Draft Guidelines for the conduct of test for Distinctiveness, Uniformity and Stability

on

Sponge gourd
(*Luffa cylindrica* (L.) Roem)

Protection of Plant Varieties and Farmers' Rights Authority (PPVFRA)

Government of India

New Delhi-110 012

CONTENTS

Sponge gourd (*Luffa cylindrica* (L.) Roem)

I. Subject

These test guidelines shall apply to all varieties, F_1 hybrids and parental lines of sponge gourd (*Luffa cylindrica* (L.) Roem).

II. Seed Material required

1. The Protection of Plant Varieties and Farmers Rights Authority (PPVFRA) shall decide when, where and in what quantity and quality of the seed material required for testing the variety applied for registration under the Protection of Plant Varieties and Farmers' Rights Act, 2001, is to be delivered. Applicants submitting seed material from a country other than India shall make sure that all customs and quarantine requirements stipulated under the relevant national legislations and regulation are complied with

2. The material is to be supplied in the form of seed.

3. The minimum quantity of the seed for different categories to be packed, sealed, well labelled and submitted to the Authority by the applicant is as follows:

Varieties/ hybrids/parental lines: 200g or 1200 seeds (in one submission only)

New category	:	200 g in case of typical variety or F1 hybrid and 100 g for each of the parental lines of the hybrid (equal weighing 10 packets in single lot)
Extant (Varieties of Common Knowledge) and Farmers category	:	100 g in case of typical variety or hybrid and 50 g for each of the parental lines of hybrid (equal weighing 5 packets in single lot)
Extant (Notified) category	:	50 g in case of typical variety or hybrid and 15 g for each of the parental lines of hybrid (equal weighing 2 packets in single lot)

4. The seed material shall meet the minimum germination percentage (80%), moisture content (<8%), physical purity (98%) and genetic purity (100%) as prescribed for seed certification in India. Especially for storage, which requires a higher standard, the applicant shall state the actual germination percentage, which shall be as high as possible.

5. The seed material supplied should be visibly healthy, vigorous and free from insect pests and disease infestation.

6. The seed supplied must not have undergone any treatment unless the Competent Authority allows and/ or request for such treatment.

7. In case of hybrids, all the involved parents of the hybrid including maintainer parent of male sterility if any, along with the protocol for hybrid seed production also have to be supplied as per category above including seeds of hybrid.

8. The designated DUS testing centre shall maintain the variety during the testing period and after registration, it may be transferred to the reference variety collection that shall be maintained permanently, even if no DUS testing is done in any year.

III. Conduct of tests

1. The minimum duration of the DUS test shall normally be at least two independent similar growing seasons in the case of New Varieties and Essentially Derived Varieties (EDVs). At least one year in the case of Extant Farmer's Varieties and Varieties of Common Knowledge (VCK).

2. The test should normally be conducted at least at two test locations. If any essential characteristic of the candidate variety is not expressed for observation/measurement at these locations, the variety should be considered for further examination at another appropriate test site or under special test protocol on the request expressed by the applicant.

3. The test shall be carried out under conditions ensuring normal growth. The size of the plot shall be such that plants or parts of plant may be removed for measuring and counting without prejudice to the observations which must be made up to the end of the growing period. Each test shall include a minimum of 84 plants, which should be divided among 3 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 shall be as follows**:

Number of rows	:	4
Row length	:	5.25-6.3 m
Plant to plant distance	:	75-90 cm
Row to Row distance	:	3.5 m (1.5m if grown on single trellis)
Number of replications	:	3
Expected number of plants	:	28 x 3 = 84

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

6. Observation shall be recorded from 10 plants from each replication.

7. Additional test protocols for special purpose shall be established by the PPVFR 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 for DUS

2. For the assessment of distinctiveness and stability, observation shall be made on 30 plants or parts of plants, which shall be divided among 3 replications (10 plants in each replication).

3. For the assessment of Uniformity of characteristics in 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% should be applied. In case of a sample size of 84 plants, the number of off-types should not exceed 1.

