

Guidelines
for the conduct of Test for
the Distinctiveness, Uniformity and Stability
on
Cowpea
(Vigna unguiculata (L.) Walp. ssp. unguiculata and Vigna
unguiculata (L.) Walp. ssp. sesquipedalis (L.) Verdc.)



पौधा किस्म और कृषक अधिकार संरक्षण प्राधिकरण
Protection of Plant Varieties & Farmers' Rights Authority
(PPV&FRA)
भारत सरकार
Government of India

CONTENTS

	Page
I. Subject	121
II. Seed material required	121
III. Conduct of tests	121
IV. Methods and observations	122
V. Grouping characteristics	123
VI. Characteristics and symbols	124
VII. Table of characteristics	126
VIII. Explanation for the Table of characteristics	134
IX. Working Group details	
X. DUS Testing Centres	

I. Subject

These test guidelines shall apply to all varieties, hybrids and parental lines of Cowpea *Vigna unguiculata* (L.) Walp. ssp. *unguiculata* and *Vigna unguiculata* (L.) Walp. ssp. *sesquipedalis* (L.) Verdc.) for three distinct types

- A. Grain cowpea
- B. Vegetable cowpea
- C. Fodder cowpea

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 1000 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 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 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 180 plants for Vegetable (Pole type) cowpea and 600 plants for each of the categories *viz.*, Grain, Vegetable (Bush type) and Fodder cowpea 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	:	A) Grain type Cowpea- 45 cm B) Vegetable Cowpea i) 60 cm for bush type ii) 150 cm for pole type C) Fodder Cowpea - 30 cm
Plant to plant distance	:	A) Grain type - 10 cm B) Vegetable type i) 10 cm for bush ii) 30 cm for pole type C) Fodder type - 10 cm
Expected plants/replication	:	200 for Grain type 200 for Vegetable bush type 60 for Vegetable Pole type 200 for Fodder type
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 shall be used for the testing of varieties for their DUS under three categories mentioned in the Table of characteristics (see section VII) as follows
 - A. Descriptors for Grain cowpea
 - B. Descriptors for Vegetable cowpea
 - C. Descriptors for Fodder cowpea
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, which shall be done by single visual observation of a group of plants or parts of plant 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 250 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 characteristics

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 characteristics are proposed to be used for grouping cowpea varieties as follows:
 - A : Grain cowpea
 - B : Vegetable cowpea
 - C : Fodder cowpea

A. Grain cowpea

- a) Days to 50% flowering (Characteristic 3)
- b) Plant growth habit (Characteristic 4)
- c) Plant twining tendency (Characteristic 9)
- d) Pod length (cm) (Characteristic 13)
- e) Seed eye colour (Characteristic 19)
- f) Seed colour (Main colour- colour of largest area of seed) (Characteristic 22)

B. Vegetable cowpea

- a) Days to 50% flowering (Characteristic 1)
- b) Growth habit (Characteristic 2)
- c) Plant type (Characteristic 3)
- d) Pod colour (Characteristic 6)
- e) Pod length (cm) (Characteristic 9)
- f) Pod thickness (Characteristic 10)
- g) Pod stringiness (Characteristic 11)

C. Fodder Cowpea

- a) Plant height (cm) (Characteristic 1)
- b) Number of primary branches per plant (numbers) (Characteristic 2)
- c) Days to 10% flowering (Characteristic 3)
- d) Growth habit (Characteristic 6)

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 (0 to 11) 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

