

Guidelines
for the Conduct of Tests for
Distinctiveness, Uniformity and Stability
on
Chilli, Paprika and Bell Pepper (*Capsicum*
***annuum* L.) under protected conditions**



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

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Chilli, Bell pepper and Paprika (*Capsicum annuum* L.) (under protected conditions)

I. Subject

These test guidelines shall apply to all varieties, hybrids and parental lines of chilli(hot pepper),bell(sweet) pepper and paprika(*Capsicum annuum*L.) under protected conditions.

II. Materialrequired

The Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) shall decidewhen, where and in what quantity and quality of the seed material required for testing a varietyapplied for registration under the PPV&FR Act, 2001. Applicants submitting seed materialfrom a country other than India shall make sure that all customs and quarantine requirementsstipulatedunder relevant nationallegislations and regulation arecompliedwith.

The minimum quantity of seeds to be supplied by the applicant should be:

Varieties, hybrids and parental lines for protected cultivation

Open pollinated varieties : 15 g

Hybrid and parental lines : 10 g each

The seed material should have the minimum requirements for germination capacity (>60% for OP varieties and >85% for hybrids),moisture content (<8%) and genetic purity (>98%). The seed material supplied should be visibly healthy, vigorous and free from insect pest or disease infestation.

The seed supplied must not have undergone any treatment unless the Competent Authorityallow or request for such treatment.If it has been treated, full details of the treatment must begiven.

III. Conduct of tests

The minimum duration of DUS test shall normally be at least two independent but similar growing seasons with reference to the ecosystem of the candidate variety.

The test shall normally be conducted at two test locations. If any essential characteristics of the candidate variety are not expressed for visual observation at these locations, the variety shall beconsidered for further examination at anotherappropriate test site or under special test protocol on expressed request of the applicant, for which additional quantity of seeds shall be required.

The test shall be carried out under conditions favoring normal growth and expression of alltest characteristics. The size of the strips shall be such that plants or parts of plants could beremoved for measurement and observation without prejudicing the other observations on thestanding plants until the end of the growing period. Each test shall have 54 plants for protected cultivation which should be divided among three replications.

The seedlings shall be raised in portrays using soil-less media (3 parts cocopeat: 1 part vermiculite: 1 part perlite) under conditions favoring normal seed germination. The seedlings shall be provided light irrigation daily and drenching of nutrient solution with water soluble fertilizers (19:19:19) at 2g per litre of water once in a week after 15 days of germination. The seedlings shall be transplanted after 40 days of sowing.

1. The test shall be performed under protected conditions comprising strips of 15 cm height and 80 cm width. A 70 cm distance shall be maintained between the strips to carry out intercultural practices and proper aeration. There shall be three replications, with 18 plants in each replication. The plant-to-plant distance of 30 cm shall be maintained.
2. Staking shall be provided for each crop under protected conditions to utilize vertical space and proper aeration across plants, within and between rows. The bell pepper plants shall be trained on the nylon ropes keeping two stems while pinching rest of the suckers in such a fashion that plant grows vertically.
3. Drip irrigation shall be employed to supply water in the root zone of plants every day during summers and fertigation at weekly interval in the initial stages and later during flowering and fruiting at 3 days interval to harness proper growth and development. For red ripe fruits, fertigation should be withheld 10 days prior to final harvest.
4. Additional test protocols for special purposes shall be established by the PPV&FRA Authority.

IV. Methods and observations

The characteristics described in the Table of Characteristics (Section VII) shall be used for the testing of varieties for their DUS.

1. For the assessment of distinctiveness and stability, observations should be made on 30 plants or parts of 30 plants, which shall be equally divided among 3 replications (10 plants per replication).
2. For the assessment of uniformity of characteristics on the strip as a whole (visual assessment by a single observation on 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 the case of a sample size of 54 plants, the number of off-types should not exceed 2.
3. For the assessment of colour characteristics, the latest Royal Horticultural Society (RHS) colour chart shall be used.
4. Unless otherwise indicated, all observations on the leaves and flowers should be made after the first flower starts and before the start of the harvest.
5. Unless otherwise indicated, all observations on the plant and fruit should be made at mature green/red ripe fruit stage.

6. Unless otherwise indicated, observations on the seed should be made on fully developed dry seed.

Stage of recording observations on specific characteristics will be as follows;

Description	Code
a) Cotyledons completely unfolded to two-true leaf stage	10
b) Active vegetative phase	30
c) Appearance of flowers on 50% plants	40
d) First fruit attaining harvest maturity	60
e) First fruit attaining physiological maturity	80
f) Full maturity: approximately all fruits are shrunken, red/yellow	100

V. Grouping of varieties

1. The candidate varieties for DUS testing shall be divided into groups (hot pepper as vegetable or spice, bell pepper as vegetable and paprika as spice) to facilitate the assessment of distinctiveness. Characteristics which are known from experience not to vary or vary slightly within a variety and in which their various states fairly distributed across all varieties in the collection, are suitable for grouping purposes.

The following characteristics shall be used for grouping *Capsicum annuum* varieties

- | | | |
|------------------|---|--|
| (a) Plant | : | Habit (characteristic 2) |
| (b) Flower/Fruit | : | Orientation [characteristic 27 (a) and (b)] |
| (c) Fruit | : | Fruit bearing habit (characteristic 28) |
| (d) Fruit | : | Colour (at mature green fruit stage on plants) (characteristic 29) |
| (e) Fruit | : | Shape in longitudinal section (characteristic 33) |
| (f) Fruit | : | Colour (at ripe fruit stage on plants) (characteristic 39) |
| (g) Fruit | : | Shape at the base (characteristic 43) |
| (h) Fruit | : | Shape of apex (characteristic 44) |

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. Notes (1-9) shall be used to describe the state of each character for the purposes of digital data processing and these notes shall be given against the states of the different characteristics.
3. Legend
 - (*) Characteristics that shall be observed during every growing season on all varieties and always be included in the description of the variety, except when the state of expression of a preceding phenological characteristic or by environmental conditions of the testing region.
 - (+) 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 offigure(s)for clarityand not forthe colour variation.

