

Cucumber (*Cucumis sativus* L.)

I. Subject

These test guidelines apply to all varieties, hybrids and parental lines of cucumber (*Cucumissativus*L.).

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: 50g 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 characteristics 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

No. of rows	:	5
Row length	:	6 m
Row to row distance	:	2.5 m
Plant to plant distance	:	0.75 m

5. recorded Number of replications : 3 Observations should not be on plants in border rows.
6. Additional tests for special purpose should 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 3.
4. For the assessment of colour characteristics, it is recommended that Royal Horticultural Society (RHS) colour chart be used.
5. Observation 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 15th node upwards to 20th 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 immature fruits around 2 weeks after anthesis, between the 10th and 20th node.
9. All observations on the seed should be made on fully developed and dry seed, after washing and drying in the shade.

10. Plant: Sex expression

Monoecious - All the nodes on the plant have both male and pistillate flowers, with more male than female flowers on each node.

Gynoeocious - All the nodes have only pistillate flowers. Under certain conditions (darkness, cold, chemical treatment), a few male flowers will develop.

11. Where there are more than 50% of nodes with one pistillate flower, the state of expression is solitary. When there are more than 50% of nodes with two or more than two pistillate flowers, the state of expression is multipistilate.

12. Ovary: Colour of vestiture should be observed before flower drop.

13. Parthenocarpy: The development of the fruit without pollination should be observed under circumstances where pollination by insects (bees, bumblebees, etc.) is not possible; for example, in an insect-free greenhouse or at a time of the year when insects are not active.

14. Colour of fruit skin at market stage is considered to be the stage when the fruits have reached their desired length in relation to the salad use of the fruit.

15. Colour of fruit skin at maturity stage (ripeness) should be taken when fruit is fully developed and mature and there are no further changes to the colour of the skin, before the fruit starts to rot.

16. Stage of recording of different observation will be as follows:

Description	Code
a. 50 % flowering stage (first pistillate flower appears in 50% plant)	30
b. Commercial harvest stage (first to third green fruit harvest)	40
c. Full fruit maturity stage (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:

f. Plant habit : Plant growth habit (characteristic-1)

- g.** Plant : Sex expression (characteristic-14)
- h.** Fruit : Parthenocarpy (characteristic-17)
- i.** Fruit : Length (characteristic-18)
- j.** Fruit : Colour at commercial maturity (marketable stage) (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 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	Determinate	1	-	30	VG
		Intermediate	2			
		Indeterminate	3	Kalyanpur Green, SwarnaAgeti, Punjab Naveen,		
2.	Plant: main vine length	Short (<1.25m)	3	SwarnaSheetal	40	MS
		Intermediate (1.25-2.0m)	5	SwarnaAgeti, Punjab Naveen		
		Long (>2.0m)	7	PhuleShubhangi		
3. (+)	Leaf blade: orientation	Erect	1	-	30	VG
		Horizontal	2	SwarnaPoorna		
		Drooping	3	PhuleShubhangi		
4.	Leaf blade: length	Short (<14cm)	3	-	30	MS
		Medium (14-20cm)	5	Japanese Long Green		
		Long (>20cm)	7	Kalyanpur Green		
5. (+)	Leaf blade: shape of apex of terminal lobe	Acute	1	Himangi	30	VG
		Obtuse	2	Punjab Naveen		
		Rounded	3	SwarnaPoorna, Dharwad Local		
6.	Leaf blade: intensity of green colour	Low	3	PhuleShubhangi	30	VG
		Medium	5	SwarnaAgeti, SwarnaSheetal		
		High	7	Punjab Naveen		
7.	Leaf blade: blistering	Absent	1	Kalyanpur Green, Punjab Naveen	30	VG
		Present	9	-		
8.	Leaf blade: undulation of margin	Absent	1	SwarnaSheetal, Dharwad Local	30	VG
		Present	9	SwarnaAgeti, Japanese Long Green		
9.	Leaf blade: dentation of margin	Weak	3	SwarnaAgeti	30	VG
		Medium	5	Japanese Long Green		
		Strong	7	-		
10.	Stem: pubescence	Absent	1	-	30	VG
		Present	9	SwarnaAgeti, SwarnaSheetal, SwarnaPoorna		
11.	Stem: shape	Angular	1	SwarnaSheetal	30	VG
		Rounded	2	Belgum Local (genotype)		
12.	Tendril	Single	1	Japanese Long	30	VG

