



**LIMA BEAN
DESCRIPTORS**

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INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES

LIMA BEAN DESCRIPTORS

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The International Board for Plant Genetic Resources (IBPGR) is an autonomous, international, scientific organization under the aegis of the Consultative Group on International Agricultural Research (CGIAR). The IBPGR, which was established by the CGIAR in 1974, is composed of its Chairman and 15 members; its Executive Secretariat is provided by the Food and Agriculture Organization of the United Nations. The basic function of the IBPGR, as defined by the Consultative Group, is to promote an international network of genetic resources centres to further the collection, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. The Consultative Group mobilizes financial support from its members to meet the budgetary requirements of the Board.

IBPGR Executive Secretariat
Crop Genetic Resources Centre
Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Via delle Terme di Caracalla, 00100 Rome, Italy

IBPGR descriptors list are available for the following crops:

<i>Allium</i> (1982)	Mung Bean (1980)
Almond (1981)	Pearl Millet (1981)
Amaranth (1981)	<i>Phaseolus vulgaris</i> (1982)
Apricot (1980)	Pigeonpea (1981)
Banana and Plantains (1978)	Potato, cultivated (1977)
Barley (1982)	Rice (1980)
Beets (1980)	Sesame (1981)
Cocoa (1981)	Sorghum (1980)
Coconut (1978)	Sugarcane (1982)
Coffee (1980)	Sweet Potato (1981)
<i>Colocasia</i> (1980)	Tomatoes (1981)
Cotton (1980)	Tropical Fruits, revised (1980)
Cruciferous crops (1981)	Winged Bean, revised (1982)
Groundnut (1981)	Wheat, revised (1981)
Lupin/lupinos (1981)	Yams (1980)
Maize (1980)	

A full request list for IBPGR publications including Crop Reports, Descriptor Lists, Reports on Regions, Conservation and Information, Newsletters, Annual Reports and Germplasm Directories can be obtained from the IBPGR Secretariat, Rome.

PREFACE

Lima bean, *Phaseolus lunatus* L., has been recognized by many scientists as a grain legume well adapted to the subhumid and humid lowland tropics. Although the plant originated in Latin America, it is also extensively cultivated and studied in temperate or subtropical regions of other continents.

This descriptor list has been prepared in an IBPGR standard format following advice on descriptors and descriptor states from the crop experts throughout the world. The IBPGR encourages the collection of data on the first four categories of this list: 1. Accession; 2. Collection; 3. and 4. Characterization and preliminary evaluation. The IBPGR endorses the information in categories 1 - 4 as the minimum that ideally should be available for any one accession. Other descriptors are given in categories 5 onwards that will enable the simple encoding of further characterization and evaluation data and which can serve as examples for the creation of additional descriptors in the IBPGR form by any user.

Although the suggested coding should not be regarded as the definitive scheme, this format has the full backing of the IBPGR and is promoted worldwide. The descriptor list given here provides an international format and thereby produces a universally understood 'language' for all plant genetic resource data. The adoption of this scheme for all data encoding, or at least the production of a transformation method to convert other schemes to the IBPGR format, will produce a rapid, reliable and efficient means for information storage, retrieval and communication. This will greatly assist the utilization of germplasm throughout the international plant genetic resources network. It is recommended, therefore, that information should be produced by closely following this descriptor list with regard to: ordering and numbering descriptors; using the descriptors specified; and using the descriptor states recommended.

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

DESCRIPTOR LIST FOR LIMA BEAN

The IBPGR now uses the following definitions in genetic resources documentation.

- i) **Passport data** (accession identifiers and information recorded by collectors);
- ii) **Characterization** (consists of recording those characters which are highly heritable, can be easily seen by the eye and are expressed in all environments);
- iii) **Preliminary evaluation** (consists of recording a limited number of additional traits thought desirable by a consensus of users of the particular crop).

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

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

- a) measurements are made in metric units;
- b) many descriptors which are continuously variable are recorded on a 1-9 scale. The authors of this list have sometimes described only a selection of the states, e.g. 3, 5 and 7 for such descriptors. Where this has occurred the full range of codes is available for use by extension of the codes given or by interpolation between them - e.g. in 8. (Pest and disease susceptibility) 1 = extremely low susceptibility and 8 = high to extremely high susceptibility;
- c) presence/absence characters are scored as 1 (present) and 0 (absent);
- d) for descriptors which are not generally uniform throughout the accession (e.g. mixed collection, genetic segregation) mean and standard deviation could be reported where the descriptor is continuous or mean and 'x' where the descriptor is discontinuous;
- e) when the descriptor is inapplicable, '0' is used as the descriptor value. E.g. if an accession does not form flowers, a 0 would be scored for the following descriptor.

Flower colour

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

- f) blanks are used for information not yet available;

- g) standard colour charts e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, Munsell Color Charts for Plant Tissues are strongly recommended for all ungraded colour characters (the precise chart used should be specified).

PASSPORT

1 ACCESSION DATA

1.1 ACCESSION NUMBER

This number serves as a unique identifier for accessions and is assigned by the curator when an accession is entered into his collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number is still not available for re-use. Letters should occur before the number to identify the genebank or national system (e.g. MG indicates an accession comes from the genebank at Bari, Italy, PI indicates an accession within the USA system)

1.2 DONOR NAME

Name of institution or individual responsible for donating the germplasm

1.3 DONOR IDENTIFICATION NUMBER

Number assigned to accession by the donor

1.4 OTHER NUMBERS ASSOCIATED WITH THE ACCESSION

(other numbers can be added as 1.4.3, etc.)

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

1.4.1 Other number 1

1.4.2 Other number 2

1.5 SCIENTIFIC NAME

1.5.1 Genus

1.5.2 Species

1.5.3 Subspecies

1.5.4 Botanical variety

1.5.5 Cultigroup¹

1.6 PEDIGREE/CULTIVAR NAME

Nomenclature and designations assigned to breeder's material

1.7 ACQUISITION DATE

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

1.7.1 Month

1.7.2 Year

1.8 DATE OF LAST REGENERATION OR MULTIPLICATION

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

1.8.1 Month

1.8.2 Year

1.9 ACCESSION SIZE

Approximate number of seeds of accession in collection

1.10 NUMBER OF TIMES ACCESSION REGENERATED

Number of regenerations or multiplications since original collection

2. COLLECTION DATA

2.1 COLLECTOR'S NUMBER

Original number assigned by collector of the sample normally composed of the name or initials of the collector(s) followed by a number. This item is essential for identifying duplicates held in different collections and should always accompany subsamples wherever they are sent.

