

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

on

Ridge gourd (*Luffa acutangula* (L.) Roxb.)



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

Government of India

New Delhi-110012

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Ridge gourd (*Luffa acutangula* (L.)Roxb.)

I. Subject

These test guidelines shall apply to all varieties, hybrids and parental lines of ridge gourd (*Luffa acutangula* (L.)Roxb.).

II. 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 required for testing the variety, is to be delivered. Applicants submitting material from a country other than India shall make sure that all customs and phytosanitary formalities are complied with.
2. The minimum quantity of seed to be supplied by the applicant shall be:

Varieties/ hybrids/parental lines : 250g or 1500 seeds (in one submission only)
3. 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.
4. The planting material must not have undergone any treatment unless the competent authority allow or reject such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of tests

1. The minimum duration of tests shall normally be two independent but similar growing seasons with reference to the ecosystem of the variety submitted for DUS testing.
2. The test shall normally be conducted at two test locations. If any essential characteristic of the variety cannot be observed at these places, the variety may be tested at an additional place.
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.

4. Test Plot Design

Number of rows	:	4
Row length	:	4.2 m
Plant to plant distance	:	60 cm
Row to Row distance	:	3.0 m (1.5m if grown on single trellis)
Number of replications	:	3

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

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

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 15th node upwards to 20th node.
6. All observations on the fruit should be made on fruits, 10-12 days after visible fruit set, between the 10th and 20th node.
7. All observations on the seed should be made on fully developed seeds collected from fully dried fruits on the plant.
8. Intensity of green colour of cotyledon should be observed just before the development of the first true leaf.
9. Stage of recording observation on specific characteristic shall be as follows

Description	Code
a. Cotyledons completely unfolded	10
b. Active vegetative phase	20
c. 50% of the flowering stage	30
d. Fruits attaining marketable maturity	40
e. Fruits attaining physiological maturity	50

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 ridge gourd varieties/hybrids/parental lines.
 - a. Leaf : Leaf blade: number of lobes (characteristic 10)
 - b. Fruit : length (characteristic 17)
 - c. Fruit : girth (characteristic 18)
 - d. Fruit : shape (characteristic 19)
 - e. Fruit : skin color (characteristic 20)
 - f. Fruit : ridge (rib) shape (characteristic 23)

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 explanation on the Table of Characteristic in Section VIII

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

VII. Table of Characteristics

S. No.	Characteristic	States	Note	Example Varieties	Stage of observation	Type of assessment
1.	Cotyledon: intensity of green color	Light	3	Jaipur Long	10	VS
		Medium	5	Arka Sujat, Arka Sumeet, Pusa Nasdar		
		Dark	7	Pusa Nutan, Phule Sucheta, Co-1		
2. (*)	Stem shape	Rounded	1	-	20	VS
		Angular	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
3.	Stem pubescence	Absent	1	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi	20	VS
		Present	9	-		
4. (*)	Leaf margin	Entire	1	-	20	VS
		Serrate	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
5. (*) (+)	Leaf shape	Ovate	1	----	20	VS
		Orbicular	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
		Reniform	3	----		
6.	Leaf : Length	Small (<10cm)	3	Phule Sucheta	20	MS

	(Between 15-20 nodes)	Medium (10.1-15cm)	5	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Co-1		
		Large (>15cm)	7	-		
7.	Leaf : Width (Between 15-20 nodes)	Small (<15cm)	3	Phule Sucheta	20	MS
		Medium (15.1-20cm)	5	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Co-1		
		Large (>20cm)	7	-		
8	Leaf pubescence	Absent	1	-	20	VS
		Present	9	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan		
9.	Leaf pubescence nature (Between 15-20 nodes)	Soft	1	-	20	VS
		Hard	9	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
10. (*)	Leaf blade: number of lobes	3 Lobes	1	-	20	VS
		5 Lobes	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
		>5 Lobes	3	-		
11.	Stem: length of internodes (between 15 th and 20th node)	Short (<10cm)	3	Arka Sujat, Phule Sucheta	30	MS
		Medium (10.1-15cm)	5	Arka Sumeet, Jaipur Long, Co-1		
		Long (>15cm)	7	Pusa Nutan, GARG-1		
12.	Stem: number of primary branches	Less (<10)	3	Arka Sujat, Co-1	30	MS
		Medium (10.1-15)	5	Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Phule Sucheta, Jaipur Long		
		More (>15)	7	-		
13.	Petiole length (Between 15-20 nodes)	Short (<8cm)	3	Pusa Nasdar, Pusa Nutan	30	MS
		Medium (8.1-10cm)	5	Arka Sujat, GARG-1, Jaipur Long		
		Long (>10cm)	7	Arka Sumeet		
14.	Flower colour	White	1	-	30	VG