4. Type of assessment of characteristics indicated in column 8 of Table of characteristics is as follows: The optimum stage of plant growth for assessment of each characteristic is indicated in the sixth column of Table of characteristics. These are explained below:

MG	:	Measurement by a single observation on a group of plants or parts of plants
MS	:	Measurement on a number on 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 observations on individual plant or parts of plants

VII. Table of Characteristics:

S. No.	Characteristics	States	Note	Crop	Example variety/ varieties	Stage of observation	Type of assessment
1 (*)	Seedling: Anthocyanin colouration of hypocotyl	Absent	1	Chilli	LCA 625	10	VG
				Bell Pepper	-		
				Paprika	LCA 424		
		Present	9	Chilli	PusaJwala		
				Bell Pepper	California Wonder		
2 (*) (+)	Plant:Habit	Spreading	1	Paprika	ByadgiDabbi	80	VG
				Chilli	ArkaSuphal		
				Bell Pepper	-----		
		Semi-upright	5	Paprika	Kashi Sinduri		
				Chilli	PusaJwala		
				Bell Pepper	California Wonder		
		Upright	9	Paprika	ByadgiDabbi		
				Chilli	Punjab Gucchedar		
				Bell Pepper	-----		
3 (*)	Plant: Length of main stem(cm)	Short (up to 5.0)	3	Paprika	-----	80	MS
				Chilli	PusaJwala		
				Bell Pepper	-----		
		Medium (5.01-10.0)	5	Paprika	ByadgiDabbi		
				Chilli	ArkaSweta		
				Bell Pepper	KTC-1(Pusa capsicum)		
		Long (>10.0)	7	Paprika	ArkaAbhir		
				Chilli	KBCH-1		
				Bell Pepper	California Wonder		
4 (*)	Plant: Length of first internode (on primary branches in cm)	Veryshort (up to 6.0)	1	Paprika	-----	80	MS
				Chilli	Kashi Abha		
				Bell Pepper	Yolo Wonder		
		Short (6.01-7.0)	3	Paprika	-----		
				Chilli	PusaJwala		
				Bell Pepper	Arka Basant		
		Medium (7.01-8.0)	5	Paprika	-----		
				Chilli	ArkaLohit		
				Bell Pepper	California Wonder		
		Long (8.01-9.0)	7	Paprika	ArkaAbhir		
				Chilli	ArkaSuphal		
				Bell Pepper	-----		
		Verylong(>9.0)	9	Paprika	ByadgiDabbi		
				Chilli	Punjab Sindhuri		
				Bell Pepper	-----		
5 (*)	Plant: Anthocyanincolourationofnodes (at active vegetative stage)	Absent	1	Paprika	KtPL-19	40	VG
				Chilli	LCA 305		
				Bell Pepper	-----		
		Present	9	Paprika	LCA 424		
				Chilli (64A)	ArkaLohit		
				Bell Pepper(77A)	California Wonder		
				Paprika	Kashmiri		

				(77B)	Chilli		
6	Plant: Intensity of anthocyanin colouration of nodes (at active vegetative stage)	Weak	3	Chilli (64A)	ArkaLohit	40	VG
				Bell Pepper (64A)	Solan Bharpur		
				Paprika (77B)	Kashmiri Chilli		
		Medium	5	Chilli (79A)	Punjab Tej		
				Bell Pepper (77A)	California Wonder		
				Paprika (79A)	KtPL-19		
		Strong	7	Chilli (186A)	ArkaSweta		
				Bell Pepper (N79A)	Arka Basant		
				Paprika (N187A)	LCA 436		
7	Plant: Anthocyanin colouration of nodes (at 50% flowering)	Absent	1	Chilli	CA 960	40	VG
				Bell Pepper	-----		
				Paprika	LCA 424		
		Present	9	Chilli (N77A)	PusaJwala		
				Bell Pepper (N79A)	California wonder		
				Paprika (N79A)	Kashmiri Chilli		
8	Plant: Intensity of anthocyanin colouration of nodes at 50% flowering	Weak	3	Chilli (61A)	LCA 305	40	VG
				Bell Pepper (61A)	Solan Bharpur		
				Paprika	-----		
		Medium	5	Chilli (187A)	Punjab Tej		
				Bell Pepper (N79A)	California Wonder		
				Paprika (N79A)	Kashmiri Chilli		
		Strong	7	Chilli (N77A)	PusaJwala		
				Bell Pepper (N79A)	Arka Basant		
				Paprika (N186B)	ByadgiDabbi		
9a	Plant:Height(cm) (hot pepper and paprika)	Very Short (<90.0)	1	Chilli	Kashi Anmol	80	MS
				Paprika	-----		
		Short (90.01-110.0)	3	Chilli	Kashi Abha		
				Paprika	-----		
		Medium (110.01-130.0)	5	Chilli	Kashi Ratna		
				Paprika	Kashi Sinduri		
		Tall (130.01-150.0)	7	Chilli	Kashi Tej		
				Paprika	ByadgiDabbi		
		Very tall (>150.01)	9	Chilli	Arka Meghana		
				Paprika	Kashmiri Chilli		
9b	Plant:Height(cm) (bellpepper)	Short (<80.0)	3	Bell Pepper	Yolo Wonder	80	MS
		Medium (80.01-100.0)	5		Arka Basant		

		Tall (>100.0)	7		California Wonder		
10a	Plant:Spread(cm) (hotpepper and paprika)(average of distance between the extremes atwidest points taken intwo directions)	Narrow (<50.0)	3	Chilli	Punjab Gucchedar	80	MS
				Paprika	KtPL-19		
		Medium(50.01-100.0)	5	Chilli	ArkaHarita		
				Paprika	Kashmiri Chilli		
		Broad (>100.0)	7	Chilli	ArkaMeghana		
				Paprika	-----		
10b	Plant: Spread (cm)(bell pepper) (average of distance Between the extremes at widest points taken in two directions)	Narrow (<50.0)	3	Bell Pepper	Arka Basant	80	MS
		Medium(50.01-100.0)	5		Yolo Wonder		
		Broad (>100.0)	7		-----		
11	Stem: anthocyanin	Absent	1	Chilli	ArkaSweta	60	VG
				Bell Pepper	California Wonder		
				Paprika	Kashi Sinduri		
		Present	9	Chilli	PusaJwala		
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		
12 (*)	Stem: Pubescence (hairiness)	Absent	1	Chilli	PusaJwala	60	VG
				Bell Pepper	California Wonder		
				Paprika	KtPL-19		
		Present	9	Chilli	ArkaLohit		
				Bell Pepper	Solan Bharpur		
				Paprika	ByadgiDabbi		
13	Stem:Shape	Round	3	Chilli	Arka Meghana	60	VG
				Bell Pepper	-----		
				Paprika	KtPL-19		
		Angular	5	Chilli	ArkaLohit		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
14	Leaf:Lengthofblade(measured from leafbasetoleaftipincm)	Short (<10.0)	3	Chilli	Kashi Anmol	60	MS
				Bell Pepper	-----		
				Paprika	-----		
		Medium (10.01-12.0)	5	Chilli	Punjab Tej		
				Bell Pepper	-----		
				Paprika	Kashi Sinduri		
		Long (>12.0)	7	Chilli	Him Palam Mirch-1		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
15	Leaf: Width of blade (measured on the widest part of the leaf in cm taken from the middle part of the plant)	Narrow (<5.0)	3	Chilli	ArkaSuphal	60	MS
				Bell Pepper	-----		
				Paprika	-----		
		Medium (5.01-8.0)	5	Chilli	ArkaLohit		
				Bell Pepper	-----		
				Paprika	LCA 436		
		Broad (>8.0)	7	Chilli	Him Palam		