2.2 COLLECTING INSTITUTE

¹ From early domestication, three directions of dispersal have been traced from the crop (Mackie, 1943) and constitute the original varietal stocks that have been clustered by Baudet (1977) into three divisions named "cultigroups" (cv-gr.). The latter being predominantly anthropomorphic divisions, other groups could be recognized within the species.

Sieva (small to medium, moderately plumped seeds) cv-gr.

Potato (small to medium, more or less spherical seeds) cv-gr.

Big Lima (large flat seeds) cv-gr.

Kidney (kidney shaped seeds).

Other (intermediate or different (specify)).

Institute or person collecting/sponsoring the original sample

2.3 DATE OF COLLECTION OF ORIGINAL SAMPLE

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

2.3.1 Month

2.3.2 Year

2.4 COUNTRY OF COLLECTION OR COUNTRY WHERE CULTIVAR/VARIETY BRED

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

2.5 PROVINCE/STATE

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

2.6 LOCATION OF COLLECTION SITE

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

2.7 LATITUDE OF COLLECTION SITE

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

2.8 LONGITUDE OF COLLECTION SITE

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

2.9 ALTITUDE OF COLLECTION SITE

Elevation above sea level in metres

2.10 COLLECTION SOURCE

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

2.11 STATUS OF SAMPLE

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

2.12 LOCAL/VERNACULAR NAME

Name given by farmer to cultivar/landrace/weed

2.13 NUMBER OF PLANTS SAMPLED

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

2.14 PHOTOGRAPH

Was a photograph taken of the accession or environment at collection?

- 0 No
- 1 Yes

2.15 TYPE OF MATERIAL

- 1 Pure line
- 2 Mixtures
- 3 Segregating
- 4 Other (specify in the NOTES descriptor, 11)

2.16 GROWTH HABIT

- 1 Determinate bush
- 2 Indeterminate semi-climber
- 3 Indeterminate climber
- 4 Other (specify in the NOTES descriptor, 11)

2.17 IF UNDER CULTIVATION: CROP

- 1 Monoculture
- 2 Mixed cropping
- 3 Relay cropping

2.18 TOPOGRAPHY

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

2.19 PESTS AND DISEASES OF COLLECTION SAMPLE

Specify, using item numbers of pests and diseases (Section 8) and severity of infection on 1-9 scale. '0' indicates that sample has no pests or diseases

2.20 HERBARIUM SPECIMEN

Was a herbarium specimen collected?

0	No
1	Yes

2.21 OTHER NOTES FROM COLLECTOR

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

CHARACTERIZATION AND PRELIMINARY EVALUATION DATA

3. SITE DATA

3.1 COUNTRY OF CHARACTERIZATION AND PRELIMINARY EVALUATION

3.2 SITE (RESEARCH INSTITUTE)

3.3 NAME OF PERSON IN CHARGE OF CHARACTERIZATION

3.4 SOWING DATE

3.4.1 Day

3.4.2 Month

3.4.3 Year

3.5 HARVEST DATE

3.5.1 Day

3.5.2 Month

3.5.3 Year

3.6 CULTIVATION METHOD

Record row spacing and other management practices

4 PLANT DATA

4.1 VEGETATIVE

4.1.1 Leaflet length

Measured on the terminal leaflet of third trifoliate leaf-from pulvinus to leaf tip

3	5-7 cm
5	9-11 cm
7	13-15 cm

4.1.2 Leaflet shape

Measured on the terminal leaflet of third trifoliate leaf according to the ratio of length

(l) to width (w). See Figure 1

		$\frac{l}{w}$	Probable genotype
1	Round	< 1.5	wlwl
3	Ovate	1.5-2)	
5	Ovate-lanceolate	2-3)	Wl -
7	Lanceolate	3-6)	
9	Linear-lanceolate	> 6)	

4.1.3 Growth pattern

Probable genotype

1	Determinate	dd
2	Indeterminate	D-

4.1.4 Days to maturity

From emergence to stage when 90% of pods are ripe

4.2 INFLORESCENCE AND FRUIT

4.2.1 Number of nodes on mainstem before first raceme

Average from 10 random plants: if determinate type, from cotyledon scar to last leaf; if indeterminate type, from cotyledon scar to first flowering node