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

5. Observations on the leaf blade should be made on a fully developed leaf blade, from the 15^{th} node upwards to 20^{th} node.

6. All observations on the flowers should be made when the plant is in 50% flowering stage.

7. All observations on the fruit should be made on fruits, 10-15 days after visible fruit set, between the 10^{th} and 20^{th} node.

8. All observations on the seed should be made on fully developed seeds collected from fully dried fruits on the plant.

9. Intensity of green colour of cotyledon should be observed just before the development of the first true leaf.

10. Stage of recording observation on specific characteristic shall be as follows

Description	**Code**
a. Cotyledons completely unfolded	10
b. Active vegetative phase	30
c. 50% of the flowering stage	60
d. Fruits attaining marketable maturity	80
e. Fruits attaining physiological maturity	100

V. Grouping of varieties

1. The selected varieties to be grown in the trial shall be divided into groups to facilitate the assessment of distinctness. Characteristics, which are suitable for grouping purpose, are those which are known from experience not to vary, or to vary only to lesser extent, within a variety. The states of expression (even produced

at different locations) shall be fairly and evenly distributed throughout the collection.

2. It is recommended that the competent authorities use the following characteristics for grouping of sponge gourd varieties/hybrids/parental lines.

a.	Leaf	:	number of lobes (characteristic 8)
b.	Fruit	:	length (characteristic 15)
c.	Fruit	:	girth (characteristic 16)
d.	Fruit	:	shape (characteristic 17)
e.	Fruit	:	skin colour (characteristic 18)
f.	Seed	:	colour of testa (characteristic 28)

VI. Characteristics and symbols

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

2. Notes (1-9) shall be used for the purpose of recording and electronic processing of data. Each state of expression is allotted a corresponding numerical note (1-9) for the different characteristics.

3. Legend

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

(+) See explanations 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 of figure(s) for clarity and not for the colour variation.

4. Type of assessment of characteristics indicated in column 7 of Table of Characteristics is as follows:

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

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

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

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

5. Characteristics containing the following key in the first column of the Table of Characteristics shall be examined as indicated below:

(+): See explanations on the Table of Characteristics
QL: Qualitative Characteristic
QN: Quantitative Characteristic

VII. Table of Characteristics

SN	Characteristics	States	Note	Example Variety(s)	Stage of observation	Type of assessment
1	**2**	**3**	**4**	**5**	**6**	**7**
1 (QL)	Cotyledon: Intensity of green colour	Light	3	Phule Prajakta (135B), Phule Komal (135C)	10	VG
		Medium	5	Pusa Supriya (138A), Kashi Vandana (138A), Kashi Kalyani (138A)		
		Dark	7	Kashi Divya (139A), Kashi Rakshita (139A)		
2 (QL)	Stem: Shape	Rounded	1	-	30	VS
		Angular	9	Pusa Sneha, Pusa Supriya, Kashi Divya		
3 (QL)	Stem: Pubescence	Absent	1	Kashi Shreya	30	VS
		Present	9	Pusa Sneha, Kashi Kalyani, Kashi Vandana		
4 (+) (QL)	Leaf: Margin	Entire	3	-	30	VS
		Serrate	5	Pusa Supriya, Kashi Kalyani, Kashi Vandana		
5 (*) (QL)	Leaf: Shape	Ovate	1	-	30	VS
		Orbicular	2	Kashi Jyoti, Kashi Shreya, Pusa Supriya		
		Reniform	3	-		
6 (QN)	Leaf: Length (between 15th - 20th nodes) (cm)	Small (≤12cm)	3	Thar Tapish	30	MS
		Large (>12 cm)	5	Kashi Jyoti, Phule Prajakta, Kashi Kalyani		

