

EAST ASIA PLANT VARIETY PROTECTION FORUM

PEPPER***(Capsicum annuum L.)*****GUIDELINES****FOR THE CONDUCT OF TESTS****FOR DISTINCTNESS, UNIFORMITY AND STABILITY**

Alternative Names:

<i>Botanical name</i>	<i>English</i>			
<i>Capsicum annuum</i> L.	Sweet Pepper, Hot Pepper, Paprika, Chili			

The purpose of these guidelines (“Test Guidelines”) is to fulfill the activities under the EAPVP Forum on harmonization of Test Guidelines.

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Capsicum annuum* L.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

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

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

2,500 seeds.

2.4 The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

2.5 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.6 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 *Number of Growing Cycles*

The minimum duration of tests should normally be two independent growing cycles.

3.2 *Testing Place*

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness".

3.3 *Conditions for Conducting the Examination*

3.3.1 The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.3.2 The recommended method of observing the characteristic is indicated by the following key in the second column of the Table of Characteristics:

MG: single measurement 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

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 20 plants which should be divided between 2 replicates.

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 *Number of Plants / Parts of Plants to be Examined*

Unless otherwise indicated, all observations should be made on 20 plants or parts taken from each of 20 plants.

3.6 *Additional Tests*

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 *Distinctness*

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the UPOV document TG/1/3 “General Introduction” prior to making decisions regarding distinctness.

4.2 *Uniformity*

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 For the assessment of uniformity of cross-pollinated varieties, a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 20 plants, 2 off-types are allowed.

4.2.3 For the assessment of uniformity of hybrids, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 20 plants, 1 off-type is allowed.

4.3 *Stability*

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

4.3.2 Where appropriate, or in cases of doubt, stability may be tested, either by growing a further generation, or by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the previous material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

- (a) Seedling: anthocyanin coloration of hypocotyl (characteristic 1)
- (b) Plant: shortened internode (in upper part) (characteristic 4)
- (c) Fruit: color (before maturity) (characteristic 21)
- (d) Fruit: attitude (characteristic 24)
- (e) Fruit: shape in longitudinal section (characteristic 28)
- (f) Fruit: color (at maturity) (characteristic 33)
- (g) Fruit: capsaicin in placenta (characteristic 45)
- (h) Resistance to Tobamovirus - Pathotype 0 (Tobacco MosaicVirus (0)) (characteristic 48.1)
- (i) Resistance to Tobamovirus - Pathotype 1-2 (Tomato MosaicVirus (1-2)) (characteristic 48.2)

- (j) Resistance to Tobamovirus - Pathotype 1-2-3 (Pepper Mild Mottle Virus (1-2-3)) (characteristic 48.3)
- (k) Resistance to Potato Virus Y (PVY) - Pathotype 0 (characteristic 49.1)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction.

6. Introduction to the Table of Characteristics

6.1 *Categories of Characteristics*

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the East Asia PVP Forum can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 *States of Expression and Corresponding Notes*

States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.3 *Types of Expression*

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the UPOV document TG/1/3 “General Introduction”.

6.4 *Example Varieties*

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.5 *Legend*

(*) Asterisked characteristic – see Chapter 6.1.2

QL: Qualitative characteristic – see Chapter 6.3

QN: Quantitative characteristic– see Chapter 6.3

PQ: Pseudo-qualitative characteristic – see Chapter 6.3

MG, MS, VG: See Chapter 3.3.2

(a) and (b) See Explanations on the Table of Characteristics in Chapter 8.1

(+) See Explanations on the Table of Characteristics in Chapter 8.2

7. Table of Characteristics

UPOV	EAPVP		Characteristics	Expression	Example Varieties	Note
1. (*) (+) QL	1	VG	Seedling: anthocyanin coloration of hypocotyl	absent present	Laris (INA) IPB Ungara (INA)	1 9
2. (+) QN	2	VG	Plant: habit	upright semi-upright prostrate	IPB C9 (INA), Bara, CT01P (MAS) Krisna (INA), Green Eagle 223 (MAS) Tanjung 2 (INA)	1 2 3
3. (+) QN	3	VG	Plant : length of stem	short medium long	IPB Perisai (INA), CT01P (MAS) Seloka IPB (INA), MC11 (MAS) TM999 (INA)	3 5 7
4. (*) (+) QL	4	VG	Plant: shortened internode (in upper part)	absent present	Tombak (INA), CT01P, MC11 (MAS) IPB 92(INA)	1 9
5. (+) QN	5	MS	Varieties with shortened internode only: Plant: number of internodes between the first flower and shortened internodes	none one to three more than three	- - IPB 92 (INA)	1 2 3
6. QN	6	MS/VG	Varieties without shortened internode: Plant: length of internode (on the first branching of the main axis)	short medium long very long	- IPB Perisai (INA) Hot Beauty(INA), CT01P, MC11 (MAS), Bara Krida 9 (INA) -	3 5 7 9
7. (+) QL	7	VG	Plant: anthocyanin coloration of nodes	absent present	Green Eagle 223 (MAS) IPB Ungara (INA), Bara, CT01P, MC11 (MAS)	1 9
8. (+) QN	8	VG	Stem: intensity of anthocyanin coloration of nodes	very weak weak medium strong very strong	 IPB 9, Tanjung 1 (INA), CT01P, MC11 (MAS) IPB Ungara (INA)	1 3 5 7 9
9. (+) QN	9	VG	Stem: hairiness of nodes	absent or very weak weak medium strong very strong	Tanjung 2 (INA), CT01P, MC11 (MAS) Jatilaba (INA) IPB Perisai (INA) IPB Ungara (INA)	1 3 5 7 9
10. (+) QN	10	VG/MS	Plant: height	very short short medium tall very tall	Tanjung 2(INA) Jatilaba (INA) IPB CH3 (INA) Biola (INA) Krida 9 (INA)	1 3 5 7 9
11. QN	11	MS/ VG	Leaf : length of blade	very short short medium	- Genie (INA) Adipati (INA),	1 3 5

				long very long	Bara, CT01P, MC11 (MAS) Tanamo (INA) Edison (INA)	7 9
12. QN	12	MS/ VG	Leaf : width of blade	very narrow narrow medium broad very broad	- Kopay (INA) IPB CH3 (INA), Bara, CT01P, MC11 (MAS) Tombak (INA) Suniya (INA)	1 3 5 7 9
13. QN	13	VG	Leaf : intensity of green color	very light light medium dark very dark	SG Hot 99 (INA) Genie (INA) TM 999 (INA), CT01P, MC11 (MAS) Tanjung 1 (INA) IPB Ungara (INA)	1 3 5 7 9
(+) QL	14	VG	Leaf: anthocyanin coloration	absent present	Bara, CT01P, MC11 (MAS) IPB Ungara (INA)	1 9
14. (+) PQ	15	VG	Leaf: shape	Lanceolate ovate broad elliptic	TM 999 (INA), Bara, CT01P, MC11 (MAS) IPB Perisai (INA) -	1 2 3
15. (+) QN	16	VG	Leaf: undulation of margin	very weak weak medium strong very strong	Genie (INA), CT01P, MC11 (MAS) Gada (INA) - Krida 9 (INA) -	1 3 5 7 9
16. (+) QN	17	VG	Leaf : blistering	absent or very weak weak medium strong very strong	TM 888 (INA), CT01P, MC11 (MAS) IPB Perisai (INA) - - -	1 3 5 7 9
17. (+) QN	18	VG	Leaf: profile in cross section	strongly concave moderately concave flat moderately convex strongly convex	IPB CH3 (INA) Kresna (INA), CT01P, MC11 (MAS) Biola (INA) - -	1 3 5 7 9
18. QN	19	VG	Leaf: glossiness	absent or very weak weak medium strong very strong	IPB Perisai (INA), CT01P, MC11 (MAS) - IPB Perbani (INA) - -	1 3 5 7 9
19. (*) (+) QN	20	VG	Flower: peduncle attitude	erect semi-drooping drooping	Bara - Tanjung 2 (INA), CT01P, MC11 (MAS)	1 2 3
(+) PQ	21	VG	Flower: stigma exsertion	below same level above	IPB Perbani (INA) IPB Perisai (INA) Adipati (INA)	1 2 3
20. (+) QL	22	VG	Flower: anthocyanin coloration in anther	absent present	- IPB Ungara (INA), CT01P, MC11 (MAS)	1 9
(+) QL	23	VG	Flower: : anthocyanin coloration in filament	absent present	Tanjung 1 (INA), MC 11 (MAS) IPB Ungara (INA),	1 9