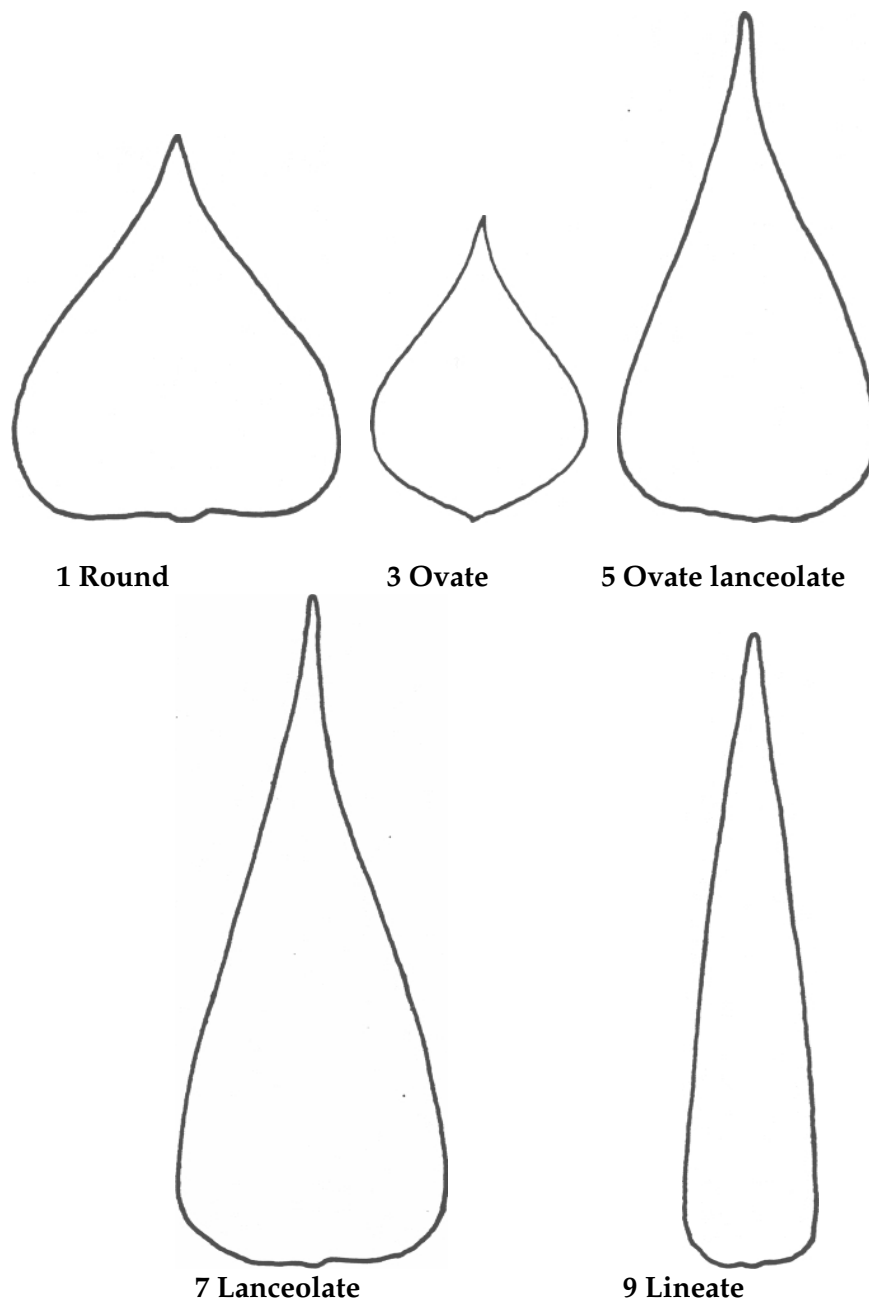


Fig. 1 Leaflet shape

4.2.2 Days to flowering

From emergence to stage when 50% of plants have begun to flower

4.2.3 Colour of flower wings

1	White		Probable genotype
3	Light pink)	cc or C-rrpp
5	Deep pink to purple)	C-R-pp or
7	Violet)	C-rrP- or
)	C-R-P

4.2.4 Pod curvature

Of fully expanded immature pod

See Figure 2

- 0 Straight
- 3 Slightly curved
- 7 Curved

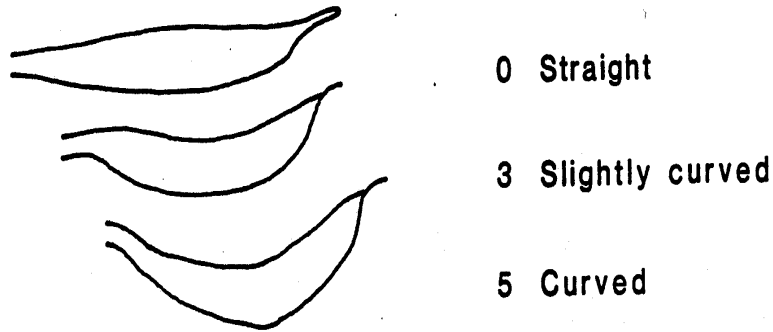


Fig. 2 Pod curvature

4.2.5 Days to first mature pods

From emergence to stage when 50% of plants have mature pods

4.2.6 Pod colour

Of mature pods

- 1 Brown
- 2 Brown with red/purple spotting or mottling (pigmented patches)
- 3 Red, purple or black (pigmented all over)

4.2.7 Pod length [cm]

Average of 20 randomly chosen mature pods. If pods are curved, measure the longest straight line from base to tip of pods

4.2.8 Number of locules per pod

Ovule attachment on 20 randomly chosen pods

4.3 SEED

Seed characteristics should be observed on mature seeds

4.3.1 Background colour

The lightest colour

1	Green	7	Maroon
2	White	8	Pink
3	Grey	9	Red
4	Yellow	10	Dark red
5	Buff	11	Purple red
6	Light brown	12	Black

4.3.2 Pattern colour

Eye always included; if bicoloured pattern consider only the lightest colour of the pattern

0	No pattern
1	Green
2	Light brown or orange
3	Dark brown
4	Red
5	Purple red
6	Black

4.3.3 Second pattern colour

Darkest colour of pattern

0	Monocoloured pattern/no pattern
1	Dark red
2	Purple red
3	Black

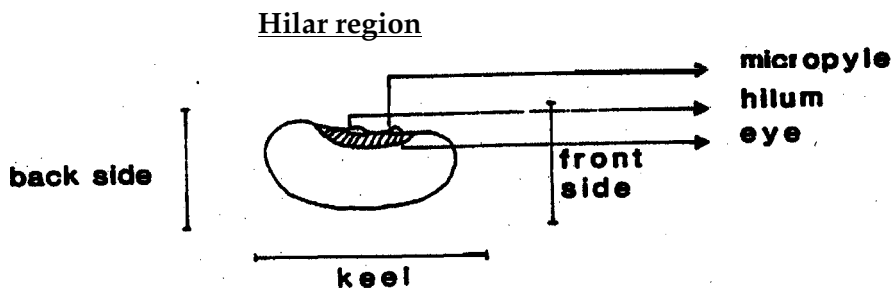


Fig 3 Seed terminology

4.3.4 Seed coat pattern

The different shapes and localization of the pigments observed on the seed testa form the basis for this classification into various patterns. In the following descriptions, refer to Figures 3 and 4 for each part of seed described

	<u>Group</u>
0 No pattern	A
1 Pattern around eye only	B
2 Eye distinct with few specks on body	C1
3 Eye distinct with many specks on body	C2
4 Eye distinct with blotches on < 50% of body	D1
5 Eye distinct with blotches on >50% of body	D2
6 Eye linked to other parts of pattern, blotches in hilar region (more developed towards micropyle), some specks may be present	E1
7 Eye linked to other parts of pattern, blotch covering hilar region and front side, some specks may be present	E2
8 Eye linked to other parts of pattern, blotch covering hilar region, back, front and keel, specks present on rest of body	E3
9 Eye linked to other parts of pattern, blotch in hilar region, body has bands radiating from hilar region	E4
10 Eye linked to other parts of pattern, blotch in hilar region, body has bands oriented radially and transversely	E5
11 Body sparsely mottled	F1
12 Body moderately mottled, some joined to form a blotch	F2
13 Body intensely mottled, seed background is almost hidden	F3

