 (160-240 ppm)
- 3 (241-480 ppm)
- 4 (>480 ppm)

6.1.17 Soil moisture (FAO, 1990)

Moisture conditions prevailing in the soil at the time of collecting 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.

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

6.1.18 Soil matrix colour (Adapted from FAO, 1990)

The colour of the soil matrix material in the root zone around the accession 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 states 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           |

6.1.19 Soil pH

Actual value of the soil within the following root depths around the accession

- 6.1.19.1 pH at 10-15 cm
- 6.1.19.2 pH at 30-60 cm
- 6.1.19.3 pH at 60-90 cm

#### 6.1.20 Soil organic matter content

- 1 Nil (as on arid zones)
- 3 Low (as in long-term cultivation in a tropical setting)
- 5 Medium (as in recently cultivated but not yet much depleted)
- 7 High (as in never cultivated, and in recently cleared from forest)
- 9 Peaty

#### 6.1.21 Rock fragments

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

- 1 (0 - 2%)
- 2 (2.1 - 5%)
- 3 (5.1 - 15%)
- 4 (15.1 - 40%)
- 5 (40.1 - 80%)
- 6 (>80%)

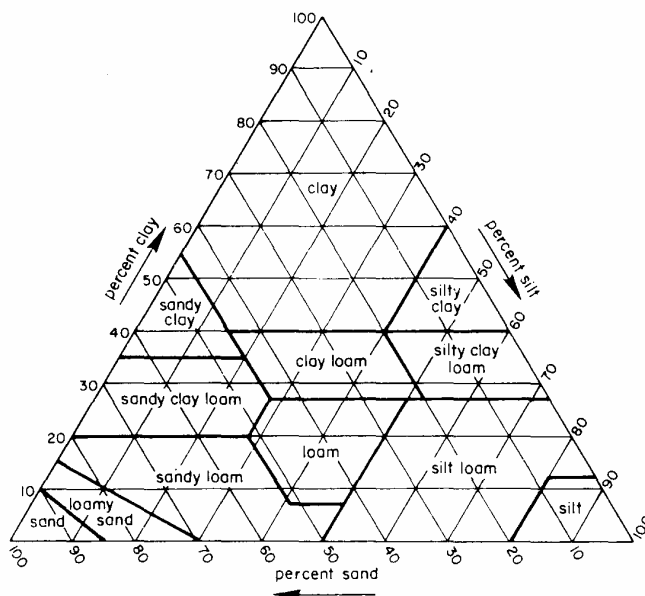
#### 6.1.22 Soil texture classes (Adapted from *FAO, 1990*)

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. 2

- |                    |                         |
|--------------------|-------------------------|
| 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 (Adapted from FAO, 1990)

1	Clay		<	2 $\mu\text{m}$
2	Fine silt	3	-	20 $\mu\text{m}$
3	Coarse silt	21	-	63 $\mu\text{m}$
4	Very fine sand	64	-	125 $\mu\text{m}$
5	Fine sand	126	-	200 $\mu\text{m}$
6	Medium sand	201	-	630 $\mu\text{m}$
7	Coarse sand	631	-	1250 $\mu\text{m}$
8	Very coarse sand	1251	-	2000 $\mu\text{m}$

**Fig. 2 Soil texture classes****6.1.23 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.)



6.1.24 Water availability

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

6.1.25 Soil fertility

- 3 Low
- 5 Moderate
- 7 High

6.1.26 Climate of collecting site

Should be assessed as close to the collecting site as possible

6.1.26.1 Temperature range [°C]

Provide either the diurnal (mean, maximum, minimum) or the seasonal (mean, maximum, minimum)

6.1.26.2 Rainfall range [mm]

Annual average (state number of recorded years)

6.1.26.3 Wind [km s<sup>-1</sup>]

Annual average (state number of years recorded)

6.1.26.3.1 Frequency of typhoons or hurricane force winds6.1.26.3.2 Date of most recent typhoons or hurricane force winds

(in the format DDMMYYYY)