					CT01P, Green Eagle 223 (MAS)	
(+) QL	24	VG	Flower: secondary color of corolla	absent at margin at base at margin and base	Adipati - IPB Ungara IPB C4	1 2 3 4
21. (*) (+) PQ	25	VG (a)	Fruit: color before maturity	greenish white yellow green purple	Solok (MAS), Bianca (INA) - Tanamo (INA), CT01P, MC11 (MAS) IPB Ungara (INA)	1 2 3 4
22. QN	26	VG (a)	Fruit: intensity of color before maturity	very light light medium dark very dark	IPB C9 (INA), Solok (MAS) Bara Tanjung 2 (INA), CT01P (MAS) Tanamo (INA), Green Eagle 223 (MAS) IPB Ungara (INA)	1 3 5 7 9
23. (+) QL	27	VG (a)	Fruit: anthocyanin coloration	absent present	Genie (INA), CT01P, MC11 (MAS) IPB Ungara (INA)	1 9
24. (*) (+) QN	28	VG (b)	Fruit: attitude	erect horizontal drooping	Bara - Kopay (INA), CT01P, MC11 (MAS)	1 2 3
25. (+) QN	29	VG/MS (b)	Fruit: length	very short short medium long very long	Bara IPB C9 (INA) TM 888 (INA) Tanamo (INA), CT01P, MC11 (MAS) Kopay (INA)	1 3 5 7 9
26. QN	30	VG/MS (b)	Fruit: diameter	very narrow narrow medium broad very broad	SG Hot 99 (INA) TM 888 (INA), Bara Tombak (INA), CT01P, MC11 (MAS) Bianca (INA), Solok (MAS) Edison (INA)	1 3 5 7 9
27. (*) QN	31	MS (b)	Fruit: ratio length/diameter	very small small medium large very large	Edison (INA) Bianca (INA) Tombak (INA) SG Hot 99 (INA) Kopay (INA)	1 3 5 7 9
28 (*) (+) PQ	32	VG (b)	Fruit: shape in longitudinal section	oblate circular cordate square rectangular trapezoidal moderately triangular narrowly triangular hornshaped linear	- - IPB Ungara (INA) Edison (INA) - Bianca (INA) Genie (INA), Solok (MAS) Bara IPB Perisai (INA), MC11 (MAS) Tombak (INA), CT01P, Green Eagle 223 (MAS)	1 2 3 4 5 6 7 8 9 10
(+)	33	VG	Fruit: twisting	Absent Present	Tombak Kopay	1 9

QL						
29. PQ	34	VG (b)	Fruit: shape in cross section (at level of placenta)	Elliptic angular circular	Krida 9 (INA), MC11 (MAS) IPB Perisai (INA) Adipati (INA), Bara, Green Eagle 223 (MAS)	1 2 3
30. (+) QN	35	VG (b)	Fruit: sinuation of pericarp at basal part	absent or very weak weak medium strong very strong	IPB Ungara (INA), Bara, CT01P (MAS) Tombak (INA) SG Hot 99 (INA), MC11, Solok (MAS) Kopay (INA) IPB Perisai (INA)	1 3 5 7 9
31. (+) QN	36	VG (b)	Fruit: sinuation of pericarp excluding basal part	absent or very weak weak medium strong very strong	Bara, CT01P (MAS) IPB CH3(INA), MC11, Solok (MAS) Tanjung 1 (INA) TM 999 (INA) IPB Perisai (INA)	1 3 5 7 9
32. (*) QN	37	VG (b)	Fruit: texture of surface	smooth or very slightly wrinkled slightly wrinkled strongly wrinkled	Hot Beauty (INA), Bara, CT01P (MAS) TM 888 (INA), MC11 (MAS) Kopay (INA), Solok (MAS)	1 2 3
33. (*) (+) PQ	38	VG (b)	Fruit: color at maturity	yellow orange red brown green	Suniya (INA) Magno (INA) Tombak (INA), MC11, CT01P (MAS) Tequila (INA) -	1 2 3 4 5
34. QN	39	VG (b)	Fruit : intensity of color at maturity	light medium dark	Bara, Solok (MAS) Tanjung 2 (INA), MC11, CT01P (MAS) IPB Ungara (INA)	3 5 7
35. (+) QN	40	VG (b)	Fruit: glossiness	weak medium strong	IPB Perisai (INA), CT01P (MAS) Kopay (INA), MC11 (MAS) Gada (INA)	3 5 7
36 (*) (+) QL	41	VG (b)	Fruit: stalk cavity	absent present	Tombak (INA), CT01P (MAS) IPB Perisai (INA), MC11, Solok (MAS)	1 9
37. (+) QN	42	VG (b)	Fruit: depth of stalk cavity	very shallow shallow medium deep very deep	Adipati (INA), MC11 (MAS) IPB Perisai (INA), Solok (MAS) Suniya (INA)	1 3 5 7 9
38. (+) PQ	43	VG (b)	Fruit: shape of apex	very acute moderately acute rounded moderately depressed very depressed	Kopay (INA) Adipati (INA), CT01P, MC11 (MAS) Tombak (INA) IPB Ungara (INA) Suniya (INA)	1 2 3 4 5
39.	44	VG	Fruit: depth of interocular grooves	absent or very shallow	Tombak, IPB	1