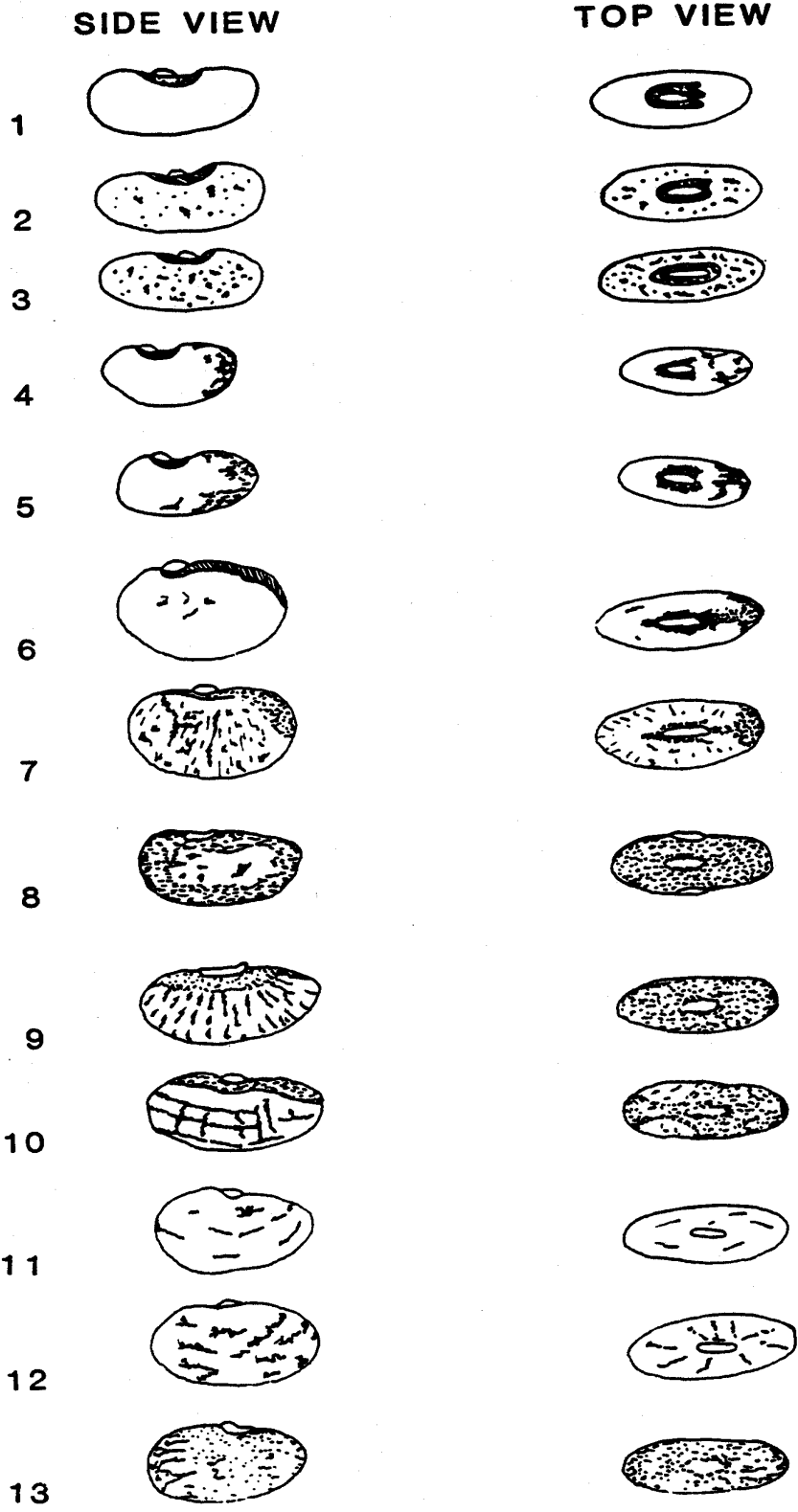


Fig. 4 Seed coat pattern

- 4.3.5 Shape of seed**
Seed taken from middle of pod, see figure 5 for descriptor states
- 4.3.6 Seed length [mm]**
Average of 10 ripe seeds chosen at random
- 4.7.7 Seed width [mm]**
Average of 10 ripe seeds chosen at random
- 4.7.8 Seed weight [mg]**
Weight of 100 seeds moisture content 12 – 14 %

