Bottle Gourd (*Lagenaria siceraria* (Mol.) Standl.)

I. Subject

These test guidelines apply to all varieties, hybrids and parental lines of bottle gourd (*Lagenariasiceraria* (Mol.) Standl.)

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

   Varieties, Hybrids and parental lines

   - For open field cultivation: 250g or 1500 seeds (in one submission only)
3. The seed should meet the minimum requirements for germination capacity (80%), moisture content (<8%) and physical purity (98%) prescribed for certified seed in India. Especially for storage, which requires a higher standard, the applicant should state the actual germination capacity, which should be as high as possible. The seed supplied should be visibly healthy, not lacking in vigour or affected by any important pest or disease.
4. The seed material must not have undergone any treatment unless the competent authorities allow or request 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 should normally be two independent but similar growing seasons (summer) with reference to the eco-system of the variety submitted for DUS test.
2. The test should normally be conducted at two different locations. If any essential characteristic of the variety can not be observed at these places, the variety may be tested at an additional place.
3. The test should be carried out under conditions ensuring normal growth. The size of the plot should be such that plants or parts of plant may be removed for measuring and counting without prejudice to the observations which must be made upto the end of the growing period. Each test shall include 120 plants for open field cultivation, which should be divided among 3 replications. Separate plots for observations and for measuring can only be used if they have been subjected to similar environmental conditions.

4. Test plot design

Number of rows	:	5
Row length	:	6.4 m
Row to row distance	:	4.0 m
Plant to plant distance	:	0.80 m
Number of replications	:	3

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

6. Additional tests for special purpose may be established by the Authority.

IV. Methods and observations

1. The characteristics described in the Table of characteristics (Section VII) should be used for the testing of varieties for DUS.

2. For the assessment of distinctiveness and stability, observations should be made on 30 plants or parts of plants selected randomly, which should be divided among 3 replications (10 plants in each 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% should be applied. In the case of a sample size of 120 plants, the number of off-types should not exceed 2.

4. For the assessment of colour characteristics, it is recommended that Royal Horticultural Society (RHS) colour chart be used.

5. Observations of leaf will be recorded on one leaf above the first fruit set nodes.

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

7. All observations on the flowers should be made on flowers between the 10th and the 20th node.

8. All observations on the fruit should be made on fruits around 8-14 days after anthesis, between the 10th and 20th node.

9. All observations on the seeds except seed texture at marketable stage should be made on fully developed and dry seed, after washing and drying in the shade.

10. Stage of recording of different observations will be as follows:

	Description	Code
a	Active vegetative growth	20
b	50 % flowering stage (first pistillate flower appears in 50% plant)	30
c	Fruit attaining marketable maturity	40
d	Full maturity (seed harvest maturity)	50

V. Grouping of varieties

1. The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctiveness. Characteristics, which are suitable for grouping purposes, are those, which are known from experience not to vary, or to vary only slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.
2. It is recommended that the competent authorities use the following characteristics for grouping varieties:

a. Leaf : Leaf blade: number of lobes (characteristic 11)

b. Fruit : Length (characteristic 16)

c. Fruit : Diameter (characteristic 17)

d. Fruit : Shape in longitudinal section (characteristic 18)

e. Fruit : Skincolour (characteristic 20)

VI. Characteristics and symbols

1. To assess distinctiveness, uniformity and stability, the characteristics and their states as given in the Table of Characteristics should be used.
2. Notes (1-9) should be used for the purposes 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 should be used in every growing season on all 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.