(+) QN		(b)		shallow medium deep	Perisai (INA), CT01P, MC11 (MAS) Edison, Bianca (INA) Magno (INA) Tequila (INA)	3 5 7
40. (*) (+) QN	45	MG (b)	Fruit: number of locules	predominantly two equally two and three predominantly three equally three and four predominantly four and more	Gada (INA), CT01P, MC11 (MAS) - Tanjung 1 (INA) - Edison (INA)	1 2 3 4 5
41. (*) QN	46	VG (b)	Fruit: thickness of flesh	very thin thin medium thick very thick	TM 999 (INA) Tanamo (INA), Bara Tanjung 1 (INA), CT01P, MC11 (MAS) Bianca (INA) Edison (INA)	1 3 5 7 9
42. QN	47	VG/MS (b)	Stalk: length	very short short medium long very long	- IPB Perisai (INA), Solok (MAS) Kresna (INA), CT01P (MAS) Krida 9 (INA) Kopay (INA)	1 3 5 7 9
43. QN	48	VG/MS (b)	Stalk: thickness	very thin thin medium thick very thick	Laris (INA), Bara Tombak (INA), MC11, Green Eagle 223 (MAS) Edison (INA)	1 3 5 7 9
44. (+) QL	49	VG (b)	Calyx: aspect	non enveloping enveloping	Suniya (INA) Krida 9 (INA), CT01P, MC11 (MAS)	1 2
45 (*) (+) QL	50	VG (b)	Fruit: capsaicin in placenta Add explanation: it's only observed the placenta	absent present	Edison (INA) Bara, CT01P, MC11 (MAS)	1 9
(+) QN	51	MG (b)	Fruit: For varieties with capsaicin in placenta present only: intensity of capsaicin	weak medium strong	IPB Perisai (INA) Tombak (INA), CT01P, MC11 (MAS) Bara	1 2 3
46. (+) QN	52	MS	Time of beginning of flowering (first flower on second flowering node	early medium late	IPB 92 (INA) IPB CH3 (INA) Tombak (INA)	3 5 7
47. (+) QN	53	VG	Time of maturity	very early early medium late very late	IPB 92 (INA) Tanjung 2 (INA) IPB CH3 (INA) Hot Bauty (INA) Tombak (INA)	1 3 5 7 9
48. (+) QL	54		Resistance to Tobamo Virus (TMV)	absent present		
48.1 (+) QL	54.1		Pathotype 0 (Tobacco Mosaic Virus (0))	absent present		1 9
48.2 (+)	54.2		Pathotype 1-2 (Tobacco Mosaic Virus (1- 2))	absent present		1 9

QL						
48.3 (+) QL	54.3		Pathotype 1-2-3 (Pepper Mild Mottle Virus (1-2-3))	absent present		1 9
49. (+) QL	55		Resistance to Potato Virus Y (PVY)	absent present		
49.1 QL	55.1		Pathotype 0	absent present		1 9
49.2 QL	55.2		Pathotype 1	absent present		1 9
49.3 QL	55.3		Pathotype 1-2	absent present		1 9
50. (+) QL	56		Resistance to Phytophthora capsici	absent present		1 9
51. (+) QL	57		Resistance to Cucumber Mosaic Virus (CMV)	absent present		1 9
52. (+) QL	58		Resistance to Tomato Spotted Wilt Virus (TSWV)	absent present		1 9
53. (+) QL	59		Resistance to Xanthomonas Campestris Virus pv. vesicatoria	absent present		1 9

Note: The set of example variety is identified by the country code where the set is coming from

8. Explanations on the Table of Characteristics

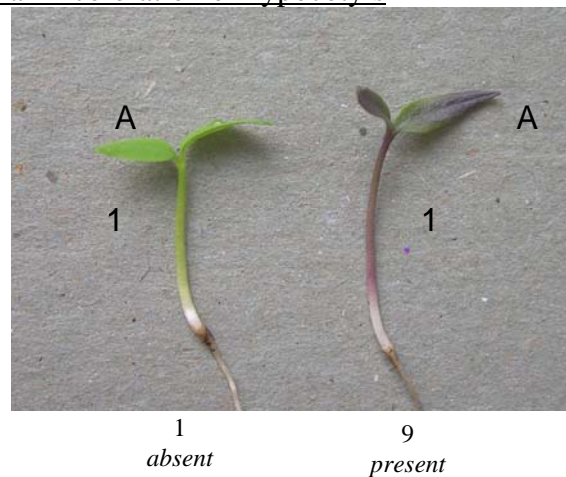
8.1 *Explanations covering several characteristics*

Characteristics containing the following key in the second column of the Table of Characteristics should be examined as indicated below:

- (a) Fruit characteristics which should be examined before maturity, i.e. before the first color change
- (b) Fruit characteristics which should be examined at maturity, i.e. after the time of the first color change

8.2 *Explanations for individual characteristics*

Ad. 1. Seedling: Anthocyanin coloration of hypocotyls



Ad.2: Plant: habit



Ad.3: Plant: Length of stem

The length of the stem is measured from the cotyledons to the first flower branch.

Ad. 4: Plant: shortened internode (in upper part)

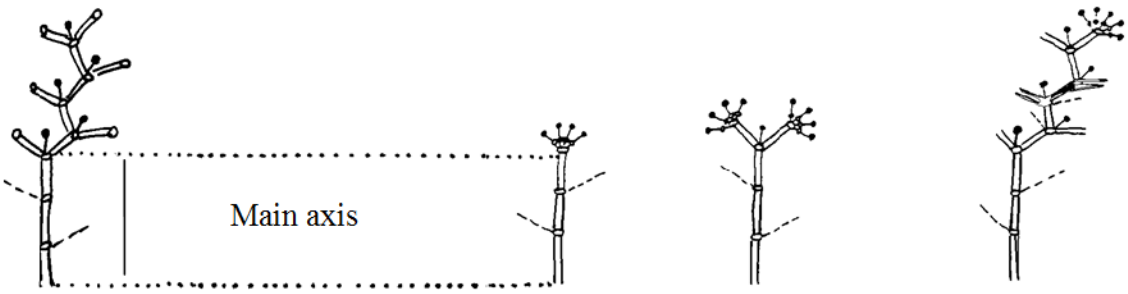
Ad. 5: Varieties with shortened internodes only: Plant: number of internodes between the first flower and shortened internodes





The tests should be done on plants which have not been pruned. The shoot system of pepper consists of main stems, which are branched off from the main axis and side shoots. Two growth types of the main stems can be distinguished:

Growth type A: the main stems grow indeterminately; one or two flowers develop per node and shortened internodes never develop.

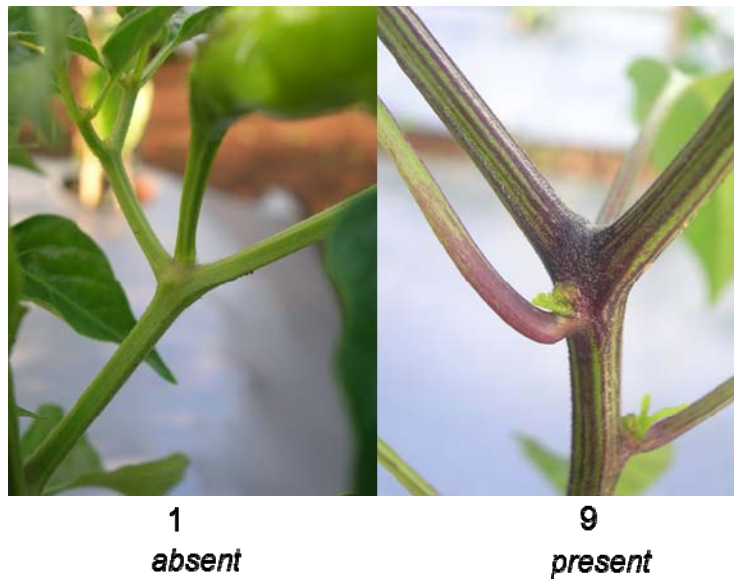
Growth type B: after the first branching of the main axis, shorter internodes appear and the growth of the main stem ends in a bunch of flowers (it appears as if there are more than two flowers per node).

Side shoots develop from the nodes on the main axis and on the main stems.