FURTHER CHARACTERIZATION AND EVALUATION

5 SITE DATA

5.1 COUNTRY OF FURTHER CHARACTERIZATION AND EVALUATION

5.2 SITE (RESEARCH INSTITUTE)

5.3 NAME OF PERSON IN CHARGE OF EVALUATING

5.4 SOWING DATE

5.3.1 Day

5.3.2 Month

5.3.3 Year

5.4 HARVEST DATE

5.4.1 Day

5.4.2 Month

5.4.3 Year

5.6 CULTIVATION METHOD

Record row spacing and other management practices

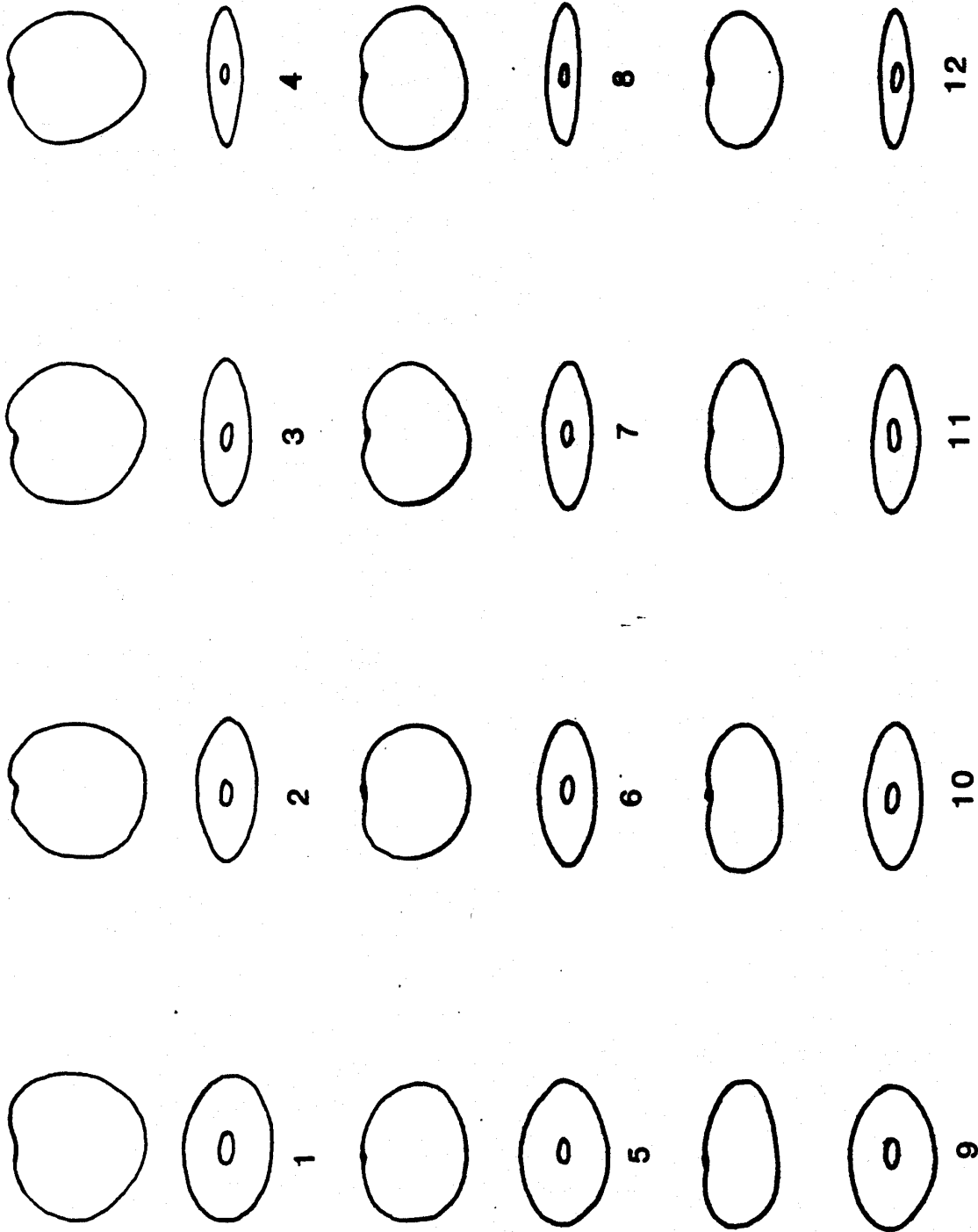


Figure 5. Shape of seed

6 PLANT DATA

6.1 VEGETATIVE

6.1.1 Emerging cotyledon colour

- | | |
|---|---------------|
| 1 | White |
| 2 | Green |
| 3 | Red or purple |

6.1.2 Hypocotyl colour

- | | |
|---|------------|
| 1 | Green |
| 2 | Red |
| 3 | Red purple |
| 4 | Purple |

Probable genotype
cc or C-rrpp or C-R-Rb-
C-R-rbrb
C-R-P-rbrb
C-rrP-rbrb

6.1.3 Main stem pigmentation

At 4-6 weeks after planting

- | | |
|---|--------------------|
| 0 | No pigmentation |
| 3 | Localized to nodes |
| 5 | Extensive |
| 7 | Almost Solid |

Probable genotype
cc or C-rrpp
C-R-pp or C-rrP-
or C-R-P-

6.1.4 Clear markings along veins of fully developed primary leaves

- | | |
|---|--------|
| 0 | Absent |
| 3 | Narrow |
| 7 | Wide |

6.1.5 Vein colour of fully developed primary leaves

On inner face

- | | |
|---|--------|
| 1 | Green |
| 2 | Purple |

6.1.6 Leaf anthocyanin

- | | |
|---|---------|
| 0 | Absent |
| 1 | Present |

6.1.7 Leaf colour: intensity of green colour

4-6 weeks after planting

- | | |
|---|--------------------|
| 3 | Pale green |
| 5 | Intermediate green |
| 7 | Dark green |

6.1.8 Leaf hairiness: density

On inner face of first fully expanded leaves from tip

- 0 Glabrous
- 3 Slightly pubescent
- 5 Moderately pubescent
- 7 Highly pubescent

6.1.9 Ramification index: if determinate type

6 weeks after planting

- 3 Long internodes on main stems, few lateral branches, type Fordhook
- 5 Intermediate
- 7 Short internodes on main stems, numerous lateral branches, type Henderson

6.1.10 Branch orientation: if determinate type

See Figure 6

- 3 Short and erect lateral branches
- 5 Branches tending to be perpendicular to main stem, medium in length
- 7 First lateral branches long and spreading over ground

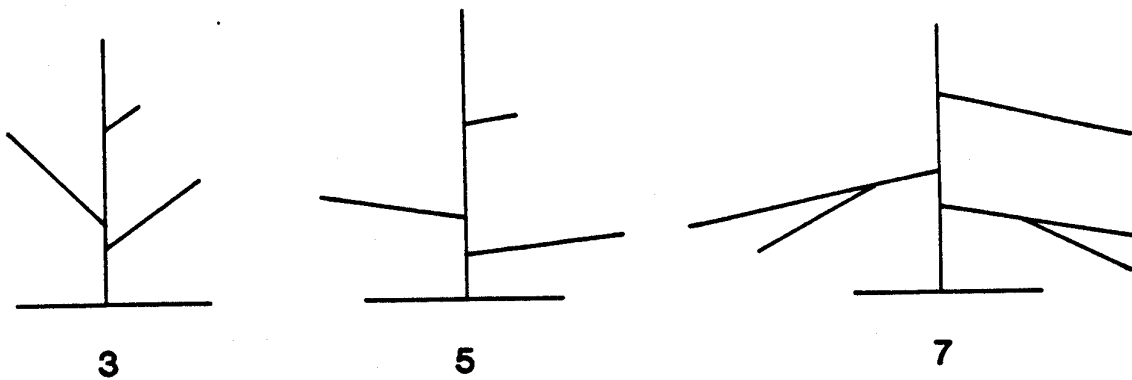


Fig. 6 Branch orientation

6.1.11 Ramification index: if indeterminate type

6 weeks after planting

- 1 One main stem, none or few short lateral branches
- 3 One main stem, few lateral branches starting from the first nodes
- 5 Two or three main stems starting from the first nodes
- 7 Two or three main stems and other lateral branches
- 9 Densely branched