4. Type of assessment of characteristics indicated in column-7 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 observations 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. (*)	Plant: growth habit	Short viny (<3.5m)	3	Punjab Komal, Punjab Long	50	MS
		Medium viny (3.5 – 5.5m)	5	Pusa Naveen, Pusa Samridhi		
		Long viny (> 5.5m)	7	KBGR-12, Arka Bahar, Kashi Ganga		
2. (*)	Stem: shape	Rounded	1	-	20	VG
		Angular	2	PusaNaveen, PusaSamridhi, Punjab Komal, Punjab Long		
3.	Stem: pubescence	Absent	1	-	30	VG
		Present	9	PusaNaveen, PusaSamridhi, Punjab Komal, Punjab Long		
4.	Stem: length of internodes of main stem (between 15th - 20th node)	Short (<10cm)	3	Kashi Ganga, Punjab Long	30	MS
		Medium (10-14cm)	5	Pant Lauki-1, PusaSamridhi		
		Long (>14cm)	7	Kalyanpur Long Green, ArkaBahar		
5.	Stem: number of primary branches	Less (<6)	3	NarendraJyoti, PusaSamridhi	40	MS
		Medium (6-12)	5	Kashi Ganga, Narendra Rashmi, Pant Lauki-1		
		Many (>12)	7	Kalyanpur Long Green		
6. (*) (+)	Leaf blade: margin	Entire	1	Kalyanpur Long Green, Arka Bahar, Kashi Ganga, Pant Lauki-1, Pusa Samridhi	30	VS

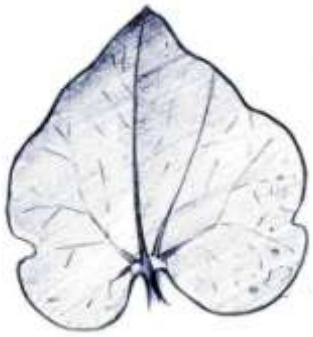
		Serrate	2	NarendraRashmi, ABG-1		
		Multifid	3	-		
7. (*) (+)	Leaf: shape	Cordate	1	Kalyanpur Long Green, Arka Bahar, Kashi Ganga, Pant Lauki-1, Pusa Samridhi	30	VS
		Oblong	2	-		
		Ovate	3	-		
		Obovate	4	-		
		Orbicular	5	-		
		Reniform	6	-		
8.	Leaf : length (between 15th-20th nodes)	Small (<15cm)	3	Kashi Ganga, Pusa Naveen	30	MS
		Medium (15-20cm)	5	Narendra Jyoti, Arka Bahar, Punjab Komal		
		Large (>20cm)	7	KBGR-12, PusaSantusthi		
9.	Leaf : width (between 15th-20th nodes)	Narrow (<15cm)	3	PunjabKomal	30	MS
		Medium (15-20cm)	5	NDBG-619, Pusa Naveen, Kashi Ganga		
		Broad (>20cm)	7	Pusa Santusthi, Arka Bahar, Pusa Sandesh		
10.	Leaf: pubescence nature (between 15th-20th nodes)	Soft	1	ArkaBahar, Kashi Ganga	30	VS
		Hard	2	Pusa Naveen, ABG-1, PunjabKomal		
11. (*) (+)	Leaf blade: number of lobes	3 lobes	3	Kashi Ganga, Pusa Santusthi, Arka Bahar, Pusa Sandesh	30	VS
		5 lobes	5	Pant Lauki-3, JBG-51		
		7 lobes	7	-		
12.	Tendril: branching	Un-branched	1	-	30	VS
		Branched	2	Pant Lauki-3, Kashi Ganga, Pusa Santusthi, Arka Bahar		
13.	Petiole: length (between 15th-20th nodes)	Short (<10cm)	3	Punjab Long, PusaSantusthi, NarendraRashmi	30	MS
		Medium (10-15cm)	5	Kalyanpur Long Green, PusaSamridhi, KBGR-12		
		Long (>15cm)	7	NDBG-132, NDBG-619		
14. (*)	Ovary: length (on the day of anthesis)	Short (<2.5cm)	3	PusaSandesh, PunjabKomal	30	MS
		Medium (2.5-5.0cm)	5	Pusa Naveen, Kashi Ganga, Narendra Rashmi		
		Long (>5.0cm)	7	Kalyanpur Long Green, Pusa Summer Prolific Long, NDBG-619		
15.	Peduncle: length	Short (<10cm)	3	Kashi Ganga	30	MS
		Medium (10-15cm)	5	ArkaBahar, NarendraRashmi, NarendraDharidar		
		Long (>15cm)	7	PusaSamridhi, PusaSandesh, Punjab Long		
16. (*)	Fruit : length	Short (<20cm)	3	PusaSandesh, PunjabKomal	40	MS
		Medium (20-	5	Kashi Ganga, ArkaBahar,		