Growth type A		Growth type B	
Char. 4: Plant: shortened internodes (in upper part)			
absent		present	
			
Char. 5: <u>Varieties with shortened internodes only</u> : Plant: number of internodes between the first flower and shortened internodes	none (1)	one to three (2)	more than three (3)

-  flower
-  node
-  main stem
-  side shoots

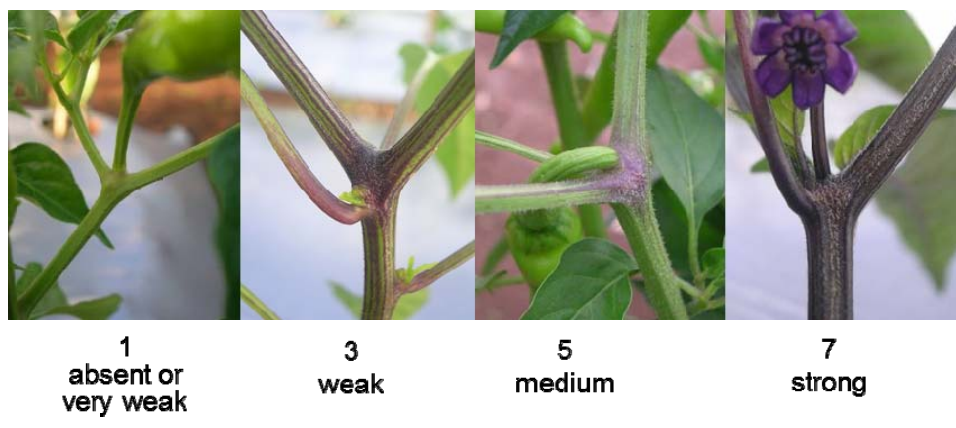
Ad. 7. Plant: Anthocyanin coloration of nodes



Ad.8. Stem: intensity of anthocyanin coloration of nodes



Ad. 9. Stem: hairiness of nodes



Ad. 10: Plant: height

To be observed after a fruit set on several nodes. Poor fruit set may influence the vigor and thus the height of the plant.