6.1.12 Length from hypocotyl base to fully expanded primary leaves [cm]
On 10 random plants

6.1.13 Plant height: if determinate type [cm]
On 10 random mature plants, from cotyledon scar to tip of plant

6.1.14 Leaf persistence
When 90% of pods are ripe

3	Few leaves remaining
5	Intermediate
7	Most leaves remaining

6.2 INFLORESCENCE AND FRUIT

6.2.1 Flower bud size
Just before opening. See Figure 7

3	Small	(3.6-4.5 cm)
5	Medium	(5.6-6.5 cm)
7	Large	(7.6-8.5 cm)



Fig. 7 Flower bud size

6.2.2 Colour of flower keel
Colour of tip

1	Greenish
2	Tinged (pink or purple)

Probable genotype
cc or C-rrpp
C-R-pp or
C-rrP- or
C-R-P-

6.2.3 Colour of flower standard
Upper part of inner side

1	White
3	Light pink
5	Deep pink to purple
7	Violet

6.2.4 Hairiness of standard

Outer face of freshly opened flower

- | | |
|---|------------------------|
| 0 | Absent |
| 3 | Sparsely hairy on tip |
| 5 | Moderately hairy |
| 7 | Densely hairy all over |

6.2.5 Wing opening

Freshly opened flowers. See Figure 8

- | | |
|---|------------------------|
| 0 | Parallel wings; closed |
| 3 | Intermediate opening |
| 7 | Wings widely diverging |

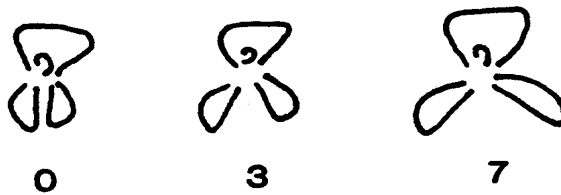


Fig. 8 Wing opening

6.2.6 Number of nodes per raceme

One raceme from each of 10 plants at pod filling period

If determinate type, one terminal raceme If indeterminate type, one lateral raceme (6th from apex)

6.2.7 Raceme length [cm]

One raceme from each of 10 plants at pod filling period

If determinate type, one terminal raceme If indeterminate type, one lateral raceme (6th from apex)

6.2.8 Raceme position

At fully expanded green pod stage

- | | |
|---|---------------------------|
| 3 | Within foliage |
| 5 | Intermediate |
| 7 | Emerging from leaf canopy |

6.2.9 Duration of flowering

From first flowers to stage where 50% of plants have finished flowering

6.2.10 Pod pubescence

On fully expanded immature pods

- | | |
|---|-----------|
| 0 | Glabrous |
| 1 | Pubescent |

6.2.11 Pod beak shape

On fully expanded immature pods. See Figure 9

- 1 Short beak
- 2 Medium length beak
- 3 Long beak
- 4 Thick beak

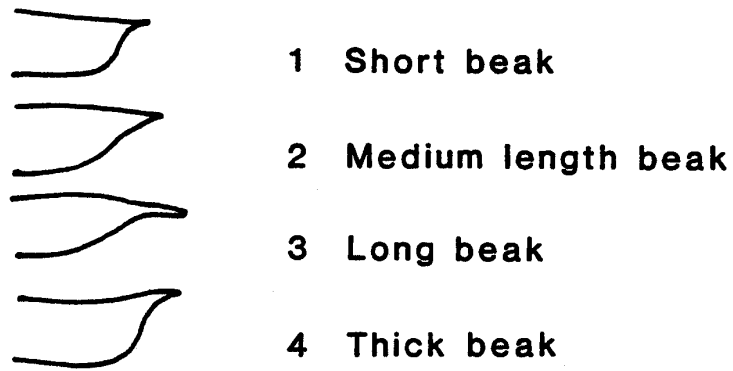


Fig. 9 Pod beak shape

6.2.12 Position of pod bearing racemes

- 1 Mainly concentrated at the base
- 2 Mainly concentrated in the middle
- 3 Mainly concentrated at the top
- 4 Evenly distributed throughout the plant
- 5 Variably distributed

6.2.13 Orientation of pod bearing racemes

At maturity

- 1 Upright
- 2 Prostrate

6.2.14 Pod dehiscence

At maturity

- 0 Non-shattering
- 1 Shattering

6.2.15 Pod width [cm]

Of the largest width from 20, randomly chosen, mature pods

6.3 SEED

Seed characteristics should be observed on mature seeds

6.3.1 Number of seeds per pod

Average from 20 randomly chosen ripe pods

6.3.2 Seed germination within pods

Radicle emergence

- | | |
|---|---------|
| 0 | Absent |
| 1 | Present |

6.3.3 Splitting of seed testa

- | | |
|---|---------|
| 0 | Absent |
| 1 | Present |

6.3.4 Texture of testa

Transverse ridges may exist radiating from the hilum to the opposite edge of seed

- | | |
|---|-------------------|
| 3 | Smooth |
| 5 | Moderately ridged |
| 7 | Markedly ridged |

6.3.5 Seed volume [ml]

94% ethanol displaced by 100 seeds

6.3.6 Cotyledon colour

Of ripe seeds

- | | |
|---|-------|
| 1 | White |
| 2 | Green |

Probable genotype

- | |
|----|
| G- |
| gg |

6.3.7 Percentage seed protein

6.3.8 Cooking time

In minutes (specify how long in storage and cooking method in the NOTES descriptor, 11)

6.3.9 HCN content

Colorimetric or potentiometric methods, specify method in the NOTES descriptor, 11