					Mirch-1		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
16	Leaf:Colour	Green	3	Chilli (N137B)	Punjab Sindhuri	60	VG
				Bell Pepper (N137A)	California Wonder		
				Paprika (N137B)	ByadgiDabbi		
		Purple (N77A) *	5	Chilli	AVPP9824		
				Bell Pepper	-----		
				Paprika	-----		
17	Leaf: Intensity of colour	Light green (143C) *	3	Chilli	PusaJwala	60	VG
				Bell Pepper	-----		
				Paprika	-----		
		Medium green (N137B) *	5	Chilli	ArkaLohit		
				Bell Pepper	Arka Basant		
				Paprika	Kashmiri Chilli		
		Dark green (N137A) *	7	Chilli	Punjab Tej		
				Bell Pepper	California Wonder		
				Paprika	KtPL-19		
		Purple (N77A) *	9	Chilli	AVPP9824		
				Bell Pepper	-----		
				Paprika	-----		
18(+)	Leaf:Shape	Lanceolate	3	Chilli	PusaJwala	60	VG
				Bell Pepper	-----		
				Paprika	ByadgiDabbi		
		Ovate	5	Chilli	Punjab Gucchedar		
				Bell Pepper	Arka Basant		
				Paprika	Paprika		
		Broadelliptic	7	Chilli	-----		
				Bell Pepper	California Wonder		
				Paprika	-----		
19	Leaf: Undulation of margin	Weak	3	Chilli	Kashi Anmol	60	VG
				Bell Pepper	Solan Bharpur		
				Paprika	Kashmiri Chilli		
		Medium	5	Chilli	PusaJwala		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Strong	7	Chilli	ArkaSuphal		
				Bell Pepper	KTC-1 (Pusa capsicum)		
				Paprika	KtPL-19		
20	Leaf: pubescence(hairiness)	Absent	1	Chilli	PusaJwala	60	VG
				Bell Pepper	KTC-1 (Pusa capsicum)		
				Paprika	KtPL-19		
		Present	9	Chilli	ArkaSuphal		
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		

21	Petiole color	Green (129 B)*	1	Chilli	PusaJwala	60	VG
				Bell Pepper	Yolo Wonder		
				Paprika	Kashmiri Chilli		
		Purple (77C)*	9	Chilli	Punjab Sindhuri		
22	Petiole length	Short (<6.0 cm)	1	Bell Pepper	ArkaLohit	60	MS
				Paprika	-----		
				Chilli	Kashmiri Chilli		
		Medium (6.01-9.0 cm)	3	Chilli	PusaJwala		
				Bell Pepper	-----		
				Paprika	LCA 436		
		Long (>9.0 cm)	5	Chilli	Punjab Gucchedar		
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		
23 (*)	Flower: Petal colour	White (NN 155D)*	3	Chilli	PusaJwala	40	VG
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Yellowish white (158 D)*	5	Chilli	Punjab Tej		
				Bell Pepper	California Wonder		
				Paprika	Kashmiri chilli		
		Purple (77C)*	7	Chilli	AVPP9824		
				Bell Pepper	-----		
				Paprika	-----		
24	Flower: Anther colour	Yellow (9C)*	3	Chilli	LCA 235	40	VG
				Bell Pepper	-----		
				Paprika	-----		
		Paleblue (107C)*	5	Chilli	PusaJwala		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Blue (99C)*	7	Chilli	Surajmukhi		
				Bell Pepper	-----		
				Paprika	-----		
		Purple (83A)*	9	Chilli	Punjab Tej		
				Bell Pepper	Arka Basant		
				Paprika	Kashmiri Chilli		
25	Flower: Style color	Yellowish white (2C)*	3	Chilli	PusaJwala	40	MS
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Purple (83A)*	5	Chilli	ArkaSuphal		
				Bell Pepper	-----		
				Paprika	Kashmiri Chilli		
26 (*)	Flower: Days to 50% flowering (from the date of sowing)	Early (≤70.0days)	3	Chilli	Kashi Anmol	40	MS
				Bell Pepper	-----		
				Paprika	-----		
		Medium (71-90.0)	5	Chilli	ArkaSweta		
				Bell Pepper	Arka Basant		

				Paprika	KtPL-19		
				Chilli	ArkaLohit		
		Late (>90.0)	7	Bell Pepper	Solan Bharpur		
				Paprika	LCA 436		
27(a)	Flower Orientation (+)	Drooping	1	Chilli	Kashi Anmol		
				Bell Pepper	YSC-5		
				Paprika	ByadgiDabbi		
		Semidrooping	5	Chilli	LCA 235		
				Bell Pepper	Solan Bharpur		
				Paprika	-----		
		Erect	9	Chilli	Him Palam Mirch-1		
				Bell Pepper	California Wonder		
				Paprika	-----		
27 (b)	Fruit: Orientation	Drooping	1	Chilli	PusaJwala		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Semi drooping	5	Chilli	-----		
				Bell Pepper	Yolo Wonder		
				Paprika	-----		
		Erect	9	Chilli	Him Palam Mirch-1		
				Bell Pepper	Arka Basant		
				Paprika	-----		
28	Fruit: Bearing habit (No. of fruits/node)	1 (Solitary)	3	Chilli	ArkaLohit		
				Bell Pepper	Solan Bharpur		
				Paprika	ByadgiDabbi		
		2-3	5	Chilli	LCA 305		
				Bell Pepper	-----		
				Paprika	-----		
		>3 (Cluster)	7	Chilli	Him Palam Mirch-1		
				Bell Pepper	-----		
				Paprika	-----		
29 (*)	Fruit: Colour (at mature unripe stage)	Cream (NN155A)*	3	Chilli	-----		
				Bell Pepper	Arka Basant		
				Paprika	-----		
		Green (N134A, 135A, 136A)*	5	Chilli	Punjab Sindhuri		
				Bell Pepper	Solan Bharpur		
				Paprika	ByadgiDabbi		
		Purple (59A)*	7	Chilli	AVPP9824		
				Bell Pepper	-----		
				Paprika	-----		
30 (a)	Fruit: Intensity of green colour (at mature unripe stage)	Light	3	Chilli (N144C)*	Him Palam Mirch-1		
				Bell Pepper (141A)*	Yolo Wonder		
				Paprika (N144B)*	Kashmiri Chilli		
		Medium	5	Chilli (141C)*	Kashi Tej		