				Green, SwarnaPoorna		
		Branched	3	-		
13.	Appearance of first pistillate flower in 50% plant	Early <40 days	3	-	30	MG
		Medium 40-55 days	5	Japanese Long Green, Himangi, Punjab Naveen		
		Late >55 days	7	SwarnaSheetal		
14. (*)	Plant: sex expression	Monoecious	1	SwarnaAgeti, SwarnaSheetal,	30	VG
		Gynoecious	2	-		
15.	Plant: number of pistillate flowers per node	Solitary	1	SwarnaAgeti, SwarnaSheetal, Japanese Long Green	30	VG
		Multipistillate	3	-		
16. (*)	Ovary: colour of vestiture	White	1	SwarnaSheetal, SwarnaPoorna, Japanese Long Green	30	VG
		Black	2	SwarnaAgeti		
17. (*)	Parthenocarpy	Absent	1	SwarnaAgeti, SwarnaSheetal, SwarnaPoorna, Japanese Long Green	40	VG
		Present	9	-		
18. (*)	Fruit: length	Short (<15cm)	3	Punjab Naveen	40	MS
		Medium (15-25cm)	5	Himangi, Phule Shubhangi, Swarna Poorna		
		Long (>25cm)	7	Japanese Long Green		
19.	Fruit: diameter	Small (<3cm)	3		40	MS
		Medium (3-5 cm)	5	SwarnaPoorna, Japanese Long Green		
		Large (>5)	7	Himangi, PhuleShubhangi		
20. (+)	Fruit: shape	Elongate	1	Japanese Long Green	40	VG
		Oblong	2	SwarnaAgeti, SwarnaSheetal, Kalyanpur Green,		
		Cylindrical	3	Himangi		
		Oval	4			
21. (*)	Fruit: shape at peduncle end	Flat	1		40	VG
		Acute	2	-		

(+)		Obtuse	3	Pant Khira-1, Himangi, SwarnaSheetal, Kalyanpur Green		
22. (+)	Fruit: shape at blossom end	Acute	1	Japanese Long Green	40	VG
		Obtuse	2	Kalyanpur Green		
		Rounded	3	SwarnaAgeti, Himangi, PhuleShubhangi		
		Flattened	4	-		
23. (* (*)	Fruit: colour of skin at market stage	Creamy white	1	-	40	VG
		Yellow (YWG-158B)	2	Himangi		
		Light green (GG-142C)	3	Pant Khira-1		
		Dark green (YGG-146A)	4	Japanese Long Green, Kalyanpur Green		
24.	Pulp texture	Crispy	1	Japanese Long Green	40	VG
		Mealy	3	Himangi		
25. (* (+)	Fruit: ribs	Absent	1	Himangi, SwarnaSheetal, Kalyanpur Green	40	VG
		Present	9	-		
26. (* (+)	Fruit: sutures	Absent	1	Punjab Naveen	40	VG
		Present	9	Himangi		
27. (* (+)	Fruit: creasing	Absent	1	Himangi	40	VG
		Present	9	Japanese Long Green		
28. (* (+)	Fruit: type of vestiture hair	Hairy	3	-	40	VG
		Non-hairy	5	-		
		Prickles	7	Punjab Naveen		
29. (* (*)	Fruit: density of vestiture	Sparse	3	Japanese Long Green	40	VG
		Medium	5	Punjab Naveen		
		Dense	7	-		
30.	Fruit: warts	Absent	1	SwarnaSheetal, Kalyanpur Green, SwarnaAgeti	40	VG
		Present	9	SwarnaPoorna		
31.	Fruit: stripes	Absent	1	Himangi, SwarnaPoorna, Pant Khira-1	40	VG
		Present	9	SwarnaAgeti, SwarnaSheetal, Kalyanpur Green		