7 STRESS SUSCEPTIBILITY

These reactions are coded on a 1-9 scale where

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

7.1 LOW TEMPERATURE

7.2 HIGH TEMPERATURE

7.3 DROUGHT

7.4 EXCESS SOIL MOISTURE

7.5 SALINITY

7.6 SOIL ACIDITY

7.7 LOW NITROGEN

8 PEST AND DISEASE SUSCEPTIBILITY

In each case, it is important to state the origin of the infection or infestation, i.e. natural, field inoculation, laboratory test (specify). Record such information in the NOTES descriptor, 11

These are coded on a 1-9 scale, where

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

8.1 PESTS

8.1.1	<i>Acanthoscelides obtectus</i> (Say)	Bean seed beetle
8.1.2	<i>Agrotis ipsilon</i> Hüfnagel	Cutworm
8.1.3	<i>Anoplocnemis curvipes</i> (Fabricius)	---
8.1.4	<i>Aphis fabae</i> Scopoli <i>Aphis craccivora</i> Koch	Black bean aphid Groundnut aphid
8.1.5	<i>Callosobruchus maculatus</i> F.	Cowpea seed beetle
8.1.6	<i>Cydia fabivora</i> Meyrick <i>Cydia ptychora</i> Meyrick	Cowpea seed moth

8.1.7	<i>Empoasca fabae</i> Harris <i>Empoasca kraemeri</i> Ross. & Moore <i>Empoasca dolichi</i> Paoli	Potato leafhopper Leafhopper Leafhopper
8.1.8	<i>Epilacha varivestis</i> Mulsant	Mexican bean beetle
8.1.9	<i>Etiella zinckenella</i> Treitschke	Lima bean pod borer
8.1.10	<i>Heliothis armigera</i> Hubner, <i>Heliothis zea</i> Boddie	Corn earworm or African ballworm
8.1.11	<i>Hylemya platura</i> Meigen <i>Hylemya florilega</i> Zetterstedt <i>Hylemya cilicrura</i> Rondoni <i>Hylemya</i> spp. (other species)	Seedcorn maggot
8.1.12	<i>Limoniusspp.</i>	Wireworm
8.1.13	<i>Lygus hesperus</i> Knight T., <i>Lygus elisus</i> Van Duzee, <i>Lygus</i> spp. (other species)	Bug
8.1.14	<i>Maruca testulalis</i> Geyer	Legume pod borer
8.1.15	<i>Megalurothrips sjostedi</i> Trybom	Legume bud thrips
8.1.16	<i>Melanotus spp.</i>	Wireworm
8.1.17	<i>Nezara viridula</i> (L.)	Green stink bug
8.1.18	<i>Onychiurus spp.</i>	Springtail
8.1.19	<i>Oothecca mutabilis</i> (Sahlberg)	Cowpea leaf beetle
8.1.20	<i>Ophiomyia phaseoli</i> (Tryon) or <i>Melanogromyza phaseoli</i> Tryon	Bean fly
8.1.21	<i>Peridroma saucia</i> Hb.	Cutworm
8.1.22	<i>Riptortus dentipes</i> (Fabricius)	

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|--------|---|-------------------------|
| 8.1.23 | <i>Zabrotes subfasciatus</i>
Boheman | Bean seed beetle |
| 8.1.24 | <i>Zonocerus variegatus</i> (L.) | |
| 8.1.25 | <i>Tetranychus</i> spp. | Two-spotted spider mite |
| 8.1.26 | <i>Meloidogyne</i> spp. | Root knot nematode |
| 8.1.27 | <i>Pratylenchus</i> spp. | Root lesion nematode |
| 8.1.28 | Other pests (specify in the NOTES descriptor, 11) | |

8.2 FUNGI

- | | | |
|--------|---|----------------------|
| 8.2.1 | <i>Alternaria fusciculata</i>
(Cke.& Ell.) Jones & Grout. | -- -- -- |
| 8.2.2 | <i>Aristastoma oeconomicum</i>
(Ell. & Tracy) Tehon | -- -- -- |
| 8.2.3 | <i>Ascochyta phaseolorum</i> Sacc.
<i>Ascochyta</i> spp. (other species) | Ascochyta leaf spot |
| 8.2.4 | <i>Aspergillus flavus</i> Lk. | -- -- -- |
| 8.2.5 | <i>Asteroma phaseoli</i> Brun. | -- -- -- |
| 8.2.6 | <i>Botryodiplodia theobromae</i>
Pat. | -- -- -- |
| 8.2.7 | <i>Botrytis cinerea</i> Fr. | Gray mould |
| 8.2.8 | <i>Cephalosporium gregatum</i>
Allington & Chamberlain | Brown stem rot |
| 8.2.9 | <i>Cercospora canescens</i>
Ellis & Martin
<i>Cercospora</i> spp. (other species) | Cercospora leaf spot |
| 8.2.10 | <i>Chaetoseptoria wellmanii</i>
Stevenson | -- -- -- |
| 8.2.11 | <i>Cladosporium</i> spp. | -- -- -- |

8.2.12	<i>Colletotrichum truncatum</i> (Schw.) Andrus & Moore <i>Colletotrichum lindemuthianum</i> (Sacc. & Magn.) Bri. & Cav.	Anthracnose
8.2.13	<i>Corynespora sp.</i>	Target spot
8.2.14	<i>Diaporthe phaseolorum</i> (Cke & Ell.) Sacc. Diaporthe spp. (other species)	Pod blight
8.2.15	<i>Dimerium grammodes</i> (Kze) Garman or <i>Parodiella perisporioides</i> (Berk. & Curt.) Speg	-- -- --
8.2.16	<i>Diplodia spp.</i>	-- -- --
8.2.17	<i>Elsinoe phaseoli</i> Jenkins	Scab
8.2.18	<i>Epicoccum spp.</i>	
8.2.19	<i>Fusarium solani</i> (Mart.) Appel & Wollenw. <i>Fusarium spp.</i> (other species)	Fusarium root rot
8.2.20	<i>Gloesporium corallinum</i> (Peyl.) Sacc. & Trav.	
8.2.21	<i>Glomerella cingulata</i> (Ston.) Spauld. & Schrenk	-- -- --
8.2.22	<i>Helminthosporium victoriae</i> Meehan & Murphy	-- -- --
8.2.23	<i>Hypochnus spp.</i>	-- -- --
8.2.24	<i>Isariopsis laxa</i> (Ell.) Sacc.	-- -- --
8.2.25	<i>Macrophomina phaseoli</i> (Maubl.) Ashby	Collar rot
8.2.26	<i>Macrosporium spp</i>	-- -- --.
8.2.27	<i>Microsphaera spp.</i>	-- -- --
8.2.28	<i>Mycosphaerella spp.</i>	-- -- --