6.1.26.3.3 Annual maximum wind velocity [km s<sup>-1</sup>]

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### 6.1.26.4 Frost

#### 6.1.26.4.1 Date of most recent frost

(in the format DDMMYYYY)

#### 6.1.26.4.2 Lowest temperature

Specify seasonal average and minimum survived

#### 6.1.26.4.3 Duration of temperature below freezing

### 6.1.26.5 Relative humidity

#### 6.1.26.5.1 Relative humidity diurnal range [%]

#### 6.1.26.5.2 Relative humidity seasonal range [%]

### 6.1.26.6 Light

3 Shady

7 Sunny

### 6.1.27 Other (specify in the appropriate Section's NOTES)

## CHARACTERIZATION

### 7. PLANT DESCRIPTORS

For all colour characteres, Royal Horticultural Society (RHS) colour codes are given in parentheses beside descriptor states

#### 7.1 VEGETATIVE

##### 7.1.1 Cotyledon/seedling leaf colour

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)

##### \* 7.1.2 Growth and branch shoot habit

Angle of branch shoot, and highest tip of branch longer or shorter than main shoot. At flowering stage. (See Fig. 3)

- 3 Semi-erect shorter
- 5 Semi-erect longer
- 7 Erect shorter
- 9 Erect longer

##### 7.1.3 Degree of determination

Recorded at physiological maturity (when 75% seeds turned brown)

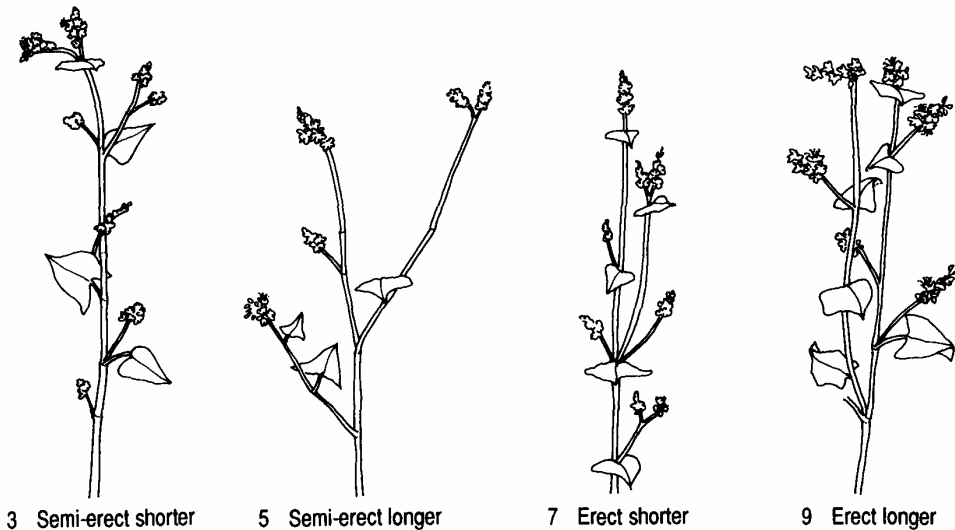
- 1 Indeterminate
- 5 Intermediate
- 9 Determinate

##### \* 7.1.4 Plant height [cm]

Mean height measured from ground level to highest tip of shoots of at least 10 randomly chosen plants at physiological maturity

### 7.1.5 Number of internodes

Average number of internodes on main stem of 10 randomly chosen plants scored at physiological maturity



**Fig. 3 Growth and branch shoot habit**

### \* 7.1.6 Plant branching

Average number of primary branches taken from 10 randomly chosen plants at physiological maturity

- 1 Very weak (no branch)
- 3 Weak (2 branches)
- 5 Intermediate (4 branches)
- 7 Strong (6 branches)
- 9 Very strong ( $\geq 8$  branches)

\* **7.1.7 Stem colour**

Recorded when 100% of plants have flowers, from middle part of main stem of 10 randomly chosen plants

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)

**7.1.8 Stem length [cm]**

Mean length measured from ground level to the highest tip of main stem of 10 randomly chosen plants, at physiological maturity