7 (QN)	Leaf: Width (between 15th - 20th nodes) (cm)	Small (≤18cm)	3	GJSG-2	30	MS
		Large (>18 cm)	5	Kalyanpur Hari Chikni		
8 (*) (QN)	Leaf blade: Number of lobes	Less (≤5)	3	Thar Tapish, Phule Prajakta, Pant Chikni Torai-1	30	MS
		More (>5)	5	Pusa Supriya		
9 (+) (QN)	Stem: Length of internodes (between 15th - 20th nodes) (cm)	Short (≤12cm)	3	Kashi Kalyani, Pant Chikni Torai-1	60	MS
		Long (>12 cm)	5	Pusa Chikni, Kashi Saumya, Thar Tapish		
10 (QN)	Stem: Number of primary branches	Less (≤ 6)	3	Kashi Kalyani, Pant Chikni Torai-1	60	MS
		More (>6)	5	Pusa Supriya, Swarna Prabha		
11 (QN)	Petiole: Length (between 15th - 20th nodes) (cm)	Short (<12 cm)	3	Kashi Rakshita, Kashi Saumya, Kashi Vandana	60	MS
		Medium (12-14 cm)	5	Pusa Chikni		
		Long (>14 cm)	7	Pant Chikni Torai-1		
12 (*) (QL)	Flower: Colour	Light Yellow	3	Pusa Supriya (6B), Kashi Kalyani (6B), Kashi Divya (6A),	60	VG
		Yellow	5	GJSG-2 (9A)		
13 (+) (QN)	Ovary: Length (on the day of anthesis) (cm)	Short (<4 cm)	3	Kashi Saumya	60	MS
		Medium (4-5 cm)	5	Kashi Vandana		
		Long (> 5 cm)	7	Punjab Nikhar		
14 (QN)	Peduncle: Length (cm)	Short (≤ 7.5 cm)	3	Kalyanpur Hari Chikni, Kashi Shreya	80	MS
		Long (> 7.5 cm)	5	Punjab Nikhar		
15 (*)	Fruit: Length (cm)	Short (≤ 20 cm)	3	Thar Tapish	80	MS

(QN)		Long (>20 cm)	5	Pusa Sneha, Kashi Divya, Kashi Shreya		
16 (*) (QN)	Fruit: Girth (cm)	Thin (≤ 12 cm)	3	GJSG-2	80	MS
		Thick (> 12 cm)	5	Kashi Shreya		
17 (*) (+) (QL)	Fruit: Shape	Elongate	3	Kashi Divya, Pusa Supriya, Kashi Kalyani, Punjab Nikhar	80	VG
		Elliptical	5	Kashi Jyoti, Swarna Prabha, Thar Tapis, Phule Komal		
18 (*) (QL)	Fruit: Skin colour	Light green	1	Pusa Supriya (143C), Swarna Prabha (143C), Kashi Jyoti (142C)	80	VG
		Green	2	Pusa Sneha (138B), Kashi Divya (138B), Kashi Vandana (138A)		
		Dark green	3	Phule Prajakta (137B)		
19 (+) (QL)	Fruit: Shape of blossom end	Rounded	3	Pusa Supriya, Kashi Jyoti, Swarna Prabha	80	VG
		Pointed	7	Kashi Shreya, Kashi Vandana, Pant Chikni Torai-1		
20 (+) (QL)	Fruit: Shape of stem end	Rounded	3	Kashi Shreya, Pusa Sneha, Kashi Divya	80	VG
		Pointed	7	Kashi Vandana, Pant Chikni Torai-1, Pusa Supriya		
21 (QL)	Fruit: Skin lustre	Matt	3	Kashi Vandana, Pant Chikni Torai-1, Pusa Supriya	80	VG
		Glossy	5	-		

