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Guidelines for the Conduct of Test for Distinctiveness, Uniformity and Stability

On

Kidney bean

(*Phaseolus vulgaris* L.)

Protection of Plant Varieties and Farmers' Rights Authority
(PPV & FRA)

Government of India

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I. Subject

These test guidelines shall apply to all varieties, hybrids and parental lines of Kidney bean (*Phaseolus vulgaris* L.)

II. Seed material required

1. The Protection of Plant Varieties and Farmers' Rights Authority (PPV & FRA) shall decide when, where and in what quantity and quality of the seed material are required for testing a variety denomination applied for registration under the Protection of Plant Variety and Farmers' Rights (PPV & FR) Act, 2001. Applicants submitting such seed material from a country other than India shall make sure that all customs and quarantine requirements stipulated under relevant national legislations and regulations are complied with. The minimum quantity of the seed to be provided by the applicant shall be 3000 gram in the case of the candidate variety. Each of these seed lots shall be packed and sealed in ten equal weighing packets and submitted in one lot.

2. The seed submitted shall have at least 85 % germination, 98% physical purity, highest genetic purity, uniformity, sanitary and phyto-sanitary standards. In addition the moisture content of the seed shall not exceed 8 - 9% to meet the safe storage requirement. The applicant shall also submit along with the seed a certified data on germination test made not more than one month prior to the date of submission.

3. The seed material shall not have been subjected to any chemical or bio-physical treatment.

III. Conduct of tests

1. The minimum duration of the DUS tests shall normally be at least two independent similar growing seasons.

2. The test shall normally be conducted at least at two test locations. If any essential characteristics of the candidate variety are not expressed for visual observation at these locations, the variety shall be considered for further examination at another appropriate test site or under special test protocol on expressed request of the applicant.

3. The field tests shall be carried out under conditions favouring normal growth and expression of all test characteristics. The size of the plots shall be such that plants or parts of plants could be removed for measurement and observation without prejudicing the other observations on the standing plants until the end of the growing period. Each test shall include about 400 plants, in the plot size and planting space specified below across three replications. Separate plots for observation and measurement can only be used if they have been subjected to similar environmental conditions. All the replications shall be sharing similar environmental conditions of the test location.

4. **Test plot design**

Number of rows	:	4
Row length	:	5 m
Row to row distance	:	40 cm (determinate type) 80 cm (indeterminate type)
Plant to plant distance	:	15 cm
Expected plants/replication	:	140
Number of replications	:	3

5. Observations shall not be recorded on plants in border rows.

6. Additional test protocols for special purpose shall be established by the PPV & FR Authority.

IV. Methods and observations

1. The characteristics described in the Table of characteristics (see section VII) shall be used for the testing of varieties, inbred lines and hybrids for their DUS.

2. For the assessment of Distinctiveness, and stability observations shall be made on 30 plants or parts of 30 plants, which shall be equally divided among 3 replications (10 plants per replication).

3. For the assessment of uniformity of characteristics on the plot as a whole (visual assessment by a single observation of a group of plants or parts of plants), a population standard of 0.5% with an acceptance probability of at least 95% shall be applied. In the case of a sample size of 300 plants, the number of off-types shall not exceed 4.

4. For the assessment of all colour characteristics, the latest Royal Horticultural Society (RHS) colour chart shall be used.

V. Grouping of varieties

1. The candidate varieties for DUS testing shall be divided into groups to facilitate the assessment of Distinctiveness. Characteristics, which are known from experience not to vary, or to vary only slightly within a variety and which in their various states are fairly evenly distributed across all varieties in the collection are suitable for grouping purposes.

2. The following characteristics are proposed to be used for grouping Rajmash / French bean varieties:

   a) Time of flowering (Characteristic 1)

   b) Plant : Habit (Characteristic 6)

   c) Pod : Colour (Characteristic 15)

   d) Seed : Colour (Characteristic 21)

VI. Characteristics and symbols

1. To assess Distinctiveness, Uniformity and Stability, the characteristics and their states as given in the Table of characteristics (Section VII) shall be used.

2. Note (1 to 9) shall be used to describe the state of each character for the purpose of digital data processing.

3. Legend:

(*) Characteristics that shall be observed during every growing season on all varieties and shall always be included in the description of the variety, except when the state of expression of any of these characters is rendered impossible by a preceding phenological characteristic or by the environmental conditions of the testing region. Under such exceptional situation, adequate explanation shall be provided.