**7.1.9 Stem diameter [cm]**

Measured on the central part of internode between 1st and 2nd nodes of 10 randomly chosen plants, at physiological maturity

**7.1.10 Thickness of stem tissue [mm]**

Mean thickness measured on middle part of internode between 1st and 2nd nodes of 10 randomly chosen plants, at physiological maturity

**7.1.11 Lodging susceptibility**

Degree of lodging of plants assessed when seeds are mature

- 1 Very resistant
- 5 Intermediate
- 9 Very susceptible

\* **7.1.12 Leaf colour**

Recorded when 100% of plants have flowers from leaves of the middle part of main stem

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)

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### 7.1.12.1 Leaf margin colour

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)

### 7.1.12.2 Leaf vein colour

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)

### \* 7.1.13 Leaf number

Mean number of leaves on main stem of 10 randomly chosen plants counted when 75% of seeds turned brown

### 7.1.14 Leaf flavour

This descriptor is scored for cultivars used as leafy vegetables

- 3 Bitter
- 5 Sour
- 7 Sweet

### 7.1.15 Petiole length [cm]

Mean length of 10 petioles from middle part of main stem measured when 75% of seeds turned brown

### \* 7.1.16 Petiole colour

Recorded on petioles from middle part of main stem, at flowering stage

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)

### \* 7.1.17 Leaf blade length [cm]

Average length of 5 randomly chosen representative leaves from middle part of main stem at the widest part of leaf measured when 75% of seeds turned brown

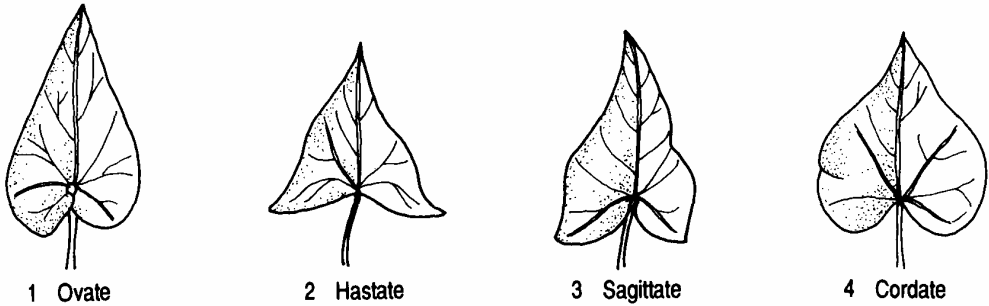
\* **7.1.18 Leaf blade width [cm]**

Average width of 5 randomly chosen representative leaves measured when 75% of seeds turned brown

\* **7.1.19 Leaf blade shape**

Scored on leaves from the middle part of the main stem, when 75% of seeds turned brown. See Fig. 4

- 1 Ovate
- 2 Hastate
- 3 Sagittate (Intermediate)
- 4 Cordate
- 5 Other (specify in the NOTES descriptor, 7.4)