22 (QL)	Fruit: Skin type	Variegated	3	Kashi Divya, Kashi Shreya, Pusa Sneha, Phule Komal	80	VG
		Non-variegated	7	Pusa Supriya, Kashi Jyoti, Punjab Nikhar, Swarna Prabha		
23 (QL)	Fruit: Flesh colour	White	1	Kashi Vandana (155B), Pant Chikni Torai-1 (155B), Pusa Supriya (155C)	80	VG
		Cream	2	-		
24 (*) (QN)	Fruit: Time of marketable maturity (Days)	Early (≤ 45)	3	Phule Prajakta, Phule Komal	80	MS
		Late (> 45)	5	Pusa Chikni, Kashi Vandana		
25 (QN)	Vine growth habit (m)	Short (≤ 6 m)	3	-	50	MS
		Long (> 6 m)	5	Kashi Divya, Kashi Shreya, Kashi Jyoti		
26 (QN)	Seediness (No. of Seeds/fruit)	Less (< 200)	3	Kashi Rakshita, Punjab Nikhar, Pusa Supriya	100	MS
		Medium (200-300)	5	Kashi Vandana, Pant Chikni Torai-1, Pusa Chikni		
		High (> 300)	7	Kashi Divya		
27 (QN)	Seed: Length (cm)	Small (≤ 1.0 cm)	3	Phule Prajakta	100	MS
		Long (> 1.0 cm)	5	Punjab Nikhar, Pusa Sneha, Kashi Kalyani		
28 (*) (QL)	Seed: Colour of testa	White	1	Kashi Vandana (202A), Pusa Supriya (202A), Kashi Jyoti (202A), Kashi Divya (202A)	100	VG
		Grey	5	Pant Chikni Torai-1 (200A),		

				Swarna Prabha (200A), Phule Komal (200A)		
		Black	9	Punjab Nikhar (161D)		
29 (QN)	100 seed weight (g)	Low (< 8.0 g)	3	Kashi Jyoti	100	MG
		Medium (8.0-10.0 g)	5	Kashi Shreya, Kashi Divya Pant Chikni Torai-1		
		High (> 10.0 g)	7	Kashi Vandana		

VIII. Explanations on the Table of Characteristics

Characteristic 1. Cotyledon: Intensity of green colour

3
Light

5
Medium

7
Dark

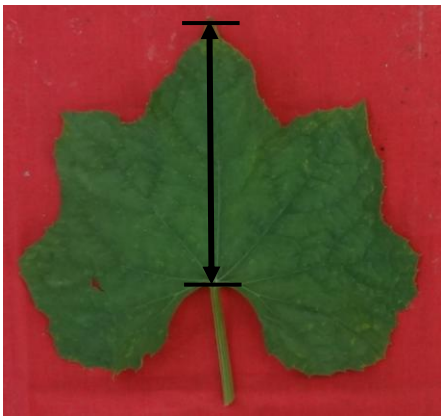
Characteristic 4. Leaf: Margin

5
Serrate

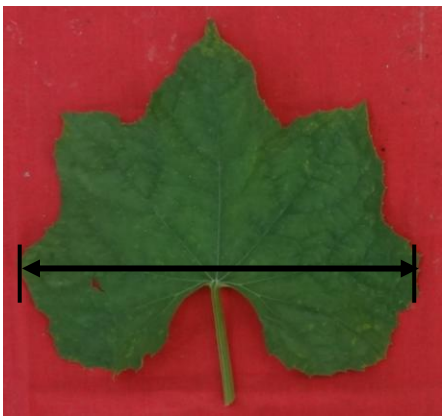
Characteristic 5. Leaf: Shape

2
Orbicular

Characteristic 6. Leaf: Length (cm)



Characteristic 7. Leaf: Width (cm)

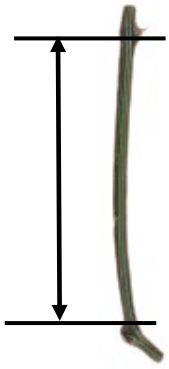


Characteristic 8. Leaf blade: Number of lobes

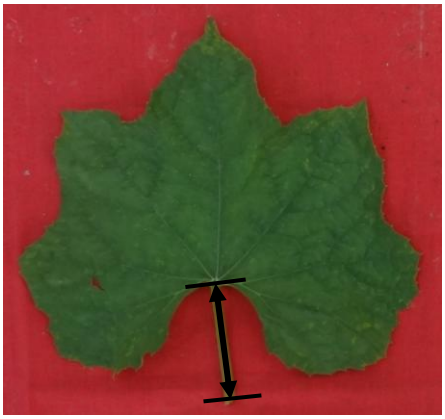
3
Less (≤5)