A. Descriptors for Grain Cowpea

S. No	Characteristics	States	Note	Example varieties	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1. (*)	Stem: Colour	Green	3	GC3, Phule CP-05040	30 Days after sowing	VG
		Light purple	5	--		
		Purple	7	DCS47-1, DC15		
2. (*)	Stem: Pubescence	Absent	1	RC101, DC15, Pant Lobia-5, IC257428 IC243489	30 Days after sowing	VG
		Present	9	IC249585, IC259106		
3. (*)	Days to 50% flowering	Early (<40 days)	3	Pant Lobia-1, Pant Lobia-3, Pant Lobia-4, RC101	50% of plants with at least one open flower (40-55 DAS)	VG
		Medium (40-55 days)	5	TPTC29, DC15		
		Late (>55 days)	7	Goa cowpea 3		
4. (*) (+)	Plant: Growth habit	Erect	3	V118, Pant Lobia-1	Days to 50% flowering (40-55 DAS)	VG
		Semi-erect	5	Pant Lobia 3,		
		Spreading/Horizontal	7	DC15, RC101		
5. (*)	Leaf: Colour	Green	3	Pant Lobia-5, DC15, IC209175	Days to 50% flowering (40-55 DAS)	VG
		Dark green	5	DCS47-1, IC202791		
6. (*)	Leaf: Surface	Glabrous	1	Gujarat Cowpea-3, RC101, CPD-119, DC15	Days to 50% flowering (40-55 DAS)	VG
		Pubescent	9	---		
7. (*) (+)	Leaflet: Shape (fully expanded penultimate matured leaf from tip of plant)	Hastate	1	EC309500	Days to 50% flowering (40-55 DAS)	VG
		Sub-hastate	2	EC390248, V118		
		Sub-globose	3	C152, RC -19 , RC-101, DCS47-1, PCP 0306-1, KBC5, KBC6, KBC9		
		Globose	4	EC390228		
8. (*)	Flower: Colour (Vexillum colour)	Yellow	3	Bhagyalakshmi, Black eye cowpea	Days to 50% flowering (40-55 DAS)	VG
		White	5	Pant Lobia 1, Pant Lobia 4		
		Purple	7	Pant Lobia 2, Pant Lobia 3, Pant Lobia 5, DC15		

9. (* (*)	Plant : Twining tendency	Absent	1	RC101, V118, IC202868	Grand growth stage (30-45 DAS)	VG
		Present	9	GC3, IC202918		
10.	Pods per plant	Low (<15)	1	V118, Goa Cowpea 3	At Physiological Maturity stage (60-90 DAS)	MS
		High (>15)	9	DC15, Pant Lobia- 2, Pant Lobia-4, Phule CP-05040, PCP 0306- 1, CPD-119		
11. (* (+)	Pod: Attachment to peduncle	Pendant	3	DC15, RC101, KBC9, TPTC29	Fully developed green pod stage (60-75 DAS)	VS
		Erect	7	V118		
12. (* (+)	Pod: Shape	Straight	1	DC15, KBC9, Phule CP-05040, TPTC29	At Physiological Maturity stage (60-90 DAS)	VG
		Curved	3	IC202790		
		Horse shoe shaped	5	Jawhar Local		
13. (* (+)	Pod: Length (cm)	Short (<15 cm)	3	V118, GC3, RC101, C152, Pant Lobia-1	At Physiological Maturity stage (60-90 DAS)	MS
		Medium (15-25 cm)	5	DC15, Pant Lobia 5, Pant Lobia 3, Pant Lobia 4, CPD119, DCS47-1		
		Long (25-35 cm)	7	Goa Cowpea 3		
14. (* (*)	Immature pod: colour	Green	3	RC101, GC3, KBC8, KBC9, Co (CP-7)	Pod initiation stage (40- 60 DAS)	VG
		Dark green	5	IC198329, IC249137		
15.	Pod: Anthocyanin pigmentation at tip	Absent	1	RC101, GC3, GC4, DC15	Immature pod stage (55-75 DAS)	VG
		Present	9	IC202919		
16. (* (*)	Days to maturity	Early (<70 days)	3	RC101, Pant Lobia-1 Pant Lobia-3 Pant Lobia-5, RC-19, GC5, Hisar Cowpea 46	At Physiological Maturity stage (60-90 DAS)	MG
		Medium (70 – 85 days)	5	DC15, Phule CP- 05040, Pant Lobia-2		
		Late (>85 days)	7	Goa Cowpea- 3, Gujarat Cowpea-3		