**Fig. 4 Leaf blade shape**

**7.2 INFLORESCENCE AND FRUIT**

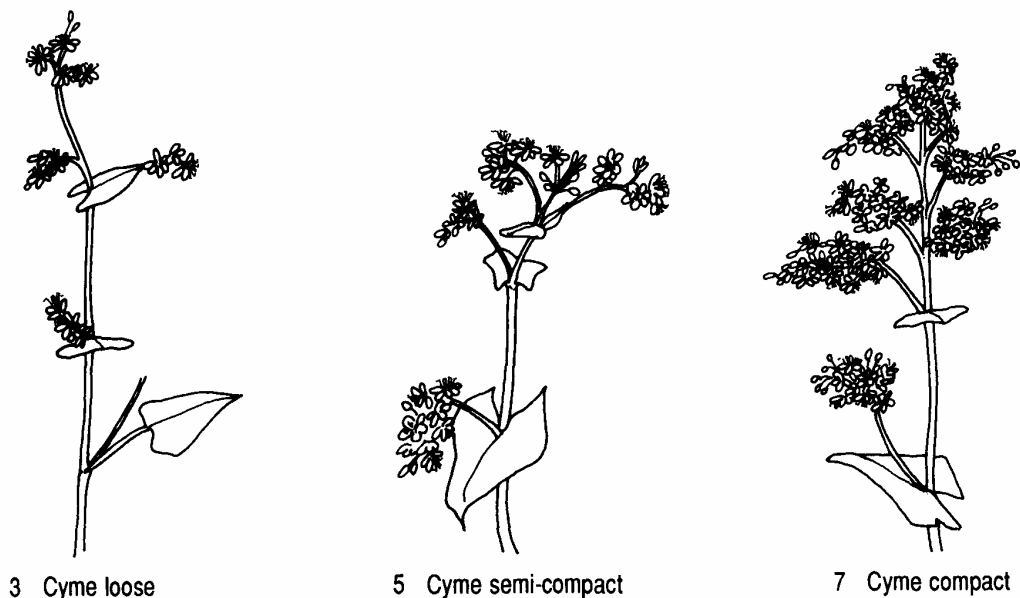
\* **7.2.1 Days to flowering**

Number of days from sowing to 50% of plants having fully open flowers

\* 7.2.2 Compactness of inflorescence

Average of 10 randomly chosen plants. See Fig. 5

- 3 Cyme loose
- 5 Cyme semi-compact
- 7 Cyme compact



**Fig. 5 Compactness of inflorescence**

7.2.3 Branched inflorescence

- 0 No
- 1 Yes

\* 7.2.4 Colour of inflorescence stalk

Recorded when 75% of seeds turned brown

- 3 Green (green group 134B; 140B; 140C; 141D; 143D)
- 5 Pink (red group 38A; 38B; 39B)
- 7 Red (red group 40D; 41C; 41D)



• 7.2.5 Length of cyme [cm]

Average length of two representative cymes from five different plants. Measured when 75% of seeds turned brown

\* 7.2.6 Number of flowers clusters per cyme

Average number of flower clusters of two representative cymes each from five representative plants. Recorded when 75% of seeds turned brown

7.2.7 Number of cymes per plant

Average of 10 randomly chosen plants. Scored at full-flowering stage

\* 7.2.8 Flower colour

Recorded at active flowering stage

- 1 White
- 3 Greenish-yellow (yellow-green group 149B; 149C; 150B; 150C)
- 7 Pink (red group 38A; 38B; 39B)
- 9 Red (red group 40D; 41C; 41D; 42B; 42C)

7.2.9 Flower morphology

Expressed as the ratio of three types of flowers (for common buckwheat). See Fig. 6

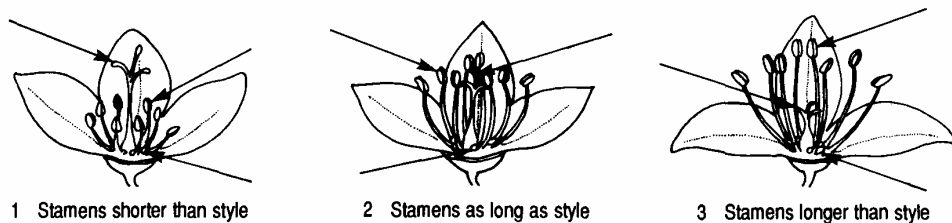
- |                              |                    |
|------------------------------|--------------------|
| 1 Stamens shorter than style | (Pin type)         |
| 2 Stamens as long as style   | (Homomorphus type) |
| 3 Stamens longer than style  | (Thrum type)       |

7.2.10 Flower abortion

- 3 Low
- 5 Intermediate
- 7 High

7.2.11 Germination period

Number of days from sowing till approximately 50% of seeds have germinated



**Fig. 6 Flower morphology**

\* 7.2.12 Days to maturity

Actual number of days between sowing and physiological maturity (75% of seeds turned brown)

- 1 Very early (<60 days)
- 2 Early (60-75 days)
- 3 Intermediate (76-90 days)
- 4 Late (91-105 days)
- 5 Very late (>106 days)