		Dark	7	Bell Pepper (141B)*	California Wonder		
				Paprika (144A)*	LCA 436		
				Chilli (139A)*	Punjab Tej		
				Bell Pepper (139A)*	YSC 5		
				Paprika (135A)*	ByadgiDabbi		
30(b)	Fruit: Intensity of purple colour (at mature unripe stage)	Light	3	Chilli	-----	60	VG
				Bell Pepper	-----		
				Paprika	-----		
		Medium	5	Chilli	-----		
				Bell Pepper	-----		
				Paprika	-----		
		Dark (59A)*	7	Chilli	AVPP9824		
				Bell Pepper	-----		
				Paprika	-----		
31a(*)	Fruit: Length(cm) (hot pepper and paprika)	Short (<8.0)	3	Chilli	Surajmukhi	60	MS
				Paprika	-----		
		Medium (8.01-10.0)	5	Chilli	Him Palam Mirch-1		
				Paprika	-----		
		Long (10.01-12.0)	7	Chilli	ArkaHarita		
				Paprika	LCA 424		
		Very Long(>12.0)	9	Chilli	Punjab Sindhuri		
				Paprika	ByadgiDabbi		
31b(*)	Fruit: Length(cm) (bell pepper)	Short (<3.0)	3	Bell Pepper	Solan Bharpur	60	MS
		Medium (3.01-6.0)	5		California Wonder		
		Long (>6.0)	7		Arka Basant		
32a(*)	Fruit: Diameter (fruits measured at the widest point in cm)[hot pepper and paprika]	Narrow (<0.8)	3	Chilli	Punjab Gucchedar	60	MS
				Paprika	-----		
		Medium (0.81-1.5)	5	Chilli	PusaJwala		
				Paprika	LCA 436		
		Broad (>1.5)	7	Chilli	CH-27		
				Paprika	ByadgiDabbi		
32b(*)	Fruit: Diameter(fruitsmeasuredatthe widest point incm)[bellpepper]	Narrow (<6.0)	3	Bell Pepper	Arka Basant	60	MS
		Medium (6.01-8.0)	5		California Wonder		
		Broad (>8.0)	7		KTC-1 (Pusa capsicum)		
33 (*) (+)	Fruit: Shape in longitudinal section	Square	1	Chilli	-----	60	VG
				Bell Pepper	California Wonder		
				Paprika	-----		
		Rectangular	2	Chilli	-----		
				Bell Pepper	Arka Basant		
				Paprika	-----		
		Trapezoidal	3	Chilli	-----		
				Bell Pepper	YSC 5		
				Paprika	-----		

		Moderatelytriangular	4	Chilli	Him Palam Mirch-2		
				Bell Pepper	Solan Bharpur		
				Paprika	KtPL-19		
		Narrowlytriangular	5	Chilli	ArkaLohit		
				Bell Pepper	-----		
				Paprika	Kashmiri Chilli		
		Hornshaped	6	Chilli	CH-52		
				Bell Pepper	-----		
				Paprika	ByadgiDabbi		
34(+)	Fruit:Curvature	Absent	1	Chilli	Surajmukhi	60	VG
				Bell Pepper	California Wonder		
				Paprika	LCA 436		
		Present	9	Chilli	Arka Meghana		
				Bell Pepper	-----		
				Paprika	ByadgiDabbi		
35(+)	Fruit :Neck at basal end	Absent	1	Chilli	Surajmukhi	60	VG
				Bell Pepper	California Wonder		
				Paprika	Kashmiri Chilli		
		Present	9	Chilli	Arka Meghana		
				Bell Pepper	-----		
				Paprika	ByadgiDabbi		
36 (*) (+)	Fruit: Cross sectional corrugation (at level of placenta)	Round	3	Chilli	ArkaSuphal	60	VG
				Bell Pepper	Solan Bharpur		
				Paprika	ByadgiDabbi		
		Slightlycorrugated	5	Chilli	-----		
				Bell Pepper	KTC-1 (Pusa capsicum)		
				Paprika	-----		
		Stronglycorrugated	7	Chilli	-----		
				Bell Pepper	HYB-1		
				Paprika	-----		
		Oval	9	Chilli	-----		
				Bell Pepper	-----		
				Paprika	KtPL-19		
37 (*) (+)	Fruit: Sinuation of pericarp	Weak	3	Chilli	Kashi Abha	60	VG
				Bell Pepper	California Wonder		
				Paprika	LCA 436		
		Medium	5	Chilli	LCA 334		
				Bell Pepper	-----		
				Paprika	Kashmiri Chilli		
		Strong	7	Chilli	PusaJwala		
				Bell Pepper	-----		
				Paprika	Kashi Sinduri		
38 (*)	Fruit: Texture of surface	Smooth	1	Chilli	Surajmukhi	60	VG
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		

		Rough	2	Chilli	ArkaLohit		
				Bell Pepper	KTC-1 (Pusa capsicum)		
				Paprika	Kashi Sinduri		
39 (*)	Fruit: Colour (at ripe maturity)	Yellow (12A)*	1	Chilli	-----		
				Bell Pepper	KTC-1 (Pusa capsicum)		
				Paprika	-----		
		Orange (N25A)*	2	Chilli	LCA 235		
				Bell Pepper	-----		
				Paprika	-----		
		Orange red (N30A)*	3	Chilli	-----	80	VG
				Bell Pepper	Arka Basant		
				Paprika	Kashmiri Chilli		
		Red (42A)*	4	Chilli	PusaJwala		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
40	Fruit: Intensity of red colour (at ripe maturity)	Light (42A)*	3	Chilli	Kashi Abha		
				Bell Pepper	-----		
				Paprika	-----		
		Medium	5	Chilli (44B)*	ArkaHarita	80	VG
				Bell Pepper (N137A)*	California Wonder		
				Paprika (44A)*	LCA 424		
		Dark (46A)*	7	Chilli	-----		
				Bell Pepper	-----		
				Paprika	KtPL-19		
41	Fruit: Color transition	Onestage	3	Chilli	PusaJwala		
				Bell Pepper	California Wonder	80	VG
				Paprika	Kashi Sinduri		
		Twostages	5	Chilli	ArkaLohit		
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		
		>Twostages	7	Chilli	ArkaSweta		
				Bell Pepper	-----		
				Paprika	-----		
42	Fruit: Glossiness	Weak	3	Chilli	Punjab Tej		
				Bell Pepper	Arka Basant	60	VG
				Paprika	-----		
		Strong	5	Chilli	Kashi Anmol		
				Bell Pepper	California Wonder		
				Paprika	Kashmiri Chilli		
43 (*) (+)	Fruit: Shape at the base	Acute	3	Chilli	PusaJwala		
				Bell Pepper	-----		
				Paprika	Kashi Sinduri		
		Round	5	Chilli	ArkaSuphal	60	VG
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		
		Sunken	7	Chilli	-----		
				Bell Pepper	California Wonder		