		45cm)		NDBG-132		
		Long (>45cm)	7	Kalyanpur Long Green, Pusa Summer Prolific Long, VRBG-136		
17. (*)	Fruit: diameter	Small (<8cm)	3	NDBG-619, NarendraJyoti, NDBG-132	40	MS
		Medium (8-12cm)	5	Kashi Ganga, Pusa Santushti, Pant Lauki-1, Arka Bahar		
		Large (>12cm)	7	PusaSandesh, PunjabKomal		
18. (*) (+)	Fruit: shape in longitudinal section	Elongate- straight	1	NarendraRashmi, NarendraJyoti	40	VS
		Elongate- curved	2	Kalyanpur Long Green, Pusa Summer Prolific Long		
		Cylindrical	3	Pusa Naveen		
		Oval	4	-		
		Club	5	PusaSamridhi, NarendraDharidar		
		Pyriform	6	PusaSantusthi, KBGR-12		
		Round	7	PanjabKomal		
		Any other	9	-		
19 (+)	Fruit: neck	Straight	1	Kashi Ganga, ArkaBahar	40	VS
		Crooked	2	Pusa Summer Prolific Long		
20. (*)	Fruit: skin color	Light green (YG-145B)	1	Kashi Ganga, Punjab Komal, Arka Bahar	40	VG
		Green (YG-145C)	2	PusaSantusthi		
		Dark green	3	-		
		Mottle green	4	-		
		Striped green (YG-145A)	5	NarendraDharidar		
21. (+)	Fruit: shape of base at blossom end	Acute	1	NarendraRashmi	40	VS
		Semi blunt	2	Kalyanpur Long Green		
		Blunt	3	KBGR-12, PusaSantusthi, Punjab Long		
		Depressed	4	IIHR-19-1 (genotype)		
22. (+)	Fruit: shape of apexat peduncle end	Raised	1	Kashi Ganga, ArkaBahar	40	VG
		Flat	2	Pusa Naveen		
		Depressed	3	-		
23. (*)	Fruit: pubescence	Absent	1	-	40	VG
		Present	9	Kashi Ganga, PusaNaveen, PusaSamridhi, Punjab Long		
24. (*)	Flesh: texture	Soft	3	Kashi Ganga, NarendraRashmi	40	VG
		Medium	5	PunjabKomal		
		Hard	7	-		
25.	Fruit: Gelatinous flesh	Absent	1	Kashi Ganga, PusaNaveen, Punjab Komal	40	VG
		Present	9	-		
26.	Seed: texture at marketable stage	Soft	3	PusaSantusthi,	50	VS
		Medium	5	Pusa Naveen		