17.	Seed crowding in a pod	Absent	1	DC15, TPTC-29	At Physiological Maturity stage (60-90 DAS)	VS
		Present	9	Black eye pea, IC202849		
18. (*)	Seeds per pod	Low (<14)	3	V118, GC3, RC101, C152, Pant Lobia-1	At Physiological Maturity stage (60-90 DAS)	VS
		Medium (14-18)	5	Pant, Lobia 3, Pant Lobia 4, Pant Lobia-5, CPD119, Phule CP-05040		
		high (>18)	7	Goa Cowpea 3 DC15, DCS47-1, KBC9		
19. (*)	Seed: Eye colour	Tan Brown	3	IC257452	At Physiological Maturity stage (60-90 DAS)	VG
		Red	5	GC3		
		Black	7	Pant Lobia-1, Pant Lobia-3, Pant Lobia-4, black eye cowpea		
20.	Seed: Length (mm)	Short (< 5 mm)	3	GC3	At Physiological Maturity stage (60-90 DAS)	MG
		Medium (5-10 mm)	5	DC15, DCS47-1, KBC9		
		Long (>10 mm)	7	Goa Cowpea-3		
21. (*) (+)	Seed: Shape	Kidney	3	Pant Lobia 3, Pant Lobia 4	At Physiological Maturity stage (60-90 DAS)	VG
		Elliptical	5	TPTC29, KBC9, DC15, Pant Lobia 5		
		Rhomboid	7	---		
22. (*)	Seed: Colour (Main colour- colour of largest area of seed)	White	1	Pant Lobia-1, Pant Lobia-1, Gujarat cowpea-3	At Physiological Maturity stage (60-90 DAS)	VG
		Brown	3	DC15, DCS47-1, Pant Lobia-3, Pant Lobia-5, Co (CP-7)		
		Red	5	Pant Lobia-1, IC202762		
		Black	7	EC390219, IC257452		
23. (*)	Seed: Test weight (weight of 100 seeds in grams)	Small (<7g)	3	RC101, GC3	At Physiological Maturity stage (60-90 DAS)	MG
		Medium (7-10g)	5	DC15, DCS47-1, KBC9		

		Large (>10g)	7	Goa cowpea-3		
24. (* (+)	Peduncle: Length (cm)	Short (<60 cm)	3	DC15, Pant lobia-3, Phule CP-05040	Pod initiation stage (40- 60 DAS)	VG
		Long (60-80cm)	5	IC202919		
		Extra long (80-90 cm)	7	IC209165		

B. Descriptors for Vegetable Cowpea

S.No	Characteristics	States	Note	Example varieties	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1. (* (*)	Days to 50% flowering	Early (< 40 days)	3	Kashi Kanchan, Kashi Nidhi, ArkaSuman, ArkaSammruddhi	50% of plants with at least one open flower (35-60 DAS)	VG
		Medium (40-50 days)	5	Arka Garima, Bhagyalakshmi, PusaKomal, Kashi Kanchan, PKB-4		
		Late (> 50 days)	7	Lola, Vyjayanthi, ArkaMangala		
2.	Climbing tendency	None	1	Arka Suman	Days to 50% flowering (35-60 DAS)	VG
		Slight	3	PusaKomal		
		Pronounced	5	Arka Mangala, Lola		
3. (*)	Plant type	Determinate	3	Arka Suman, ArkaSammruddhi, PusaBarsathi, Kashi Gauri	Days to 50% flowering (35-60 DAS)	VG
		Indeterminate	5	Arka Mangala, Lola, Vyjayanthi, Mallika		
4. (*)	Plant:	Erect/Bush	3	Arka Suman, ArkaSammruddhi	Days to 50%	VG

(+)	Growth habit	Semi erect	5	S268	flowering (35-60 DAS)	
		Horizontal	7	Kashi Kanchan		
		Pole type	9	ArkaMangala, Lola		
5. (*)	Twining habit	Viny	1	Lola, Arka Mangala	Days to 50% flowering (35-60 DAS)	VG
		Non viny	9	ArkaSammruddhi, Arka Suman, PusaSukomal		
6. (*)	Pod: Colour	Green	3	Arka Mangala, PKB – 6	Fully grown green pod stage (45-80 DAS)	VG
		Dark Green	5	Kashi Kanchan		
		Purple	7	Vyjayanthi		
7. (*)	Pod: Surface	Smooth	1	Arka Mangala, Kashi Kanchan	Fully grown green pod stage (45-80 DAS)	VS
		Rough	3	Arka Garima		
8. (*)	Pod: Pubescence	Absent	1	Kashi Kanchan	Fully grown green pod stage (45-80 DAS)	VS
		Present	9	Arka Garima		
9. (*)	Pod: Length (cm)	Short (<20 cm)	3	Arka Suman	Fully grown green pod stage (45-80 DAS)	VS
		Medium (20- 30 cm)	5	Kashi Kanchan, PKB – 6		
		Long (30-60 cm)	7	Arka Mangala		
		Extra long (> 60 cm)	9	Vyjayanthi, Lola		
10. (*)	Pod: Thickness (cm)	Thin (< 0.5 cm)	3	PusaBarasathi	Fully grown green pod stage (45-80 DAS)	MS
		Medium (0.5-1 cm)	5	Arka Suman, ArkaSammruddhi, PusaKomal		
		Thick (>1 cm)	7	Arka Garima		
11. (*)	Pod: Stringiness	Absent	1	Arka Mangala	Fully grown green pod stage (45-80 DAS)	VS
		Present	9	Lola, Vyjayanthi		