44(+)	Fruit: Shape of apex	Acute	1	Paprika	-----	60	VG
				Chilli	PusaJwala		
				Bell Pepper	-----		
		Blunt	3	Paprika	ByadgiDabbi		
				Chilli	Kashi Abha		
				Bell Pepper	Arka Basant		
		Depressed	5	Paprika	KtPL-19		
				Chilli	-----		
				Bell Pepper	California Wonder, Solan Bharpur		
				Paprika	-----		
45 (*)	Fruit: Number of locules/lobes (bell pepper)	2	1	Bell Pepper	Solan Bharpur	60	MG
		3	2		Arka Basant		
		4	3		California Wonder		
46 (*)	Fruit: Pericarp thickness in mm (at physiological maturity stage)	Verythin(<1.0)	1	Chilli	PusaJwala	60	MS
				Bell Pepper	-----		
				Paprika	LCA 424		
		Thin (1.01-2.0)	3	Chilli	Kashi Anmol		
				Bell Pepper	-----		
				Paprika	LCA 436		
		Medium (2.01-3.0)	5	Chilli	Punjab Sindhuri		
				Bell Pepper	-----		
				Paprika	Kashmiri Chilli		
		Thick (3.01-4.0)	7	Chilli	-----		
				Bell Pepper	Solan Bharpur		
				Paprika	KtPL-19		
		Verythick(>4.0)	9	Chilli	-----		
				Bell Pepper	California Wonder		
				Paprika	-----		
47	Fruit: Stalk Length (cm)	Short (1.6-2.5)	3	Chilli	LCA 625	60	MS
				Bell Pepper	-----		
				Paprika	-----		
		Medium (2.6-3.5)	5	Chilli	Punjab Gucchedar		
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Long (3.6-4.5)	7	Chilli	ArkaLohit		
				Bell Pepper	Arka Basant		
				Paprika	LCA 424		
		Verylong(>4.5)	9	Chilli	Punjab Sindhuri		
				Bell Pepper	YSC-5		
				Paprika	Paprika		
48(+)	Fruit: Calyx Cover	Non-enveloping	1	Chilli	ArkaSuphal	60	VG
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
		Enveloping	9	Chilli	PusaJwala		
				Bell Pepper	LCA 436		

49(+)	Fruit: Calyx Margin	Smooth	1	Paprika	-----	60	VG
				Chilli	ArkaLohit		
				Bell Pepper	-----		
				Paprika	-----		
		Dentate	9	Chilli	Arka Meghana	60	VG
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		
50 (+)	Fruit: Calyx Constriction	Absent	1	Chilli	ArkaLohit	60	VG
				Bell Pepper	-----		
				Paprika	-----		
		Present	9	Chilli	Arka Meghana	60	VG
				Bell Pepper	Arka Basant		
				Paprika	ByadgiDabbi		
51	Fruit: Pedicel attachment	Weak	1	Chilli	Kashi Anmol	60	VG
				Bell Pepper	-----		
				Paprika	ByadgiDabbi		
		Strong	9	Chilli	Punjab Sindhuri	60	VG
				Bell Pepper	California Wonder		
				Paprika	Kashmiri Chilli		
52 (+)	Fruit: Blossom end appendage	Absent	1	Chilli	ArkaLohit	80	VG
				Bell Pepper	-----		
				Paprika	-----		
		Present	9	Chilli	Punjab Sindhuri	80	VG
				Bell Pepper	California Wonder		
				Paprika	KtPL-19		
53	Fruit: Days to 50% ripening (from the date of sowing)	Early (≤130.0 days)	3	Chilli	Kashi Anmol	80	MS
				Bell Pepper	Arka Basant		
				Paprika	Kashmiri Chilli		
		Medium (131-150 days)	5	Chilli	PusaJwala		
				Bell Pepper	California Wonder		
				Paprika	Kashi Sinduri		
		Late (>150.0 days)	7	Chilli	Him Palam Mirch-1		
				Bell Pepper	-----		
				Paprika	LCA 424		
54	Seed: 1000 seed weight (g)	Low (<4.0)	3	Chilli	PusaJwala	100	MS
				Bell Pepper	-----		
				Paprika	-----		
		Medium (4.01-6.0)	5	Chilli	Kashi Tej		
				Bell Pepper	-----		
				Paprika	Kashmiri Chilli		
		High (>6.0)	7	Chilli	Punjab Sindhuri	100	MS
				Bell Pepper	California Wonder		
				Paprika	ByadgiDabbi		
55	Seed: Recovery (%)	Low (<30.0)	3	Chilli	Punjab Sindhuri	100	MS

				Bell Pepper	Arka Basant						
				Paprika	Kashmiri Chilli						
				Chilli	Punjab Tej						
				Bell Pepper	-----						
		Medium (30.1-40.0)	5	Paprika	LCA 424						
				Chilli	PusaJwala						
		High (>40.0)	7	Bell Pepper	-----						
				Paprika	-----						
		56	Seed:Colour	Lightyellow	3			Chilli (11B)*	Kashi Gaurav	100	MG
								Bell Pepper (8C)*	Arka Basant		
Paprika (11C)*	ByadgiDabbi										
Yellow	5			Chilli (10A)*	Punjab Sindhuri						
				Bell Pepper (8B)*	Solan Bharpur						
				Paprika (10A)*	Kashmiri Chilli						

*Based on Royal Horticulture Society (RHS) colour chart

VIII. Explanations on the table of characteristics

Characteristic 1 (*): Seedling: Anthocyanin colouration of hypocotyls

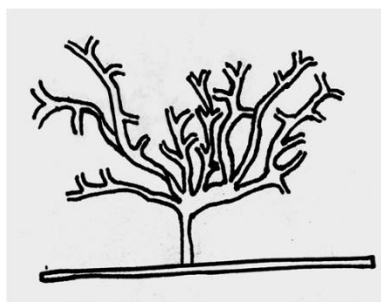


Absent (1)

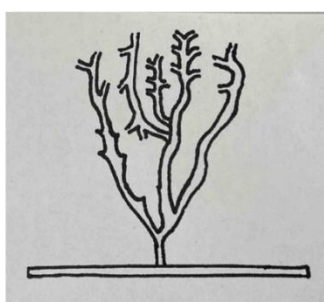


Present (9)