8.2.29	<i>Nectria spp.</i>	
8.2.30	<i>Nematospora phaseoli</i> Wingard <i>Nematospora spp.</i> (other species)	Yeast spot
8.2.31	<i>Oedocephalum roseum</i> Cke.	-- -- --
8.2.32	<i>Phakopsora vignae</i> (Bres.) Arth. <i>Phakopsora pachyrhizi</i> Syd.	Pink rust
8.2.33	<i>Phoma terrestris</i> Hansen	-- -- --
8.2.34	<i>Phyllachora phaseoli</i> (P. Henn.) Theiss. & Syd.	-- -- --
8.2.35	<i>Phyllosticta spp.</i>	-- -- --
8.2.36	<i>Physarum cinereum</i> (Batsch.) Pers.	-- -- --
8.2.37	<i>Phytophthora phaseoli</i> Thaxter <i>Phytophthora spp.</i> (other species)	Downy mildew
8.2.38	<i>Pleospora herbarum</i> (Pers. & Fr.) Rab.	-- -- --
8.2.39	<i>Pullularia pullulans</i> (DBy.) Berkhout	-- -- --
8.2.40	<i>Pythium ultimum</i> Trow. <i>Pythium aphanidermatum</i> (Edson) Fritz.	Seedling wilt
8.2.41	<i>Ramularia spp.</i>	-- -- --
8.2.42	<i>Rhizoctonia solani</i> Kuehn or <i>Thanotophorus cucumeris</i> (Frank) Dark <i>Rhizoctonia spp.</i> (other species)	Web blight
8.2.43	<i>Sclerophoma phaseoli</i> Karak	-- -- --
8.2.44	<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	White mould

- 8.2.45 *Sclerotinia* spp. (other species)
Sclerotium rolfsii Sacc. Southern blight
- 8.2.46 *Sphaerotheca humili* var.
fuliginea (Schlecht) Salmon -- -- --
- 8.2.47 *Stagonospora phaseoli* -- -- --
Dearn. & Barth
- 8.2.48 *Stemphylium botryosum* -- -- --
Wallr.
- 8.2.49 *Thielaviopsis basicola* Black root rot
(Berk. & Br.) Ferr
- 8.2.50 *Uromyces phaseoli* (Pers.) Rust
Winter (*Uromyces* spp.) (other species)
- 8.2.51 *Vermicularia polytricha* -- -- --
Cke.
- 8.2.52 Other fungi (specify in the NOTES descriptor, 11)
- 8.3.1 *Pseudomonas phaseolicola* Halo blight
(Burk.) Dowson
- 8.3.2 *Pseudomonas syringae* Bacterial brown spot
van Hall
- 8.3.3 *Pseudomonas* spp. (other species) -- -- --
- 8.3.4 *Xanthomonas phaseoli* Bacterial blight
(E.F. Smith) Dowson
Xanthomonas phaseoli var.
fuscans (Burk.) Starr.
and Burkh.
- 8.3.5 *Xanthomonas* spp. (other species) -- -- --
- 8.3.6 Other bacteria (specify in the NOTES descriptor, 11)

8.4 VIRUS AND MYCOPLASM

- 8.4.1 Bean curly dwarf mosaic

- 8.4.2 Bean rugose mosaic
- 8.4.3 Common mosaic
- 8.4.4 Cucumber mosaic
- 8.4.5 Double bean yellow mosaic
- 8.4.6 Lima bean golden mosaic
- 8.4.7 Lima bean green mottle
- 8.4.8 Veinal necrosis
- 8.4.9 Other viruses (specify **in** the NOTES descriptor, 11)
- 8.4.10 Mycoplasmas (specify in the NOTES descriptor, 11)

9 ALLOENZYME COMPOSITION

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

10 CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES

11 NOTES

Give additional information where descriptor state is noted as 'Other' as, for example, in descriptors 2.10, 2.19, etc. Also include here any further relevant information.

APPENDIX I

LITERATURE

- Baudet, J.C.
1977
Origine et classification des espèces cultivées du genre *Phaseolus*. Bull. Soc. Roy. Bot. Belg. 110: 65-76.
- Mackie, W.W.
1943
Origin, dispersal and variability of the Lima bean, *Phaseolus lunatus*. Hilgardia 15: 1-29.

Appendix II

WORLD EXPERTS WHO PROVIDED INPUT FOR THIS DESCRIPTOR LIST

Primary authors

- Dr. J.P. Baudoin Faculté des Sciences agronomiques de l'Etat Phytotechnie des
Régions chaudes,
B 5800 Gembloux,
Belgium
- R. Marechal Faculté des Sciences agronomiques de l'Etat Phytotechnie des
Régions chaudes,
B 5800 Gembloux,
Belgium

Experts consulted

- Dr. H. Bannerot Station de Génétique et d'Amélioration des Plantes Centre National de
Recherches Agronomiques, Etoile de Choisy - Route de Saint-Cyr
78000 Versailles (Yvelines) France
- E. Bergman Department of Horticulture. Pennsylvania
State University,
102 Tyson Building
University Park,
Pennsylvania
16802 USA
- M. Davids Genetic Resource Unit
International Institute of Tropical Agriculture
Oyo Road, P.M.B. 5320
Ibadan,
Nigeria
- D.G. Debouck Faculté des Sciences agronomiques de l'Etat Laboratoire de
Morphogenese vegetale appliquee,
B 5800 Gembloux,
Belgium
- Dr. J.M. Lyman The Rockefeller Foundation 1133
Avenue of the Americas,
New York,
NY 10036,
USA

M.D. Orzolek Department of Horticulture, Pennsylvania
State University,
102 Tyson Building
University Park,
Pennsylvania,
16802 USA

Dr. K.O. Rachie The Rockefeller Foundation,
1133 Avenue of the Americas,
New York,
NY 10036
USA

Dr. C.A. Thomas Applied Plant Pathology Laboratory,
Agricultural Research Northeastern Region,
Beltsville Agricultural Research Center,
Beltsville,
Maryland 20705,
USA