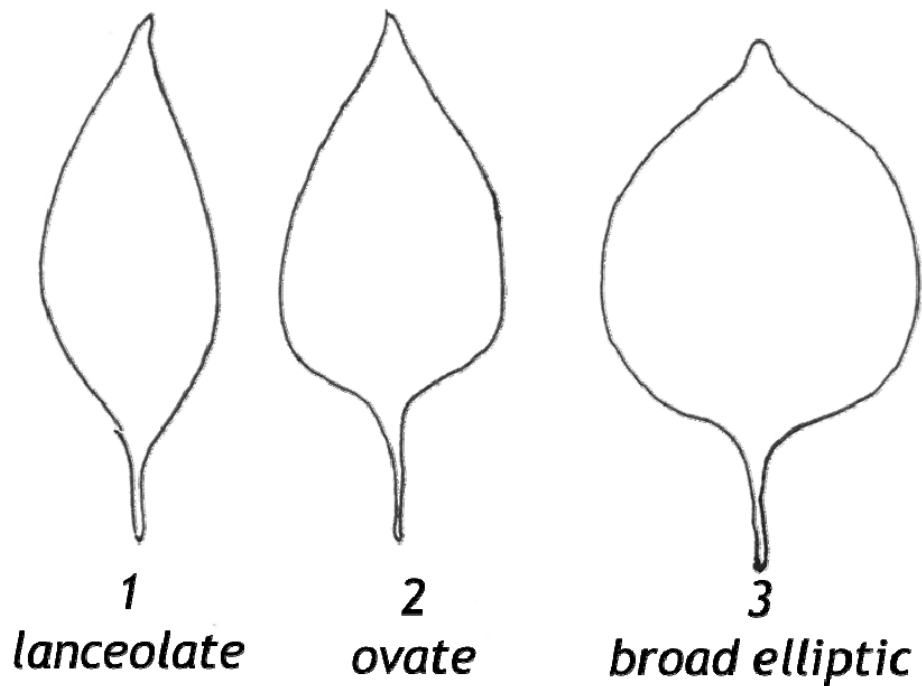
Ad. 14. Leaf: anthocyanin coloration



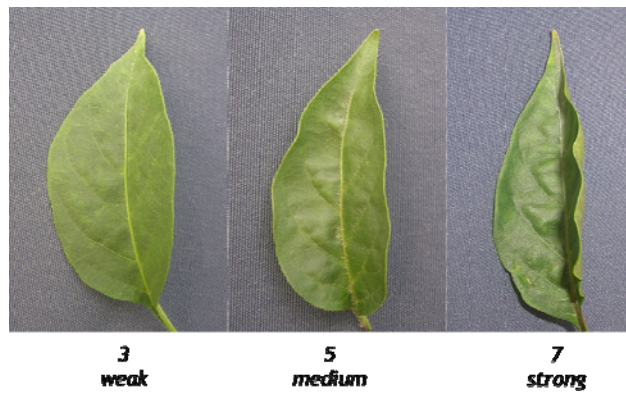
1
absent

2
present

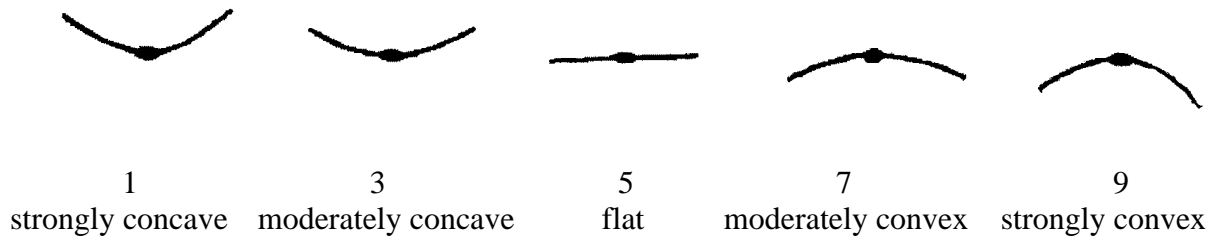
Ad. 15: Leaf: shape



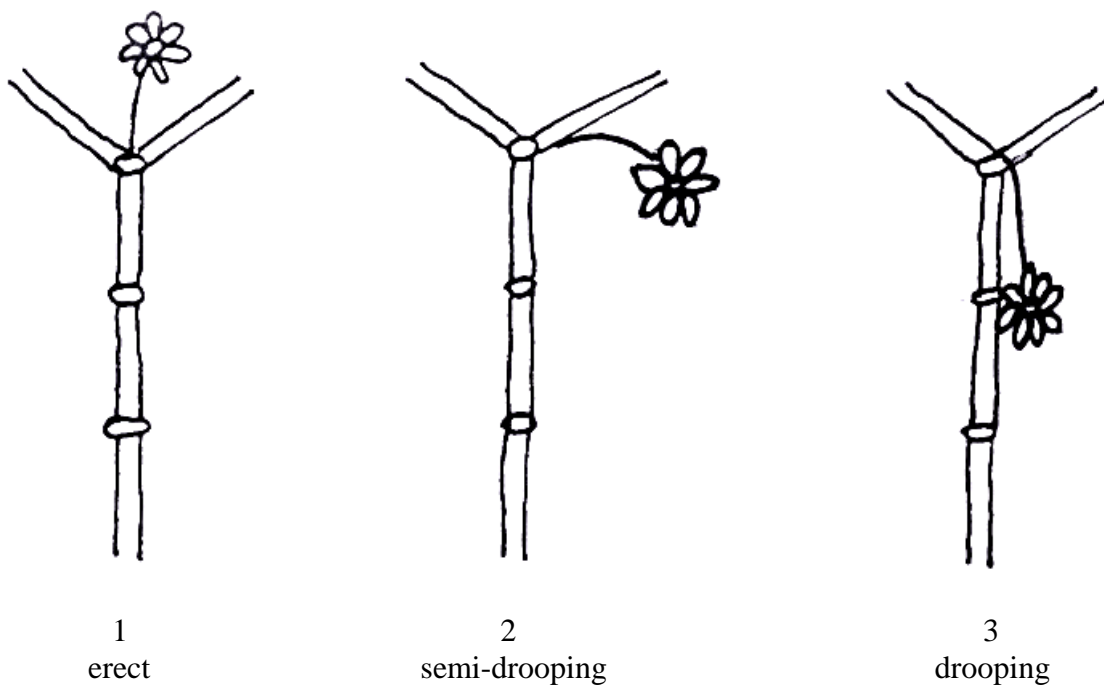
Ad. 16. Leaf: undulation of margin



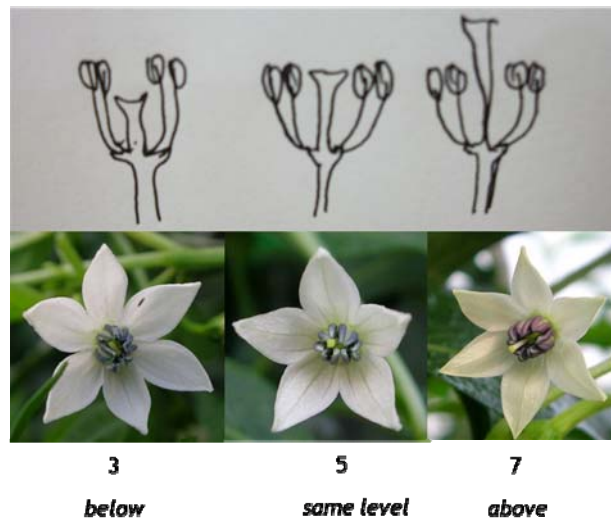
Ad. 18: Leaf: profile in cross section



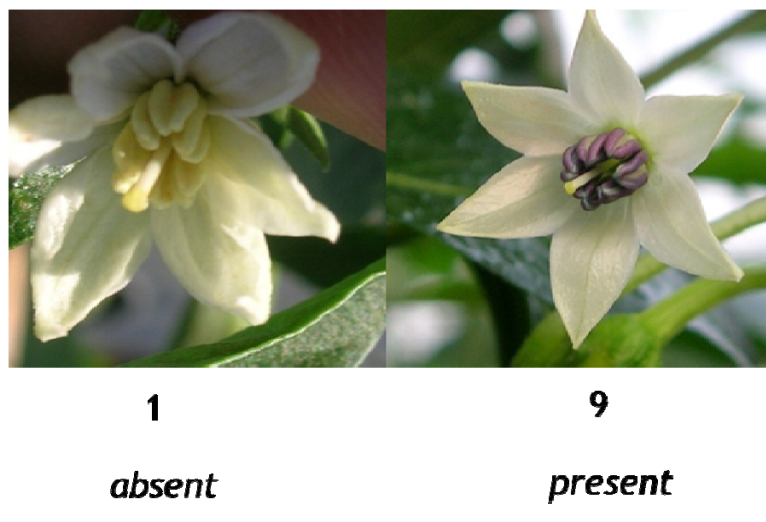
Ad. 20: Peduncle: attitude



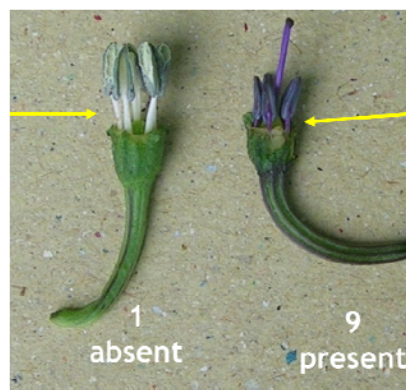
Ad. 21: Flower: Stigma exsertion



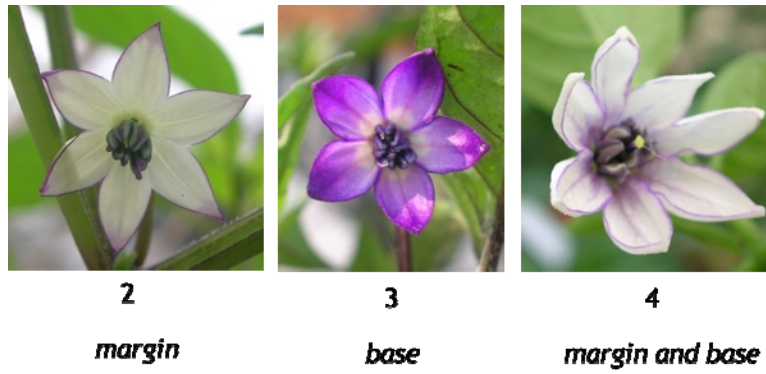
Ad. 22: Flower: Anthocyanin coloration in anther



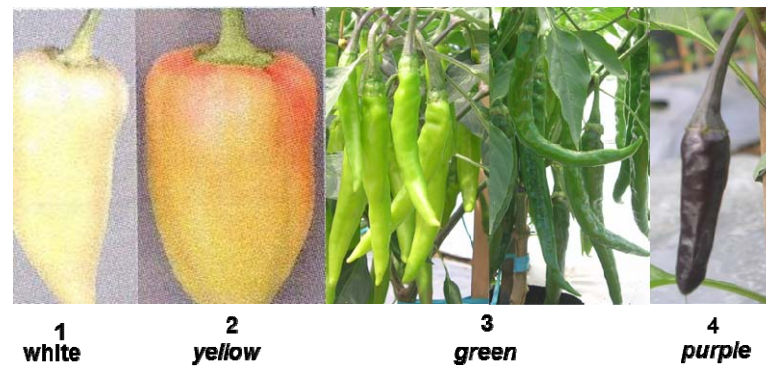
Ad. 23: Flower: Anthocyanin coloration on filament



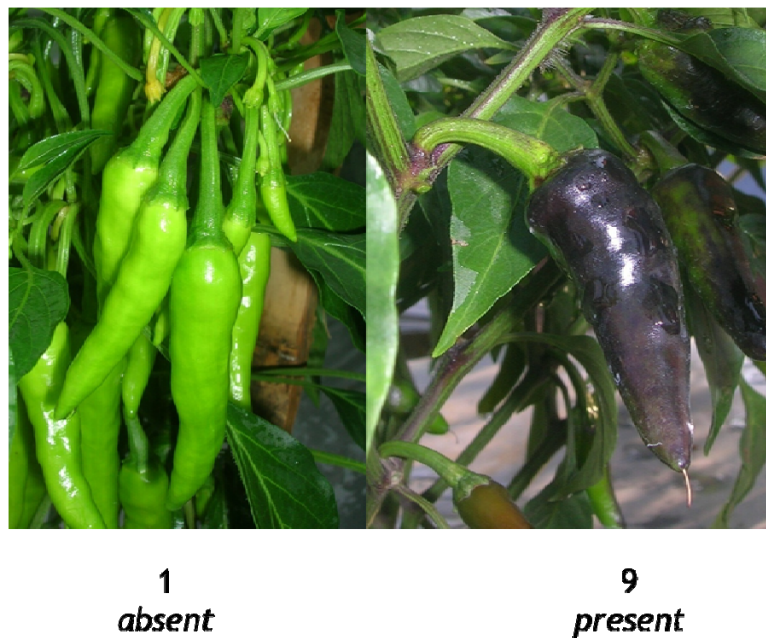
Ad. 24: Flower: secondary color of corolla