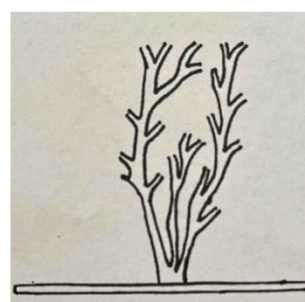
Characteristic 2 (*) (+): Plant: Habit



Spreading (1)



Semi Upright (5)



Upright (9)



Characteristic 5 (*) (+): Plant: Anthocyanin colouration of nodes (at active vegetative growth)



Absent (1)



Present (9)

Characteristic 6: Plant Intensity of anthocyanin colouration of nodes (at active vegetative stage)



Weak (3)

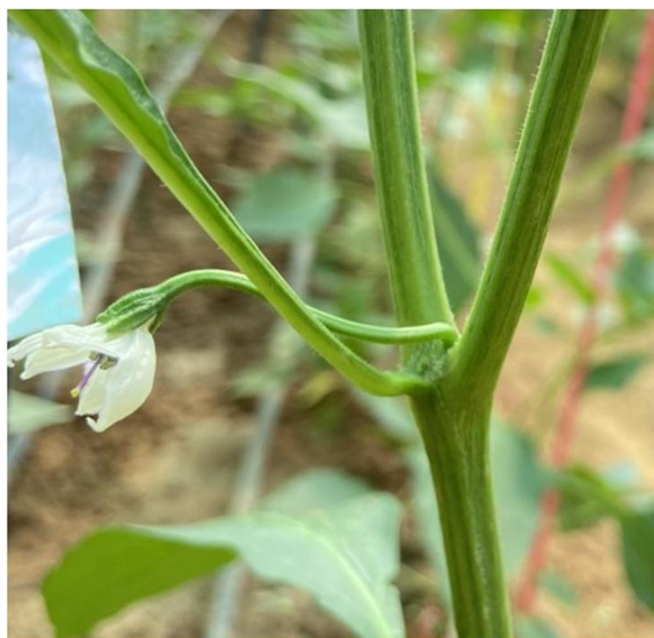


Medium (5)



Strong (7)

Characteristic 7: Plant: Anthocyanin colouration of nodes (at 50% flowering)



Absent (1)



Present (9)

Characteristic 8: Plant: Intensity of anthocyanin colouration of nodes (at 50% flowering)



Weak (3)



Medium (5)



Strong (7)

Characteristic 11: Stem: Anthocyanin



Absent (1)



Present (9)

Characteristic 12 (*): Stem: Pubescence (hairiness)



Absent (1)



Present (9)

Characteristic 13: Stem: Shape



Round (3)



Angular (5)

Characteristic 16: Leaf: Colour



Green (3)

Purple (5)

Characteristic 17: Leaf: Intensity of colour



Light green (3)

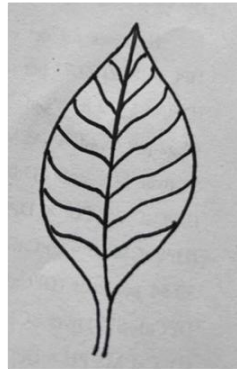
Medium green (5)

Dark green (7)

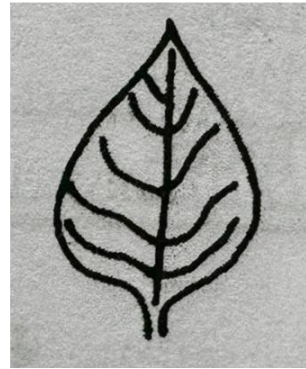
Characteristic 18 (+): Leaf: Shape



Lanceolate (3)



Ovate (5)



Broad Elliptic (7)



Characteristic 19: Leaf: Undulation of margin



Weak (3)



Medium (5)



Strong (7)

Characteristic 20: Leaf: Pubescence (hairiness)



Absent (1)



Present (9)

Characteristic 21: Petiole colour



Green (1)



Purple (9)

Characteristic 23 (*): Flower: Petal colour



White (3)



Yellowish white (5)



Purple (7)

Characteristic 24: Flower: Anther colour



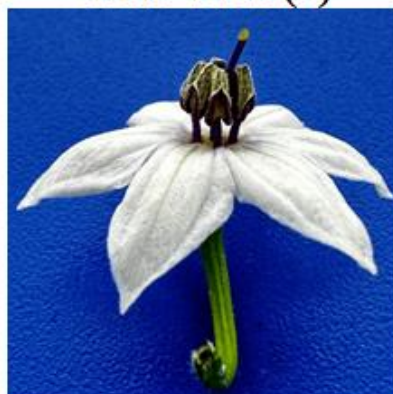
Yellow (3)



Pale Blue (5)



Blue (7)



Purple (9)

Characteristic 25: Flower: Style colour

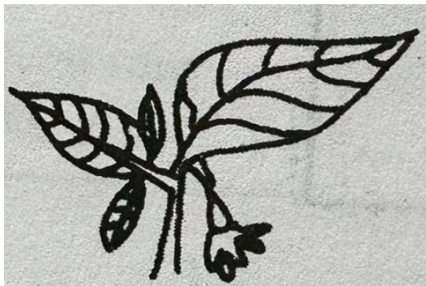


Yellowish White (3)



Purple (5)

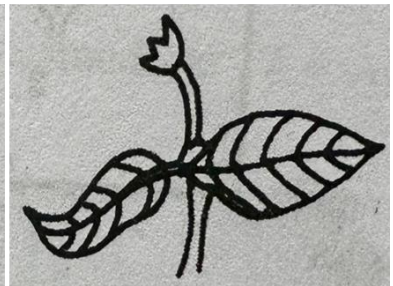
Characteristic 27 (a) (+): Flower orientation



Drooping (1)



Semi drooping (5)



Erect (9)



Characteristic 27 (b): Fruit orientation (Chilli and Paprika)



Drooping (1)



Erect (9)

Characteristic 27 (b): Fruit orientation (Bell Pepper)



Drooping (1)



Semi drooping (5)



Erect (9)

Characteristic 28: Fruit: Bearing habit (No. of fruits/ node)



1 (Solitary) (3)



2-3 Fruits (5)



>3 (Cluster) (7)

**Characteristic 29 (*): Fruit: Colour (at mature unripe stage)
(Chilli)**



Green (5)



Purple (7)

**Characteristic 29 (*): Fruit: Colour (at mature unripe stage)
(Capsicum)**



Cream (3)



Green (5)

Characteristic 30 (a): Fruit: Intensity of green colour (at mature unripe stage)



Light (3)



Medium (5)



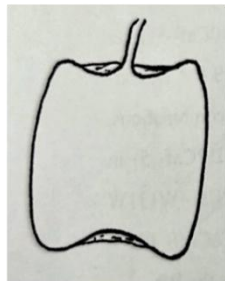
Dark (7)