12. (* (+)	Pod: Shape	Straight	1	Lola, Arkamangala, ArkaSammruddhi, Arka Suman, PKB-6	Fully grown green pod stage (45-80 DAS)	VG
		Curved	3	Arka Garima, PusaSukomal		
13. (* (+)	Pod: Maturity	Early (<50 days)	1	Arka Suman, ArkaSammruddhi	Fully grown green pod stage (45-80 DAS)	VG
		Medium (50 days)	3	PusaKomal, PusaSukomal		
		Late (> 50 days)	5	Lola, Vyjayanthi, Arka Mangala		
14 (*)	Pod: Cross section (through seed)	Cordate	1	---	Fully grown green pod stage (45-80 DAS)	VS
		Circular	3	Arka Mangala, ArkaSammruddhi, Arka Suman		
		Eight shaped	5	---		
		Oval	7	S268, Krishnamony		
15. (* (+)	Seeds per pod	Few (<10 seeds)	1	Arka Suman, ArkaSammruddhi	Pod maturity stage (45-80 DAS)	VS
		Medium (10-15 seeds)	3	Kashi Kanchan, Arka Garima, Podinentumani		
		High (> 15 seeds)	5	Arka Mangala, Lola		
16. (* (+)	Seed: Shape	Elliptical	1	Arka Garima	Physiologically matured Seed (70- 110 DAS)	VG
		Kidney	3	Arka Mangala, Kanakamony		
		Rhomboid	5	---		
17.	Seed: Length (cm)	Short (< 1cm)	3	Arka Suman, ArkaSammruddhi, PusaDophasali, PusaBarasathi, Kashi Kancan	Physiologically matured Seed (70- 110 DAS)	VG
		Long (> 1cm)	5	Arka Mangala, Lola		

18. (*)	Seed: Colour	White	1	---	Physiologically matured Seed (70- 110 DAS)	VG
		Brown	3	Kashi Kanchan, Arka Mangala		
		Brick Red	5	Vyjyanthi		
		Purple	7	---		
		Black	9	Lola		
19. (*)	Flower: Colour (Colour of vexillum)	Yellow	3	Arka Suman, Bhagyalakshmi	Days to 50% flowering (35-60 DAS)	VG
		White	5	---		
		Violet	7	---		

C. Descriptors for Fodder Cowpea

S. No	Characteristics	States	Note	Example varieties	Stage of observation	Type of assessment
1	2	3	4	5	6	7
1. (*)	Plant height (cm)	Dwarf (<50)	3	Bundel Lobia-1	Days to 10% flowering (40-60 DAS)	MS
		Tall (50-60)	5	Kohinoor, BL-2, MFC-08-14, MFC-09-1		
		Extra tall (>60)	7	EC-4216, GFC-1, BL-1, Swad, KBC-2, CoFC-8, MFC 09-1, UPC5286 , MFC-09-12, UPC-622		
2. (*)	Number of primary branches per plant (numbers)	Low (<5)	3	BL-2, EC-4216, UPC-622, UPC-5286, MFC-09-12, UPC-8705, UPC-9202, Bundel Lobia-1	Days to 10% flowering (50-75 DAS)	MS
		Medium (5-8)	5	BL-1, CoFC-8, MFC-08-14, MFC-09-1		
		High (>8)	7	KBC-2		
3. (*)	Days to 10% flowering	Early (<45 days)	3	--	10% of plants with at least one open flower	VG
		Medium (45 – 55 days)	5	BL-2		
		Late (>55 days)	7	GFC-1, UPC-287, BL-1, KFC-1, UPC-621, UPC-625, COFC-8		
4. (*)	Growth habit	Erect	3	PL-1, BL-2, EC4216	Days to 10% flowering	VS
		Semi erect	5	Swad, MFC-09-1, UPC-622, UPC-		

