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

On

Pigeon pea

(*Cajanus cajan* (L.) Millsp.)

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

Government of India

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CONTENTS

I. Subject

These test guidelines shall apply to all varieties, hybrids and parental lines of Pigeon pea (*Cajanus cajan* (L.) Millsp.)

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 2000 gram in the case of the candidate variety or hybrid and 1500 gram for each of the parental line of the hybrid. 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 95 % 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 500 plants, in the plot size and planting space specified below across three replications. Separate plots for observation and for 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	:	6
Row length	:	5 m
Row to row distance	:	60 cm (early varieties)
		80 cm (late varieties)
Plant to plant distance	:	20 cm
Expected plants/replication	:	360
Number of replications	:	4

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 40 plants or parts of 40 plants, which shall be equally divided among 4 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 1% 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. All observations on growth habit and leaf shall be made at the time of full flowering unless indicated otherwise.
5. All observations on the pod shall be made at dough stage unless indicated otherwise.
6. All observations on the seed shall be made on harvested dry seeds.
7. For the assessment of all colour characteristics, the latest Royal Horticultural Society (RHS) colour chart shall be used.

V. Grouping of varieties based on characters

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 pigeon pea varieties:
    a) Time of flowering (Characteristic 3)
    b) Plant: Growth habit (Characteristic 4)

c) Stem: Colour (Characteristic 5)

d) Pod: Waxiness (Characteristic 12)

e) Seed: Colour (Characteristic 18)

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 period 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

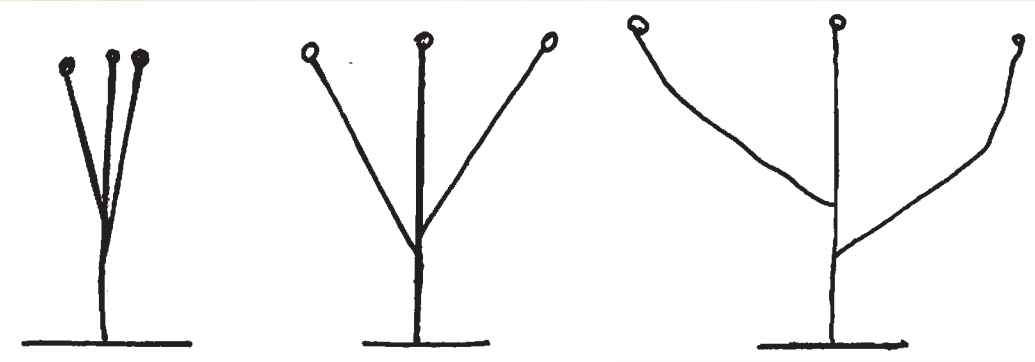
S.No	Characteristics	States	Note	Example variety/line	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1. (*)	Plant: Anthocyanin colouration of hypocotyl	Absent	1	DA 11, BSMR 736	Seedling	VS
		Present	9	UPAS 120, Pusa 992		
2. (+)	Plant: Branching pattern	Erect (<30^0)	3	ICPL 151, GI 100	First flowering	VS
		Semi-spreading (30^0-60^0)	5	Paras, BDN 2		
		Spreading (>600)	7	MA 6, MAL 13		
3. (*)	Time of flowering (50% of the plants with at least one open flower)	Very early (<60 days)	1	-		
		Early(61-90 days)	3	UPAS 120, Pusa 992, Pusa 855, ICPL 151		
		Medium (91-130 days)	5	Pusa 855, ICPL 155		
		Late (131-160 days)	7	Azad, DA11		
		Very late (>160 days)	9	Amar, Bahar	First flowering	VG
4. (*) (+)	Plant: Growth habit	Determinate	1	ICPL 151, GT 100	50 % flowering	VG
		Indeterminate	3	Manak, Paras		
5. (*)	Stem : Colour	Green	1	Manak, Paras	50 % flowering	VG
		Purple	2	BDN 2, Hy 3C		
6. (*) (+)	Leaf: Shape	Oblong	1	AL 15, AL 201	50 % flowering	VG
		Obovate	3	TS 3		
		Narrowly Oblong(sesame)	5	Manak, MA 3		
7. (*)	Leaf : Pubescence on lower surface of the leaf	Absent	1	UPAS 120, Pusa 992	50 % flowering	VG
		Present	9	---		

8. (*)	Flower: Colour of base of petal (standard)	Light yellow Yellow Orange yellow Purple Red	1 2 3 4 5	--- Manak, Paras --- --- Hy 3C, BSMR 853	50 % flowering	VG
9. (*) (+)	Flower: Pattern of streaks on petal (standard)	Absent Sparse Medium Dense Mosaic	1 3 5 7 9	BDN 2, BSMR 736 Amar ICPL 87, AKT 8811 NDA 1 ---	50 % flowering	VG
10. (*)	Pod: Colour	Green Green with brown streaks Green with purple streaks Purple Dark purple	1 2 3 4 5	BSMR 736, GT 1 ICPL 87, LRG 30 CO 6, PT 221 Amar, Bahar ---	Premature stage) pod (dough	VG
11. (*)	Pod: Pubescence	Absent Present	1 9	Manak, Pusa 885 ---	Fully developed green pods	VG
12. (*)	Pod: Waxiness	Absent Present	1 9	UPAS 120, Pusa 992 ---	Premature pods (dough stage)	VG
13.	Pod : Surface stickiness	Absent Present	1 9	--- Paras, ICPL 332	Premature pods	VG
14. (*) (+)	Pod: Constriction	Slight Prominent	3 7	Hy 3C, ITB 7 AL 15, AL 201, MAL 13	Mature pods	VG
15. (*)	Pod: Size (cm)	< 4 cm 4-5 >5	3 5 7	--- --- ---	Mature pods	VG