Characteristic 30 (b): Fruit: Intensity of purple colour (at mature unripe stage)

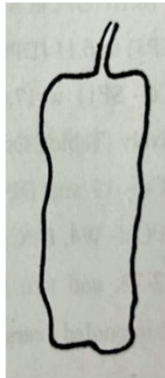


Dark (7)

Characteristic 33 (*) (+): Fruit: Shape in longitudinal section (Bell Pepper)



Square (1)



Rectangular (2)



Characteristic 33 (*) (+): Fruit: Shape in longitudinal section (Chilli and Paprika)



**Moderately
triangular (4)**



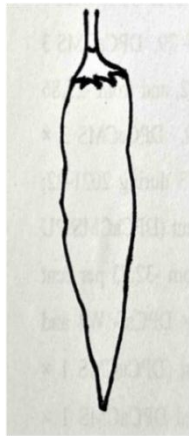
**Narrowly
triangular (5)**



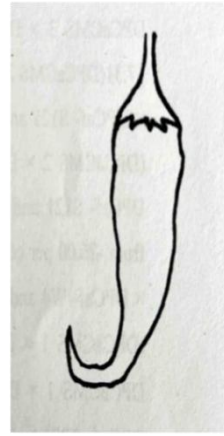
**Horn Shaped
(6)**



Characteristic 34 (+): Fruit: Curvature



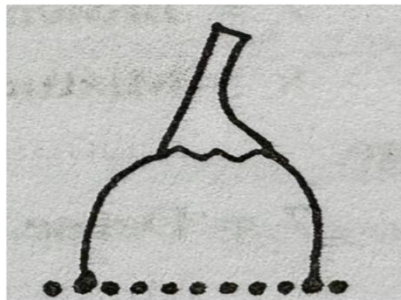
Absent (1)



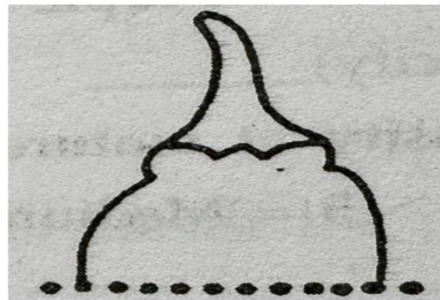
Present (9)



Characteristic 35 (+): Fruit: Neck at basal end



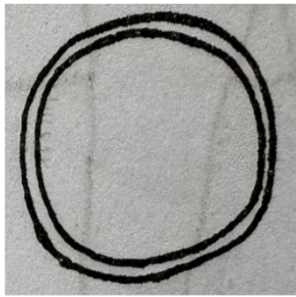
Absent (1)



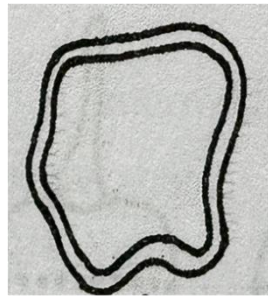
Present (9)



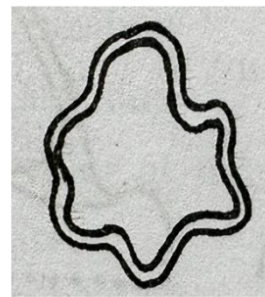
Characteristic 36 (*) (+): Fruit: Cross sectional corrugation (at level of placenta)



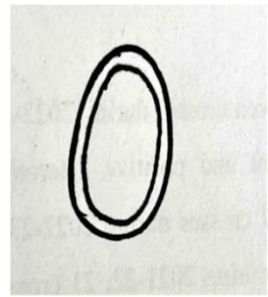
Round (3)



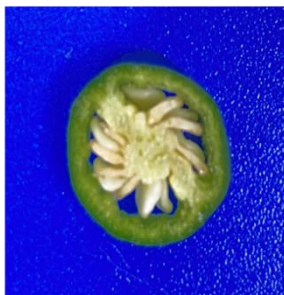
Slightly corrugated (5)



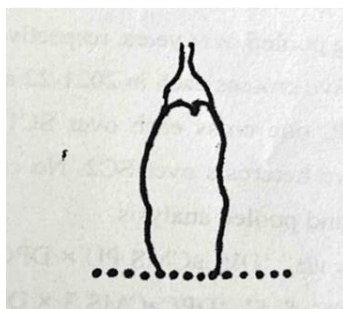
Strongly corrugated (7)



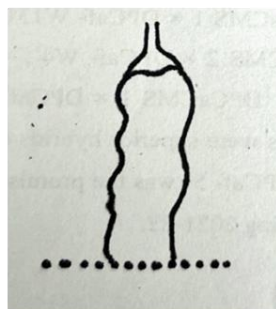
Oval (9)



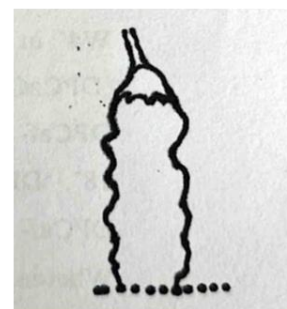
Characteristic 37 (*) (+): Fruit: Sinuation of pericarp



Weak (3)



Medium (5)



Strong (7)



Characteristic 38 (*): Fruit: Texture of surface



Smooth (3)



Rough (5)

**Characteristic 39 (*): Fruit: Colour (at ripe maturity)
(Chilli)**



Orange (2)



Orange Red (3)



Red (4)

Characteristic 39 (*): Fruit: Colour (at ripe maturity) (Bell Pepper)



Yellow (1)



Orange Red (3)



Red (4)

Characteristic 40: Fruit: Intensity of red colour (at maturity)



Light (3)



Medium (5)



Dark (7)

Characteristic 41: Fruit: Colour transition



One Stage (3)



Two Stage (5)



> Two Stage (7)

Characteristic 42: Fruit: Glossiness

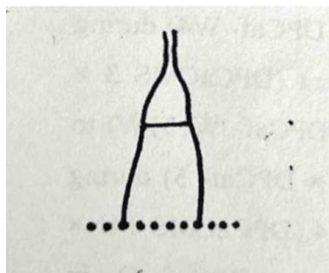


Weak (3)

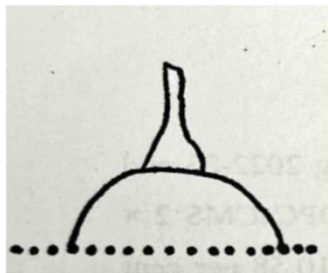


Strong (5)