7.3 SEED

\* 7.3.1 Number of seeds per cyme

Average number of seeds per two representative cymes each from five different plants. Recorded when 75% of seeds turned brown

\* 7.3.2 Seed colour

- 3 Grey (grey-brown group 199C; 199D)
- 5 Brown (brown group 200D)
- 7 Black (black group 202B)
- 9 Mottled

### 7.3.3 Seed coat colour

Degree of green of seed coat (seed stripped off pericarp)

- 1 Greenish-yellow (yellow-green group 144C; 144D; 145B; 148D)
- 2 Light green (green group 128D; 129D; 130D)
- 3 Green (green group 134D; 140C; 141D; 143D)

### 7.3.4 Pericarp colour

In ripened grain

- 1 White silver
- 3 Grey (grey-brown group 199C; 199D)
- 5 Brown (brown group 200D)
- 7 Dark brown (brown group 200C; 201A)
- 9 Black (black group 202C)

### \* 7.3.5 Seed shape

See Fig. 7

- 1 Triangular
- 2 Ovate (Intermediate)
- 3 Conoidal
- 4 Other (specify in the NOTES descriptor, 7.4)

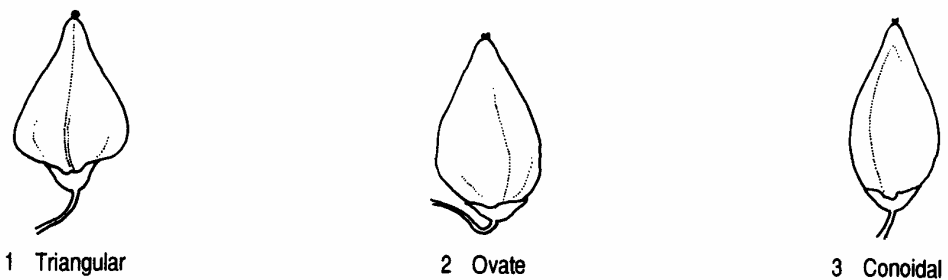


Fig. 7 Seed shape

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### \* 7.3.6 Seed surface

- 1 Smooth
- 2 Irregular or wrinkled
- 3 Other (specify in the NOTES descriptor, 7.4)

### 7.3.7 Seed length [mm]

Average of five randomly chosen seeds each from five plants. At maturity stage

### 7.3.8 Seed width [mm]

Average of five randomly chosen seeds each from five plants. At maturity stage

### \* 7.3.9 1000-seed weight [g]

Weight of 20 randomly chosen seeds each of five plants. At maturity stage

### 7.3.10 Seed flavour

- 3 Bitter
- 5 Sour
- 7 Sweet

### 7.3.11 Seed quality

- 3 Poor
- 5 Intermediate
- 7 Good

### 7.3.12 Threshability

- 3 Difficult
- 5 Intermediate
- 7 Easy

7.3.13 Eating quality of noodle

- 3 Poor
- 5 Intermediate
- 7 Good

## 7.4 NOTES

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

## EVALUATION

### 8. PLANT DESCRIPTORS

#### 8.1 YIELD AND QUALITY CHARACTERS

##### 8.1.1 Leaf yield [g]

Total fresh weight of all the leaves of five plants recorded when 100% of plants are in full-flowering stage

##### \* 8.1.2 Seed yield [g]

Total seed weight harvested of 50-100 randomly chosen plants dried at 13% moisture content expressed as an average per plant. At maturity stage

##### 8.1.3 Leaf protein content [%]

Total crude protein content of randomly collected leaves from 10 plants recorded when 100% of plants have flowers, expressed as percentage of fresh weight

##### 8.1.4 Leaf dry matter content [%]

All the leaves used to determine leaf yield are being dried and weighted. The descriptor state is expressed as percentage of fresh weight

##### 8.1.5 Seed protein content [%]

Crude protein content of representative seed sample content expressed as percentage of the seed weight at 13% moisture content

##### 8.1.6 Lysine content [%]

Percentage of lysine per unit of protein (absolute)