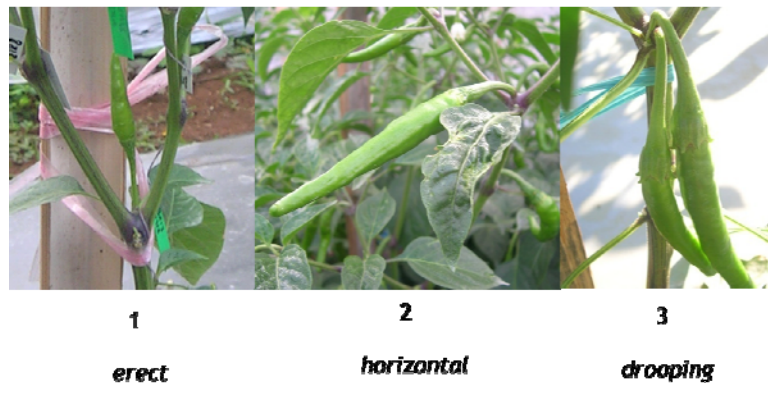
Ad. 25. Fruit : Color before maturity



27. Fruit : Anthocyanin Coloration



Ad. 28. Fruit : Attitude



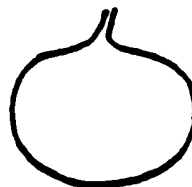
Ad 29. Fruit: length



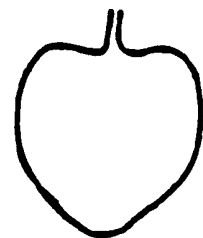
Ad. 32: Fruit: shape in longitudinal section