		Hard	7	-		
27.	Seediness (no. of seeds/fruit at the time of seed extraction)	Low (<200)	3	NarendraRashmi, Pusa Summer Prolific Long	50	VG
		Medium (200-400)	5	PusaSamridhi, Kashi Ganga		
		High (>400)	7	NarendraJyoti, NDBG-619, ArkaBahar		
28.	Seed: length	Small (<1.0cm)	3	NDBG-619, NDBG-132, Pant Lauki-3	50	MS
		Medium (1.0-1.5cm)	5	Kashi Ganga, PusaNaveen, VRBG-7 (genotype)		
		Large (>1.5cm)	7	ArkaBahar, PusaSantusthi, PusaSamridhi		
29.	Seed: width	Small (<0.4cm)	3	Pusa Sandesh, Pusa Samridhi, Kalyanpur Long Green	50	MS
		Medium (0.4-0.6cm)	5	ArkaBahar, PusaSantusthi		
		Large (>0.6cm)	7	NDBG-619		
30. (*)	Seed: shape	Triangular	1	NDBG-619	50	MS
		Rectangular	2	Kashi Ganga, Arka Bahar, Pusa Naveen		
31.	Seed: intensity of brown color of testa	Light (165D, 159D)	3	PusaSantusthi, Pusa Naveen	50	VS
		Medium (158C, 159A)	5	Kashi Ganga, ArkaBahar, Kalyanpur Long Green		
		Dark (158A)	7	NarendraJyoti, ABG-1, PusaSandesh		

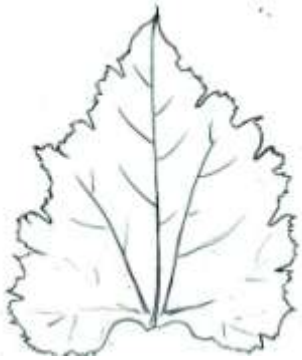
VIII. Explanation of table of characteristics

Ch.6: Leaf blade margin



Entire (1)

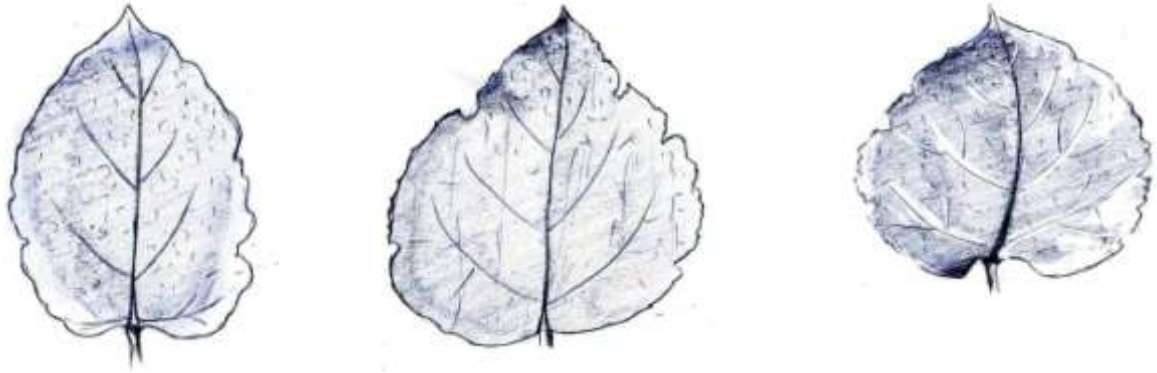
Serrate (2)



Multifid (3)

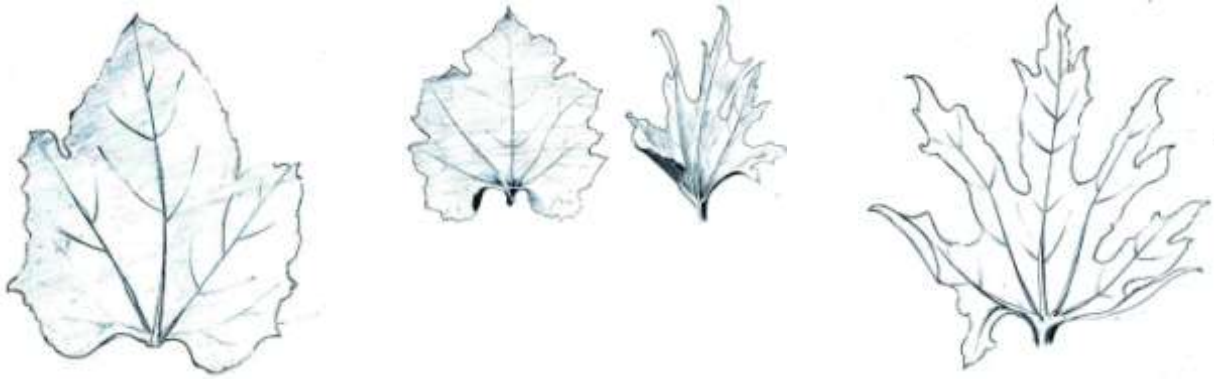
Ch.7: Leaf:shape

Cordate (1) Oblong (2) Ovate (3)