##### 8.1.7 Amino acidic content

List amino acids and percentage composition for all non-lysine amino acids

8.1.8 Glucoside content of flowering branches [%]

Glucoside content of flowering branches (leaves, young stems and flowers) of five different plants is expressed as percentage of fresh weight. Specify glucoside(s) and method used

8.1.9 Flour ratio [%]

Flour weight/seed weight x 100

8.1.10 Pericarp ratio [%]

Pericarp weight/seed weight x 100

8.1.11 Dough/hull ratio

- 3 Low
- 5 Intermediate
- 7 High

## 9. 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

## 9.1 LOW TEMPERATURE

## 9.2 FROST DAMAGE SUSCEPTIBILITY

## 9.3 HIGH TEMPERATURE

State the stage of measurement

## 9.4 DROUGHT TOLERANCE

State the stage of measurement

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### 9.5 HIGH SOIL MOISTURE

State the stage of measurement

### 9.6 REACTION TO HIGH SALINITY

Specify method used

### 9.7 REACTION TO HIGH pH

Specify method used

### 9.8 NOTES

Specify any additional information here

## 10. 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, 10.5. 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

### 10.1 PESTS

<i>Causal organism</i>	<i>Pest or common name</i>
10.1.1 <u><i>Acanthoscelides obtectus</i></u>	Bruchid (Seed beetle)
10.1.2 <u><i>Cirphis</i> sp.</u>	Cutworm, armyworm
10.1.3 <u><i>Myzus persicae</i></u>	Aphid
10.1.4 <u><i>Cephitinea</i> sp.</u>	Grain moth
10.1.5 <u><i>Mycetophagus</i> sp.</u>	Storage beetle
10.1.6 <u>Others</u> (specify in the NOTES descriptor, 10.5)	



## 10.2 FUNGI

<i>Causal organism</i>	<i>Disease or common name</i>
10.2.1 <u><i>Sphacelotheca fagopyri</i></u>	Smut
10.2.2 <u><i>Septoria polygonicola</i></u>	Leaf spot
10.2.3 <u><i>Phytophthora fagopyri</i></u>	Blight
10.2.4 <u><i>Ascochyta italica</i></u>	Brown leaf spot
10.2.5 <u><i>Cercospora fagopyri</i></u>	Leaf blight
10.2.6 <u><i>Erysiphe polygoni</i></u>	Powdery mildew
10.2.7 <u><i>Pernospora ducometi</i></u>	Downy mildew
10.2.8 <u><i>Puccinia fagopyri</i></u>	Rust
10.2.9 <u><i>Sclerotinia libertiana</i></u>	Root rot/collar rot
10.2.10 <u><i>Alternaria alternata</i></u>	
10.2.11 <u><i>Phoma</i> sp.</u>	
10.2.12 <u>Other</u> (specify in the NOTES descriptor 10.5)	

## 10.3 VIRUSES

10.3.1 Brazilian curly top of tobacco and tomato transmitted by the vector <i>Agolla albidula</i>	(in Brazil)
10.3.2 <u>Mosaic virus</u>	(in USSR)
10.3.3 <u>Others</u> (specify in the NOTES descriptor, 10.5)	

#### **44 DESCRIPTORS FOR BUCKWHEAT**

##### 10.4 MLOs

###### 10.4.1 Aster yellow virus

(in Canada)

##### 10.5 NOTES

Specify here any additional information

#### **11. BIOCHEMICAL COMPOSITION**

##### 11.1 PROTEIN CHARACTERIZATION

##### 11.2 ALLOZYME COMPOSITION

##### 11.3 DNA FINGERPRINTING (RFLP/RAPD)

#### **12. CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES**

##### 12.1 CHROMOSOME NUMBER

##### 12.2 PLOIDY LEVEL

## REFERENCES

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Ms. Adriana Alercia prepared the text for publication. Illustrations were drawn by Mrs. Pina di Pilla. Mr. Paul Stapleton managed the production of the publication. Scientific direction was provided by Dr. Mark Perry.