5
More (>5)

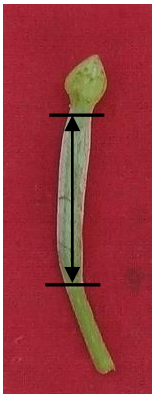
Characteristic 9. Stem: Length of internodes



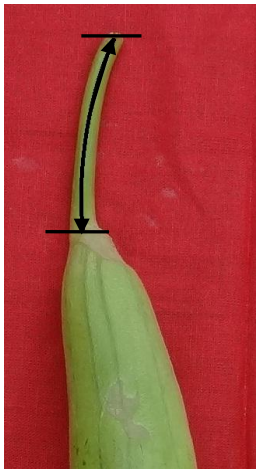
Characteristic 11. Petiole: Length (cm)



Characteristic 13. Ovary: Length (cm)



Characteristic 14. Peduncle: Length (cm)



Characteristic 15. Fruit: Length (cm)

Characteristic 16. Fruit: Girth (cm)

Characteristic 17. Fruit: Shape

3
Elongate

5
Elliptical

Characteristic 18. Fruit: Skin colour

3
Light Green

5
Green

7
Dark Green

Characteristic 19. Fruit: Shape of blossom end

3
Rounded

5
Pointed

Characteristic 20. Fruit: Shape of stem end

3
Rounded

5
Pointed

Characteristic 22. Fruit: Skin type

3
Variegated

5
Non-variegated

Characteristic 23. Fruit: Flesh colour

1
White

Characteristic 27. Seed: Length (cm)

Characteristic 28. Seed: Colour of testa

1
Black

2
Grey

3
White

IX. Working Group Details: The test guidelines have been developed by the ICAR-Indian Agricultural Research Institute, New Delhi, the Nodal Officer, DUS testing centre in consultation with the Task Force (01/2024) constituted by the PPVFR Authority.

The Members of the Task Force		
1.	Dr. T. A. More Former Vice Chancellor, MPKV, Rahuri, Survey No. 90/5A, Renuka Niwas, Manjiri greens Annexe, Manjiri Budruk-412307, Pune	Chairman
2.	Dr. Pranab Hazra Former Dean & Professor (Vegetable Science), BCKV, Kalyani, West Bengal	Member
3.	Dr. A.S. Dhatt Director of Research, PAU, Ludhiana-141004	Member
4.	Dr. R. R. Acharya Professor & Head, Dept. of Vegetable Crops, Anand Agricultural University, Anand, Gujarat	Member
5.	Dr. T. K. Behera Director, ICAR-IIVR, PB No. 01, PO-Jakhini, Shahanshahpur, Varanasi, Uttar Pradesh-221305	Member
6.	Dr. Dhananjay Sharma Associate Director of Research, Directorate of Research Services & Professor & PI (AICRP-Veg Crops), Department of Vegetable Science, IGKV, Raipur-492012, Chhattisgarh	Member
7.	Dr. K. K. Gangopadhyay Principal Scientist Division of Vegetable Science, ICAR-IARI, Pusa, New Delhi-110012	Member
8.	Shri UK Dubey Deputy Registrar, PPVFRA, New Delhi-110012	Member Secretary

Nodal officer
Dr. Krishna Kumar Gangopadhyay, Principal Scientist & PI of DUS Project, Division of Vegetable Science, ICAR-Indian Agricultural Research Institute (IARI), Pusa, New Delhi-110012

Co-Nodal officer Dr. Tribhuvan Chaubey, Principal Scientist, Director, ICAR-IIVR, PB No. 01, PO-Jakhini, Shahanshahpur, Varanasi, Uttar Pradesh-221305

X. DUS test centres

Nodal Center ICAR-Indian Agricultural Research Institute (IARI), Pusa, New Delhi-110012

Co-Nodal Center ICAR-Indian Institute of Vegetable Research, PB No. 01, PO-Jakhini, Shahanshahpur, Varanasi, Uttar Pradesh-221305