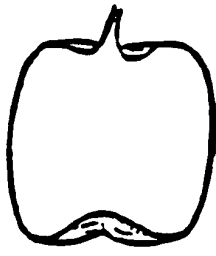
1
oblate



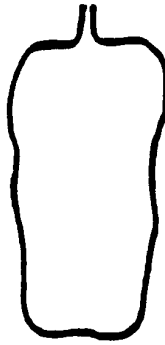
2
circular



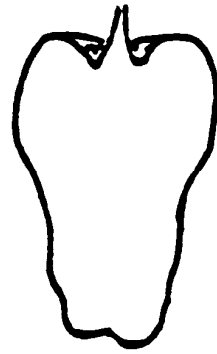
3
cordate



4
square



5
rectangular



6
trapezoidal



7
moderately triangular

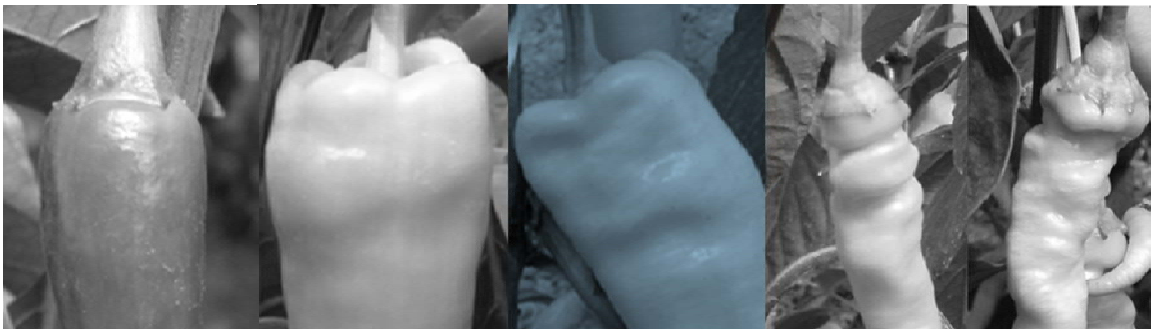


8
narrowly triangular



9
hornshaped

Ad. 35: Fruit: sinuation of pericarp at basal part



1
**absent or
very weak**

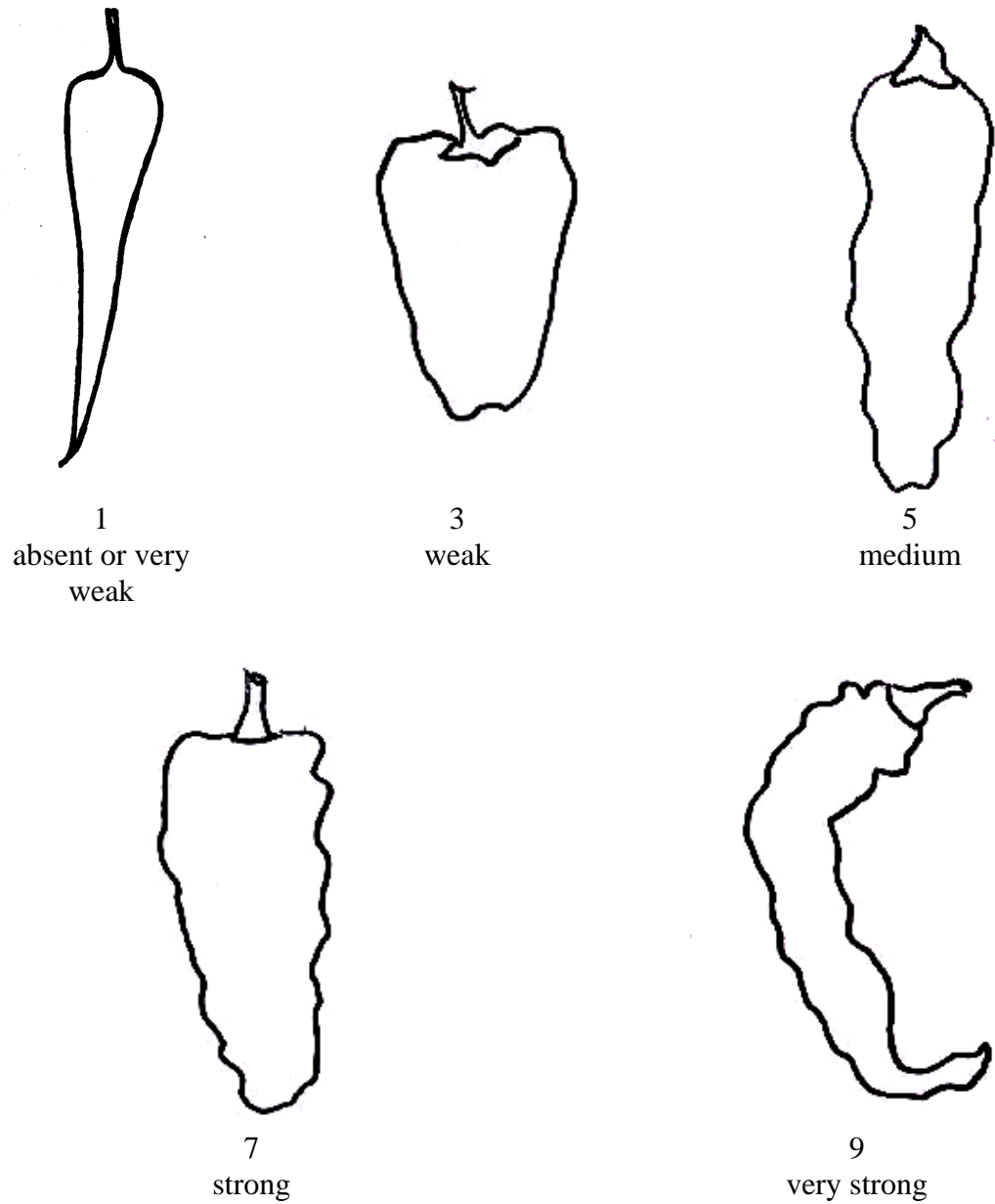
3
weak

5
medium

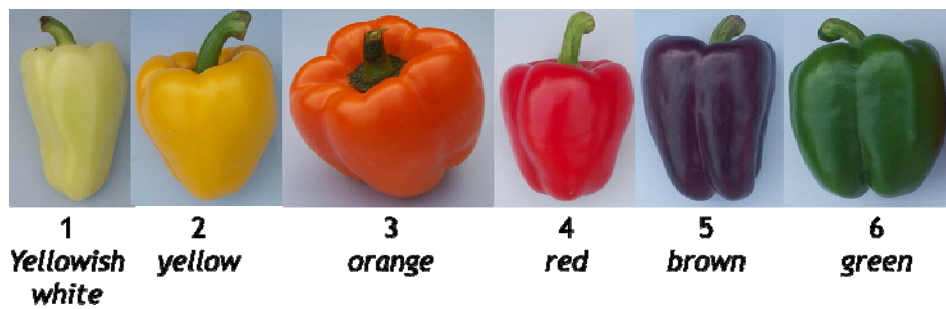
7
strong

9
very strong

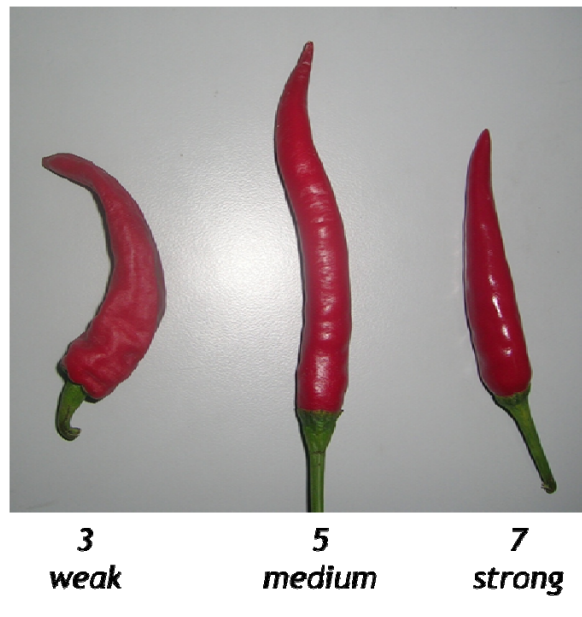
Ad. 36: Fruit: sinuation of pericarp excluding basal part



Ad. 38. Fruit : Color at maturity



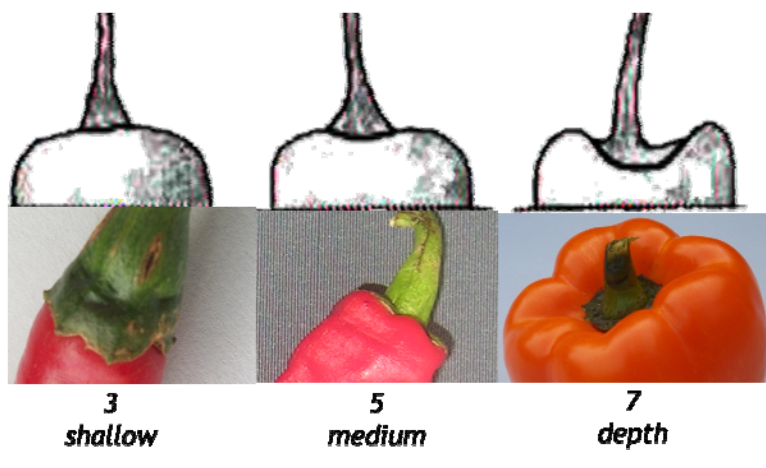
Ad. 40. Fruit : Glossiness



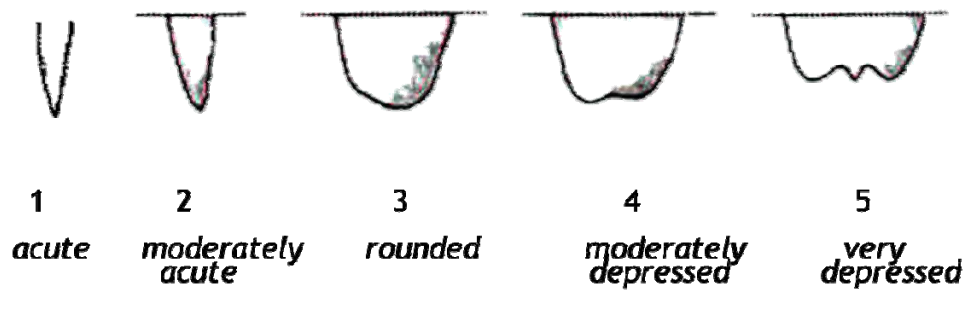
Ad. 41. Fruit : Stalk cavity



Ad. 42. Fruit: depth of stalk cavity

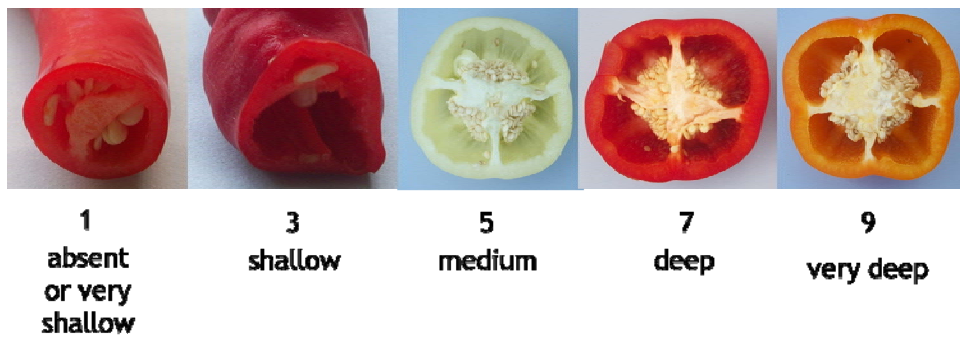


Ad. 43. Fruit : Shape of apex

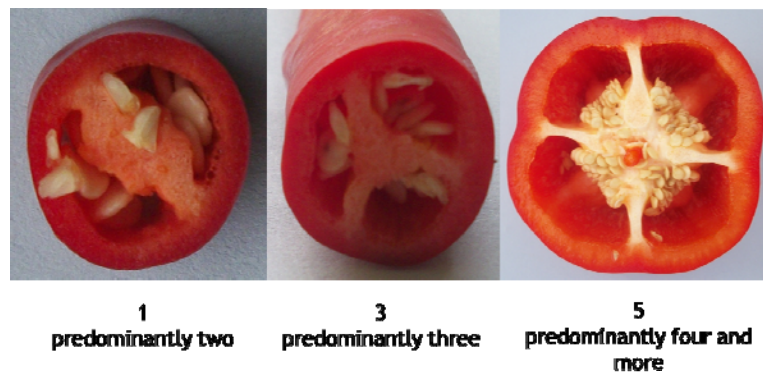


Ad. 44: Fruit: depth of interloculary grooves

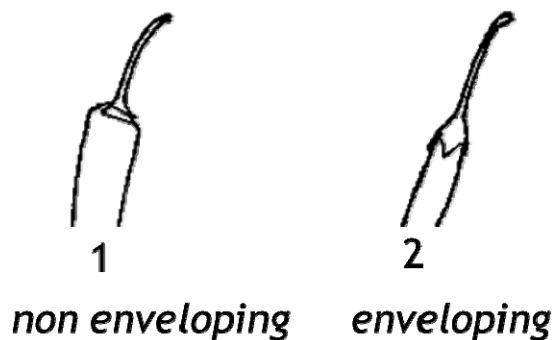
To be observed in the middle part of the fruit.