(+) See Explanation on the Table of characteristics in Section VIII. It is to be noted that for certain characteristics the plant parts on which observations to be taken are given in the explanation or figure(s) for clarity and not the colour variation.

4. The optimum stage of plant growth for assessment of each characteristic is given in the sixth column of Table of characteristics.

5. Type of assessment of characteristics indicated in column seven of Table of characteristics is as follows:

MG : Measurement by a single observation of a group of plants or parts of plants

MS : Measurement of a number of individual plants or parts of plants

VG : Visual assessment by a single observation of a group of plants or parts of plants

VS : Visual assessment by observation of individual plants or parts of plants

VII. Table of characteristics

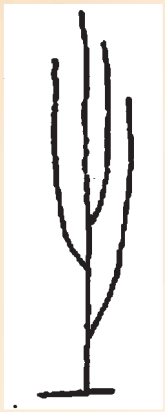
S.No	Characteristics	States	Note	Example varieties	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1. (*)	Time of flowering	Early (<50)	3	HUR 137	50% plants with at least one open flower	VG
		Medium (50-75)	5	IPR 96-4		
		Late (76-100)	7	---		
		Very late (>100)	9	---		
2. (*)	Stem: Anthocyanin colouration	Absent	1	PDR-14, IPR 98-5	Peak flowering	VS
		Present	9	---		
3.	Leaflet: Size (at terminal leaflet of first flowering node)	Small	3	IPR 98-5	Peak flowering	MS
		Medium	5	IPR 96-4, HUR 15		
		Large	7	PDR 14		
4. (+)	Plant: Growth type	Erect	3	PDR 14, IPR-96-4	Peak flowering	VG
		Semi-erect	5	Arka Bold		
		Spreading	7	Kentucky Wondor		
5. (*) (+)	Plant: Twining habit	Viny	1	IPR 98-5	Peak flowering	VG
		Non-viny	9	PDR 14		
6. (*) (+)	Plant: Habit	Determinate	1	PDR 14	Peak flowering	VG
		Indeterminate	3	Kentucky Wondor		
7.	Leaf: Intensity of green colour	Light	3	HUR 15	Peak flowering	VG
		Dark	7	---		
8. (*) (+)	Leaflet: Shape of central leaflet	Cordate	1	IPR-96-4, IPR 98-5	Peak flowering	VG
		Ovate	2	PDR 14, HPR 35		
		Rhombohedric	3	---		
		Hastate	4	---		

9. (*)	Flower: Colour of standard petal	White Yellow Pink Violet	1 2 3 4	PDR 14, IPR 96-4 --- Contender ---	Peak flowering	VG
10. (+)	Flower: Outer surface of standard petal	Striped Non-striped	1 3	IPR 98-5, IPR 96-4 HUR 15	Peak flowering	VG
11. (*) (+)	Pod: Curvature	Absent Medium Strong	1 5 7	PDR 14, IPR 96-4 HUR 15 Contender	Fully grown green pod	VG
12. (*)	Pod: Shape of cross section (through seed)	Cordate Circular Eight shaped Oval	1 2 3 4	PDR 14, HUR 15 Anupama --- ---	Fully grown green pod	VG
13. (*) (+)	Pod: Shape (in relation to suture)	Concave S -shaped Convex	1 2 3	Contender --- PDR 14, HUR 137	Fully grown green pod	VG
14. (*) (+)	Pod: Shape of distal part (excluding beak)	Acute Acute to truncate Truncate	3 5 7	PDR 14, HUR 15 --- ---	Fully grown green pod	VG
15. (*)	Pod: Colour	Pale green Green Purple	1 2 3	HUR 15 PDR 14, IPR 96-4 HPR 35	Fully grown green pod	VG
16.	Pod: Stringiness	Absent Present	1 9	HUR 15 PDR 14, IPR 96-4	Fully grown green pod	VS