Obovate (4) Orbicular (5) Reniform(6)

Ch.11: Leaf blade: number of lobes



3 lobes (3) 5 lobes (5) 7 lobes (7)

Ch. 18: Fruit: shape in longitudinal section

Elongate Straight (1) Elongate curved (2) Cylindrical (3)

Oval (4)

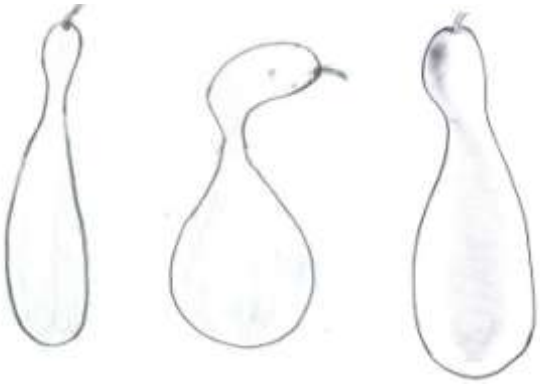
Club (5)

Pyriform (6)

Round (7)

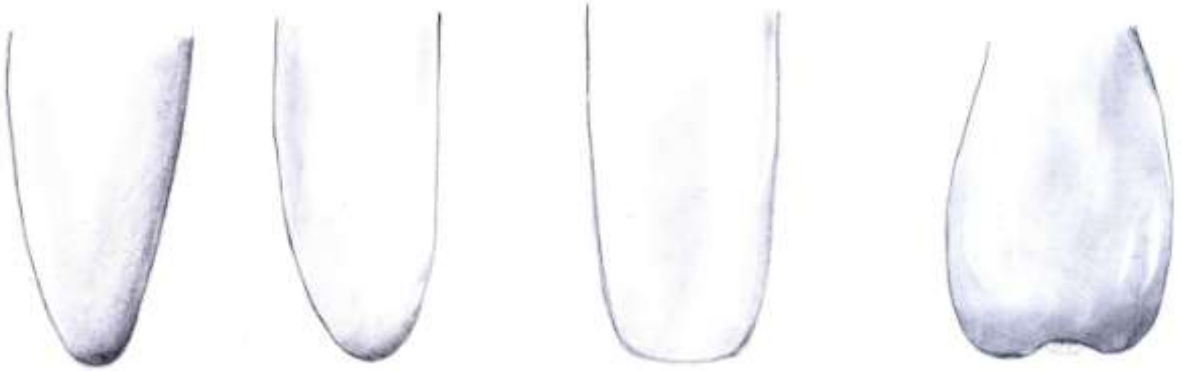
Ch. 19: Fruit: neck

Straight (1)



Crooked (2)

Ch.21: Fruit: shape of base at blossom end



Acute (1) Semi Blunt (2) Blunt (3) Depressed (4)

Ch.22: Fruit: shape of fruit apex at peduncle end

Raised (1)

Flat (2)

Depressed (3)

IX. DUS test centres

Nodal Centre	**Other Centre**
Indian Institute of Vegetable Research, P.B. No.- 01, P.O. -Jakhini (Shahanshahpur), Varanasi-221 305 (U.P.)	1. Indian Institute of Horticultural Research, Hessarghatta, Lake Post, Bengaluru-560089 (Karnataka). 2. Indian Agricultural Research Institute, Pusa, New Delhi-110012