(+)				5286, UPC-9202, DCS-47-1, UPC-8705, MFC-08-14, MFC-09-12, EC-4216	(50-75 DAS)	
		Spreading/horizontal	7	GFC-1, GFC-2, GFC-3, UPC4200		
5. (*)	Terminal leaflet: Length of penultimate leaf(cm)	Short (<5)	3	--	Days to 10% flowering (50-75 DAS)	MS
		Medium (5-8)	5	Swad		
		Long (>8)	7	MFC-09-1		
6. (*)	Terminal leaflet: Width of penultimate leaf(cm)	Short (<5)	3	Swad	Days to 10% flowering (50-75 DAS)	MS
		Medium (5-8)	5	MFC-09-1		
		Long (>8)	7	--		

VIII. Explanations for the Table of characteristics

Characteristic 4. Plant: Growth habit (for A. Grain Cowpea , B. Vegetable Cowpea and C. Fodder Cowpea)

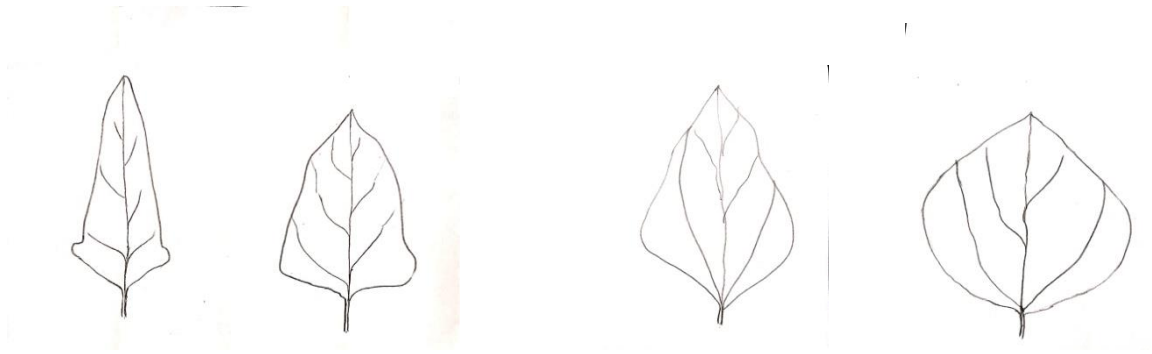


**3
Erect**

**5
Semi-erect**

**7
Spreading/
Horizontal**

Characteristic 7. Leaflet: Shape (for A.)



1
Hastate

2
Sub-hastate

3
Sub-globose

4
Globose

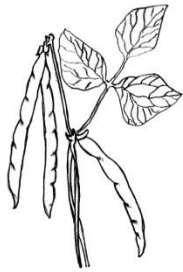
Characteristic 9. Plant : Twining tendency (for A.)



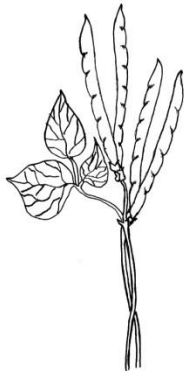
1
Absent

2
Present

Characteristic 11. Pod : Attachment to peduncle (for A.)

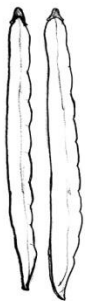


3
Pendant

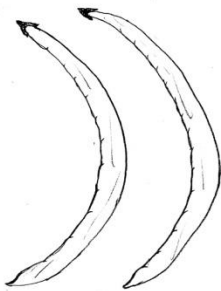


7
Erect

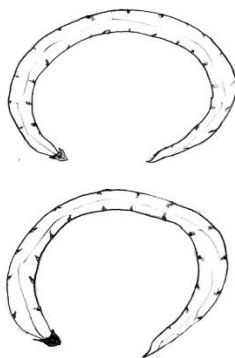
Characteristic 12. Pod : Shape (for A and B)