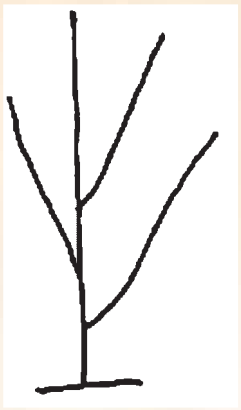
17.	Pod: Pigmentation on pod shell	Absent Present	1 9	HPR 35 PDR 14, IPR 96-4	Fully grown green pod	VS
18.	Plant: Height	Short (<40cm) Medium (40-75cm) Tall (>75cm)	3 5 7	HUR 15, HUR 137 PDR 14, IPR 96-4 Arka Komal, Contender	Harvest maturity	MS
19. (*) (+)	Seed: Shape	Circular Circular to elliptic Elliptic Kidney shaped	1 2 3 4	--- --- PDR 14, IPR 96-4 HUR 15, HUR 137, Arka Komal	Mature seed	VG
20. (*)	Seed: Size (weight of 1000 seeds)	Small (< 250 g) Medium (250-350 g) Large (351-450g) Very large (>450 g)	3 5 7 9	--- PDR 14, IPR 96-4 --- HUR 15, HUR 137	Mature seed	MG
21. (*)	Seed: Testa colour	White Brown Red Dark red Black	1 2 3 4 5	HUR 15 Arka Komal, Contender IPR 98-5 --- ---	Mature seed	VG
22.	Seed: Testa variegation	Absent Present	1 9	HUR 15, IPR 98-5 PDR 14, IPR 96-4	Mature seed	VG

VIII. Explanation for the table of characteristics

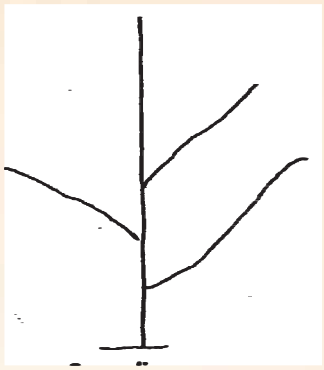
Characteristic 4. Plant: Growth type



3
Erect

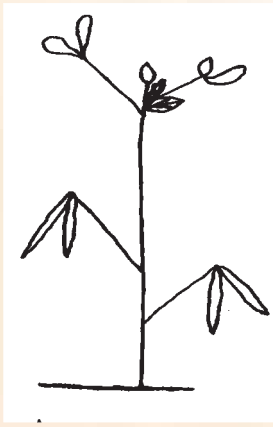


5
Semi-erect

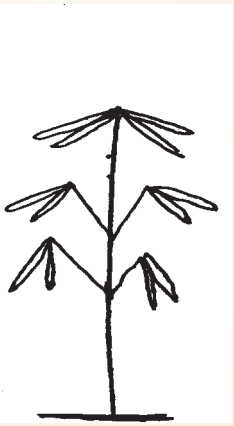


7
Spreading

Characteristic 6. Plant: Habit

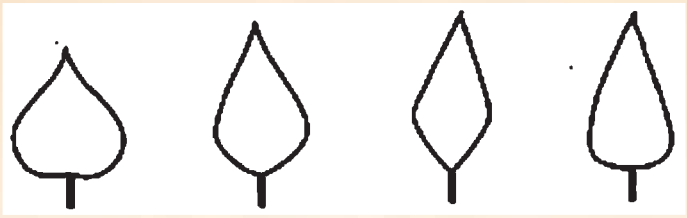


1
Indeterminate



3
Determinate

Characteristic 15. Seed: Shape



1	2	3	4
Cordate	Ovate	Rhombohedric	Hastate

Characteristic 10. Flower: Outer surface of standard (banner) petal

1	3
Striped	Non-striped

1	5	7
Absent	Medium	Strong

Characteristic 13. Pod: Shape of curvature

1	2	3
Concave	S- Shaped	Convex

Characteristic 14. Pod: Shape of distal part (excluding beak)

3	5	7
Acute	Acute to truncate	Truncate

Characteristic 19. Seed: Shape in longitudinal section

1	2	3	4
Circular	Circular to elliptic	Elliptic	Kidney shaped

IX. Working Group details

The Test Guideline developed by the National Core Committee in consultation with the Project Co-ordinator (Mulla RP), Indian Institute of Pulses Research (IIPR), Kanpur, the Nodal Officer, DUS Testing, IIPR, Kanpur and the Task Force (1/2005) constituted by the PPV & FR Authority

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