32.	Fruit: length of peduncle	Short (<2cm)	3	SwarnaAgeti, SwarnaSheetal	40	MS
		Medium (2-3.0cm)	5	Himangi, PhuleShubhangi		
		Long (>3.0cm)	7	Kalyanpur Green		
33.	Fruit: colour of skin at ripening stage	White	1	-	50	VG
		Yellow (160-A)	2	Himangi		
		Orange	3	-		
		Brown (175-B)	4	SwarnaAgeti, Japanese Long Green, SwarnaPoorna		
34.	Seed: size	Small (<1.00cm)	3	VR-101(genotype)	50	VG
		Medium (1.00-1.20cm)	5	PhuleShubhangi		
		Large (>1.20cm)	7	SwarnaPoorna, Punjab Naveen		
35.	Seediness (no. of seeds/fruit)	Low (75-100)	3	VR-101(genotype)	50	VG
		Medium (100-150)	5	SwarnaSheetal		
		High (>150)	7	SwarnaAgeti		

VIII Explanation on the table of characteristics

Ch.3. Leaf blade orientation: To be observed only for staked, vertically grown varieties



Erect (1)



Horizontal (2)

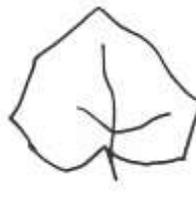


Drooping (3)

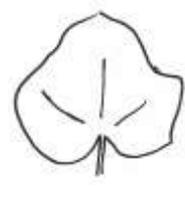
Ch.5: Leaf blade: Shape of apex of terminal lobe



Acute (1)



Obtuse (2)



Rounded (3)

Ch. 20: Fruit: shape



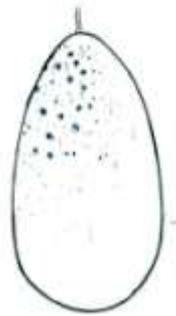
Elongate (1)



Oblong (2)



Cylindrical (3)



Oval (4)

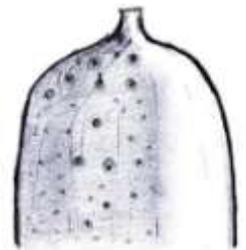
Ch 21: Fruit: shape at peduncle end



Flat (1)

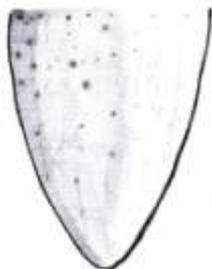


Acute (2)

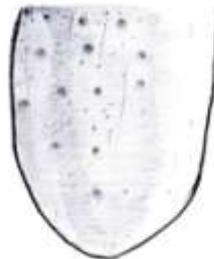


Obtuse (3)

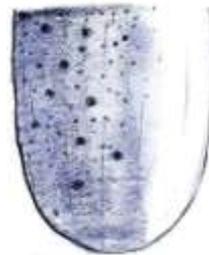
Ch.22: Fruit: shape at blossom end



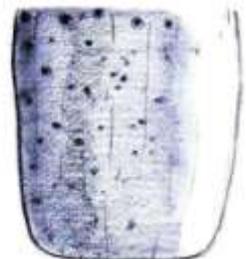
Acute (1)



Obtuse (2)



Rounded (3)



Truncate (4)

Ch. 25: Fruit: ribs



Absent (1)



Present (9)

Ch. 26: Fruit: sutures (Sutures are slightly depressed in relation to the fruit surface)



Absent (1)



Present (9)

Ch. 27: Fruit: creasing

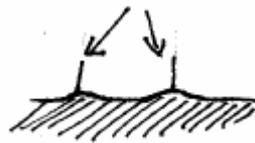


Absent (1)



Present (9)

Ch.28: Fruit: type of vestiture



Hairy (3)



Prickles (7)

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.)	3. Indian Institute of Horticultural Research, Hessarghatta, Lake Post, Bengaluru-560089 (Karnataka). 4. Indian Agricultural Research Institute, Pusa, New Delhi-110012