(*)		Light Yellow	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1		
		Yellow	3	Deepthi		
15.	Ovary: length (on the day of anthesis)	Short (<4.0cm)	3	-	30	MG
		Medium (4.1-6.0cm)	5	Arka Sujat, Pusa Nutan		
		Long (>6.0cm)	7	Arka Sumeet, Pusa Nasdar, GARG-1, Co-1		
16.	Peduncle length	Short (<8cm)	3	Pusa Nutan, Phule Sucheta, Jaipur Long	40	MS
		Medium (8.1-10cm)	5	Arka Sumeet, Pusa Nasdar		
		Long (>10cm)	7	GARG-1, Co-1		
17. (*)	Fruit : length	Short (<20cm)	3	-	40	MS
		Medium (20.1-30cm)	5	Arka Sujat, Pusa Nutan, Phule Sucheta, Jaipur Long		
		Long (>30cm)	7	Arka Sumeet, Co-1		
18. (*)	Fruit: girth	Small (<10cm)	3	-	40	MS
		Medium (10.1-14cm)	5	Arka Sujat, Pusa Nutan, Phule Sucheta, Jaipur Long		
		Large (>14cm)	7	Arka Sumeet		
19. (*) (+)	Fruit: shape	Oblong	1	-	40	VS
		Elongate	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1		
		Elliptical	3	Deepthi		
20. (*)	Fruit: skin color	Light Green	1	GARG-1	40	VG
		Green	2	Arka Sujat, Arka Sumeet, Co-1, Jaipur Long		
		Dark Green	3	Pusa Nutan, Deepthi		
21. (*) (+)	Fruit: shape of blossom end	Rounded	1	Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Co-1, Deepthi	40	VG
		Pointed	2	-		
22. (*) (+)	Fruit: shape of base	Rounded	1	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi	40	VG

		Pointed	2	-		
23. (*)	Fruit: ridge (rib) shape	Superficial	1	GARG-1	40	VG
		Medium	2	Pusa Nasdar, Jaipur Long		
		Deep	3	Arka Sumeet, Phule Sucheta, Co-1, Deepthi		
24.	Continuity of ridge	Continuous	1	Arka Sujat, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi	40	VG
		Discontinuous	2	Arka Sumeet		
25. (*)	Fruit skin luster	Matt	1	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi	40	VG
		Glossy	2	-		
26.	Skin softness of the marketable fruits	Mild Soft	3	Deepthi	40	VG
		Soft	5	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, Jaipur Long, Phule Sucheta, Co-1		
		Hard	7	GARG-1		
27. (*)	Flesh texture	Smooth	1	-	40	VG
		Soft/Spongy	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
		Fibrous- Gelatinous	3	-		
28. (*)	Flesh color	White	1	-	40	VG
		Cream	2	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
29.	Time of marketable maturity	Early (<60 Days)	3	Pusa Nutan, GARG-1	40	MS
		Medium (60.1- 70days)	5	Pusa Nasdar, Jaipur Long, Deepthi		
		Late (>70days)	7	Arka Sujat, Arka Sumeet, Phule Sucheta, Co-1		
30. (*)	Plant growth habit	Short Viny (<3.5m)	3	Pusa Nutan	50	MS

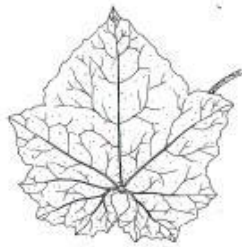
		Medium Viny (3.51 -5.5m)	5	Arka Sumeet, Phule Sucheta, Co-1		
		Long Viny (> 5.5m)	7	Arka Sujat		
31.	Seediness (No. of Seeds/fruit at the time of seed extraction)	Low (<100)	3	-	50	MS
		Medium (100.1-200)	5	Arka Sumeet, Pusa Nasdar, GARG-1, Phule Sucheta, Co-1, Jaipur Long		
		High (>200)	7	Arka Sujat, Pusa Nutan		
32.	Seed: Length	Small (<1.0cm)	3	-	50	MS
		Medium (1.1-1.2cm)	5	-		
		Large (>1.2cm)	7	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi		
33.	Seed: colour of testa	Black	1	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1	50	VS
		Gray	2	-		
34.	Seed luster	Matt	1	Arka Sujat, Arka Sumeet, Pusa Nasdar, Pusa Nutan, GARG-1, Jaipur Long, Phule Sucheta, Co-1, Deepthi	50	VG
		Glossy	2	GARG-1		
35.	100 seed weight	Low (<10g)	3	Pusa Nasdar, Pusa Nutan, Deepthi	50	MG
		Medium(10.1-14g)	5	Arka Sumeet, GARG-1		
		High (>14g)	7	Co-1		

VIII. Explanations on the Table of Characteristics

Characteristic 5. Leaf: shape



1
Ovate



2
Orbicular



3
Reniform

Characteristic 19. Fruit: shape



1
Oblong



2
Elongate



3
Elliptical

Characteristic 21. Fruit: Shape of blossom end



1
Rounded

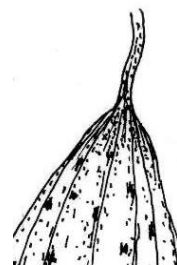


2
Pointed

Characteristic 22. Fruit: Shape of base



1
Rounded



2
Pointed

IX. Working Group Details

The Test Guidelines developed by the IIHR, Bangalore was finalized by the Task Force Committee (10/2014) constituted by the PPV & FR Authority.

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- | | | |
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IX. DUS testing centers

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