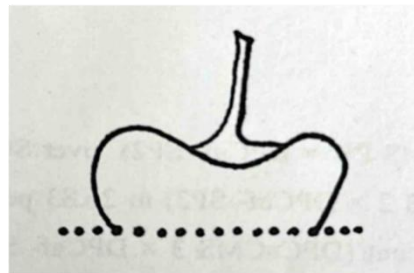
Characteristic 43 (*) (+): Fruit: Shape at the base



Acute (3)



Round (5)



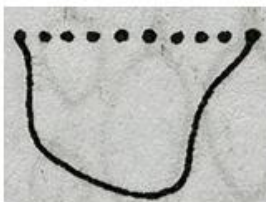
Sunken (7)



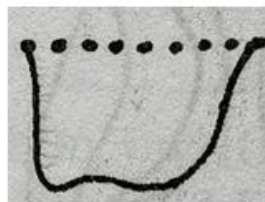
Characteristic 44 (+): Fruit: Shape of apex



Acute (1)



Blunt (3)



Depressed (5)



Characteristic 45 (*): Fruit: Number of locules/ lobes (bell pepper)



Two (1)

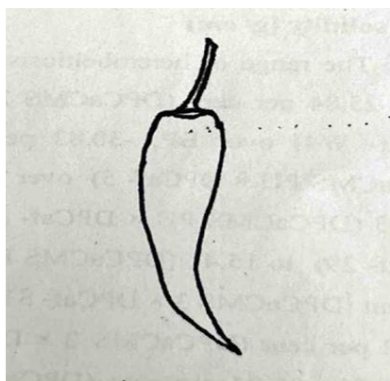


Three (2)

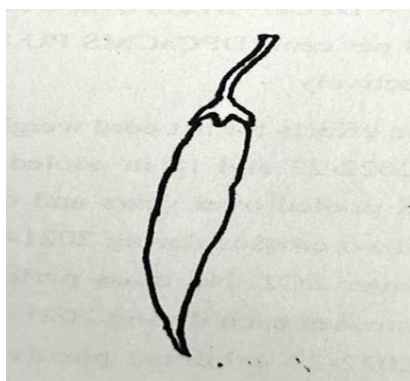


Four (3)

Characteristic 48 (+): Fruit: Calyx cover



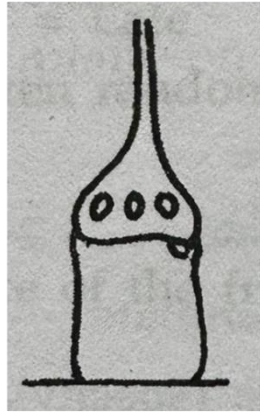
Non- Enveloping (1)



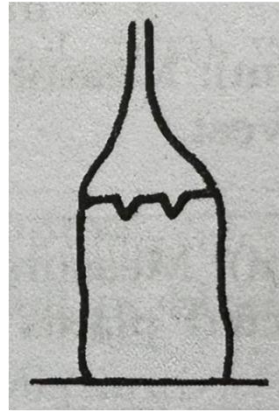
Enveloping (9)



Characteristic 49 (+): Fruit: Calyx margin



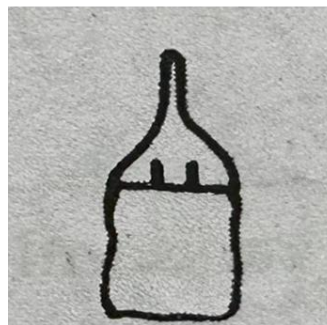
Smooth (1)



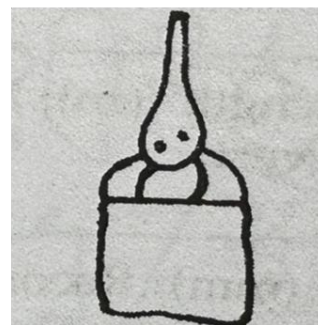
Dentate (9)



Characteristic 50 (+): Fruit: Calyx constriction



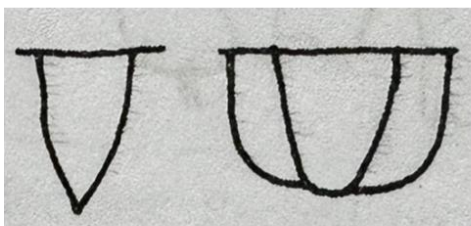
Absent (1)



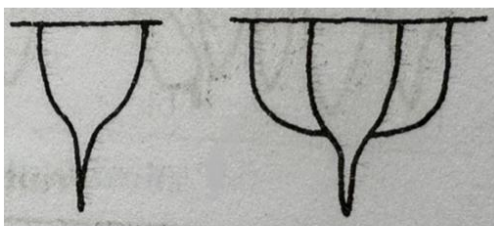
Present (9)



Characteristic 52 (+): Fruit: Blossom end appendage



Absent (1)



Present (9)



Characteristic 56: Seed: Colour



Light Yellow (3)



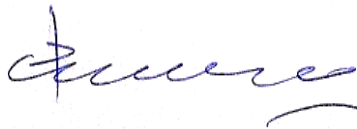
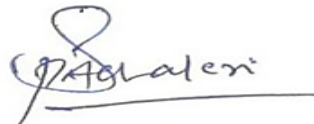
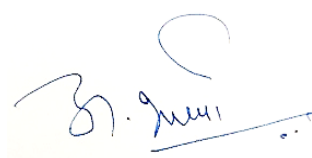
Yellow (5)

VIII. Literature: The DUS guidelines on chilli, paprika and bell pepper was used as base line for framing guidelines for protected conditions.

IX. Working Group Details:

The test guidelines were developed by the members of task force, the Nodal Officer, Co-Nodal Officers, DUS testing centers constituted by the PPV&FR Authority.

The Members of the Task Force

Dr. Pritam Kalia, Former Head, Division of Vegetable Science, IARI, New Delhi	Chairman	
Dr. Rajesh Kumar, Project Coordinator, AICRP on Vegetable Crops, IIVR, Varanasi	Member	
Dr. Mohan Rao, Professor & Head, Department of Genetics & Plant Breeding, UAS, GKVK, Bengaluru	Member	
Dr. Sharan Basappa, Senior Hot Pepper Breeder, Indo-American Hybrid Seeds Pvt. Ltd, Bengaluru	Member	
Registrar, PPVFRA, New Delhi		
Nodal Officer Dr. Akhilesh Sharma, Professor, Department of Vegetable Science & Floriculture, CSKHPKV, Palampur		
Co-Nodal Officer Dr. Mohan Rao, Professor & Head, Department of Genetics & Plant Breeding, UAS, GKVK, Bengaluru		

X. DUS test centres

Nodal DUS Centre
CSKHPKV, Palampur

Co-Nodal DUS Centre
UAS, GKVK, Bengaluru