1
Straight

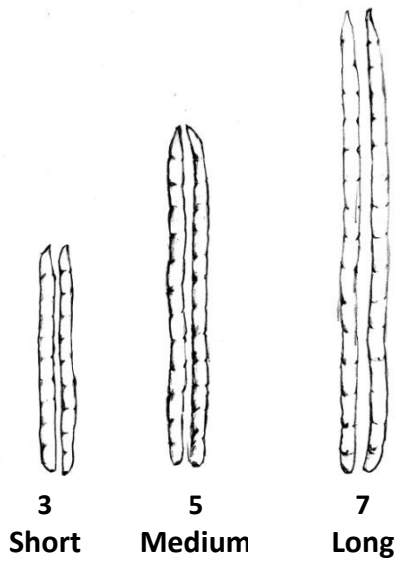


3
Curved

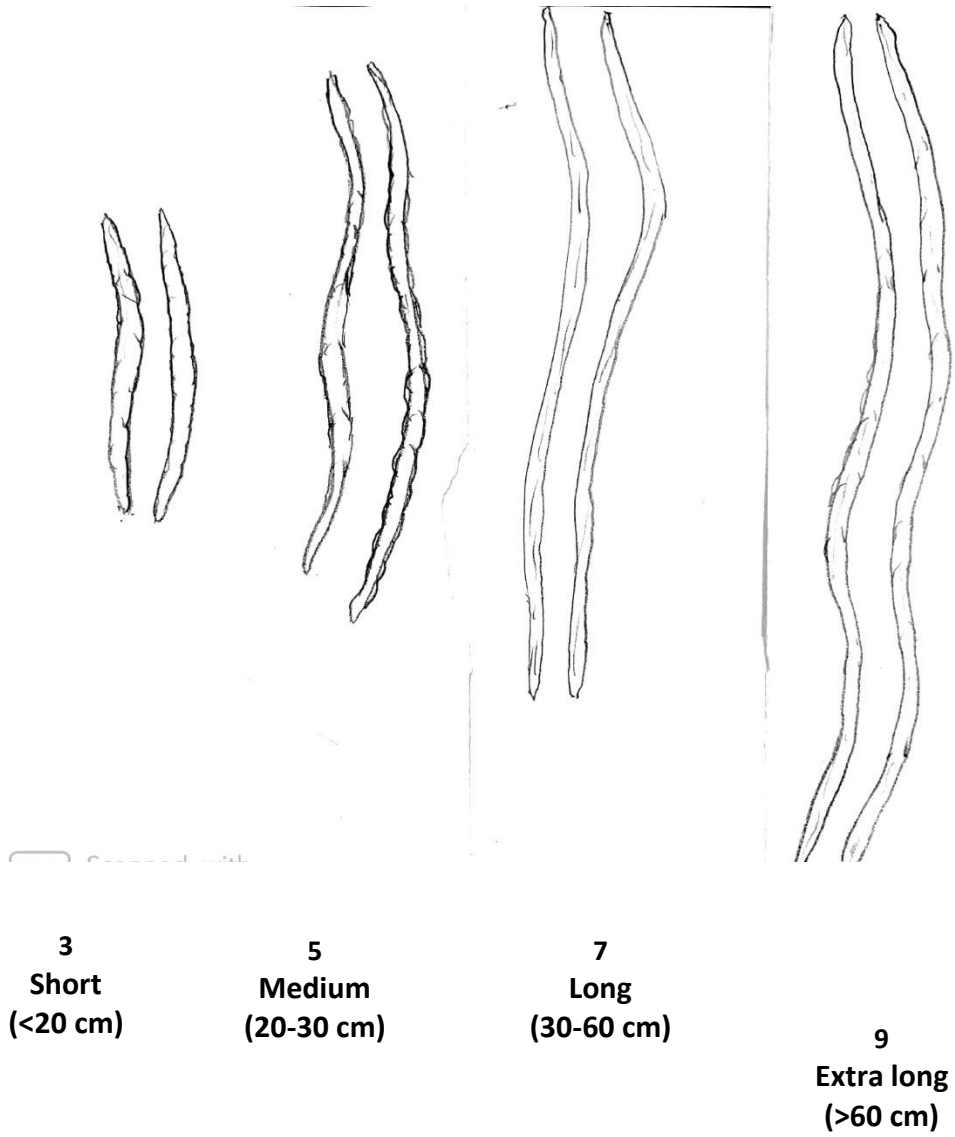


5
Horse shoe

Characteristic 13. Pod : Length (for A. Grain Cowpea)



Characteristic 9. Pod : Length (for B. Vegetable Cowpea)



Characteristic 21.

i) Seed : Shape (for A.)



**1
Kidney**



**2
Elliptical**



**3
Rhomboid**

Characteristic 24. Peduncle: Length (cm) (for A.)



**3
Short
(<60 cm)**

**5
Medium
(60-80 cm)**

**7
Long
(80-90 cm)**

IX. Working group details

This test guideline of cowpea (*Vigna unguiculata* L.) has been developed by the Task Force committee constituted by the PPV&FR Authority.

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X. Name of the DUS testing Centre

Lead DUS Test Centre	University of Agricultural Sciences (UAS), Dharwad-580005, Karnataka (India).
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