16. (*)	Pod: No. of seeds	2 3 4	3 5 7	--- --- ---	Mature pods	MS
17. (*)	Plant: Height	Short(<100 cm) Medium (100-150 cm) Tall (>150 cm)	3 5 7	Al 15, ICPL 87 Pusa 992, AL 15 JKM 7, ICPL 85063	Harvest maturity	MS
18. (*)	Seed: Colour	Cream Brown Dark brown Grey Purple	1 2 3 4 5	T 1515, GT 1 Azad, Amar Vamban 1, AKT 8811 -- --	Ripe seeds	VG
19. (*) (+)	Seed: Colour pattern	Uniform Mottled	1 2	Manak, GT 100 DA 11	Dry seeds	VG
20. (*) (+)	Seed: Shape	Oval Globular Elongate	1 2 3	Paras, GT 100 GS 1, T 7 Pusa 33, Pusa 9	Dry seeds	VG
21.	Seed: Size (100 seed weight)	Small (<7g) Medium (7-9g) Large (>9-11g) Very large (>11g)	3 5 7 9	LRG 30 Paras, Co 6 ICPL 87, LRG 38 Hy 3C, Amar	Dry seeds	MG

VIII. Explanations on the table of characteristics

Characteristic 2. Plant: Branching pattern



3
Erect

5
Semi-spreading

7
Spreading

Characteristic 4. Plant: Growth habit

1
Indeterminate

2
Determinate

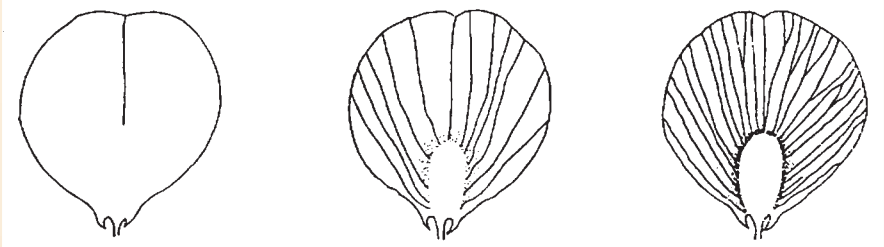
Cha

1
Oblong

2
Obovate

3
Narrowly oblong (sesame)

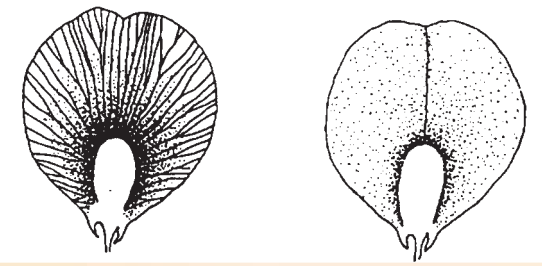
Characteristic 9. Flower: Pattern of streaks on petal (standard)



1
Absent

2
Sparse

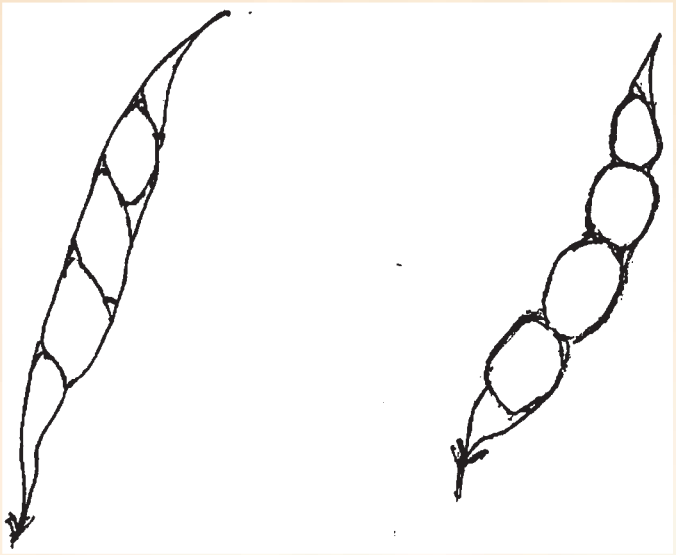
3
Medium



4
Dense

5
Mosaic

Characteristic 14. Pod: Constriction



3
Slight

7
Prominent

1
Uniform

2
Mottled

Characteristic 20. Seed: Shape

1
Oval

2
Globular

3
Elongate

IX. Working Group details:

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

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