Ad. 45. Fruit : Fruit: number of locules



Ad. 44: Calyx: aspect



Ad. 50: Fruit: capsaicin in placenta

The Intensity of capsaicin is observed by tasting the placenta at the third part from the base, in compare with example variety.

Ad. 52. Time of beginning of flowering

Time of beginning of flowering is reached when 50% populations produce fully open flower.

Ad. 53. Time of maturity

Maturity is reached when 50% of the populations completely change to the final color (ripe color).

Ad. 48: Resistance to Tobamovirus

Maintenance of pathotypes

Type of medium: On plants or dehydrated leaves (in deep-freezer or method BOS)

Special conditions: Regeneration of the virus on plant material before inoculum preparation

Execution of test

Growth stage of plants: When cotyledons are fully developed or at “first leaf” stage

Temperature: 20-25°C

Growing method: Sowing and raising of seedlings in boxes or soil blocks in glasshouse

Method of inoculation: Rubbing of cotyledons with a virus suspension

Duration of test

- Sowing to inoculation: 10 to 15 days

- Inoculation to reading: 10 days

Number of plants tested: 15 to 30 plants

Genetics of virus pathotypes and resistant genotypes:

The genetic resistance to Tobamoviruses is controlled by 5 alleles located on the same locus. The table below shows the relationship between virus pathotypes and resistance genotypes:

Pepper Genotype reactions to Tobamovirus Pathotypes

Virus:	Pepper Tobamovirus Pathotypes		
	TMV	ToMV	PMMoV
Strain:	U1 Feldman	P11 Obuda Pepper Mosaic Virus	P14 Samsun latens
Genotype / mark	P ₀	P ₁₋₂	P ₁₋₂₋₃
L ⁻ L ⁻	S	S	S
L ¹ L ¹	R	S	S
L ³ L ³	R	R	S
L ⁴ L ⁴	R	R	R

Legend:

S = susceptible

R = resistant

TMV = Tobacco Mosaic Virus

ToMV = Tomato Mosaic Virus

PMMoV = Pepper Mild Mottle Virus

Ad. 49: Resistance to Potato Virus Y (PVY)

Maintenance of pathotypes

Type of medium: On susceptible plants

Special conditions: For the strain PVY(0): use the line TO72(A)
For the strain PVY(1): use the line Sicile 15
For the strain PVY(1-2): use the line SON41

Execution of test

Growth stage of plants: Young plants at the stage of developed cotyledons - first pointing leaf

Temperature: 18-25°C

Growing method: Raising of plants in glasshouse

Method of inoculation: Rubbing of cotyledons with a virus solution
Composition of the solution:
inoculum: 4 ml extraction solution for 1 g infected leaves + 80 g activated carbon + 80 mg carborundum;
extraction solution: buffer solution diluted 1/20 with 0.2% diethyl dithiocarbamate of sodium (DIECA);
buffer solution: (for 100 ml sterile water) 10.8 g Na_2HPO_4 + 1.18 g K_2HPO_4 at pH 7.1-7.2

Duration of test

Sowing to inoculation: 10 to 15 days

Inoculation to reading: 3 weeks (2 weeks minimum, 4 weeks maximum)

Number of plants tested: 60 plants

Remarks: The test should not be conducted at high temperatures.

Standard varieties:	Pathotype 0	Pathotype 1	Pathotype 1-2
Sensitive varieties:	Yolo Wonder	Yolo Wonder, Yolo Y	Florida VR2,* Yolo Wonder, Yolo Y
Resistant varieties:	Yolo Y	Florida VR2	Serrano Criollo de Morenos

* Florida VR2 can exhibit diffused and very late symptoms.

Ad. 50: Resistance to *Phytophthora capsici*

Scoring must be carried out under conditions of controlled infection:

Maintenance of inoculum

Inoculum and type of medium: *Phytophthora capsici* strain 101, to be cultivated on V8 juice-agar (1%) in Petri's dishes.

Conduct of test

Growth stage of plants: around eight-week old plants, grown in greenhouse (stage: first flower bud)

Temperature: 22°C

Light: 12 hours/day

Method of inoculation: Plants are cut just below the point of first branching. A disc of mycelium of 4 mm-diameter should be used as inoculum. The disc is placed on the freshly cut stem. The top of the stem is wrapped with a piece of aluminium foil, to keep it wet. Infected plants are transferred to a growth chamber kept at 22°C.

Duration of test:

From sowing to inoculation: between 6 and 8 weeks

From inoculation to scoring: first scoring: 7 days
second scoring: 14 days
final scoring: 21 days

Number of plants tested: 20 plants

Scoring: The length of necrosis on the stem, induced by the fungus development, is recorded once a week during 3 weeks, on each plant. The aluminium foil on the top of the stem should be removed 7 days after the inoculation. The first reading should take place immediately after the removal of the aluminium foil. Subsequent scoring should be made on the 14th and 21st day counting from the day of inoculation. The distance (in mm) between the lowest point reached by the necrosis and the top of the stem should be recorded.

Standard varieties: Susceptible: Yolo Wonder
Resistant: Chistera, Favorol, Solario, Phyo 636 (given in the order of their level of resistance)

Ad. 51: Resistance to Cucumber Mosaic Virus (CMV)

Maintenance of pathotypes

Strain: Fulton

Type of medium: On susceptible plants: *Vinca rosea*

Special conditions: -

Inoculum production: Crushing of 1g of fresh leaves of *Vinca rosea* in 4 ml of Phosphate buffer 0.03M pH 7 + DIECA (diethyl dithiocarbamate de sodium) (1 for 1000) + 300 mg of activated carbon + 80 mg of carborundum

Execution of test:

Growth stage of plants: Young plants at the stage of developed cotyledons. First leaf non pointing

Number of plants: 50 plants

Growing conditions: 22°C, 12 hours of light

Growing method: Raising of plants in climatized room

Method of inoculation: Mechanical rubbing of cotyledons with a virus solution, the plants are kept in darkness for 48 hours

Duration of test:

From sowing to inoculation: 12 to 13 days

From inoculation to reading: 3 readings at 10, 15 and 21 days after inoculation

Standard varieties:

Susceptible variety: Yolo Wonder

Tolerant (T) or resistant (R) varieties: Milord (T)
Vania (R)

Ad. 52: Resistance to Tomato Spotted Wilt Virus (TSWV)

Maintenance of pathotypes:

Type of medium: Pepper fruit in deep-freezer (-70 °C)
Special condition: Regeneration of the virus on *Nicotiana rustica* or *Nicotiana benthamiana* plants before inoculation

Execution of test:

Growth stage of the plants: Two leaves expanded
Temperature: 20 - 22 °C
Light: Extra light in winter
Growing method: Sowing in greenhouse
Method of inoculation: Mechanical, rubbing on cotyledons, inoculum suspension 10 °C

Duration of test:

from sowing to inoculation: 20 days
from inoculation to reading: 14 days

Number of tested plants: 20 plants

Standard varieties.

Susceptible: Lamuyo
Resistant: Galileo, Jackal, Jackpot

Ad. 53: Resistance to *Xanthomonas campestris* pv. *vesicatoria*

Maintenance of pathotypes

Type of medium: PDA (Potato, Dextrose, Agar) medium
Special conditions: 48 hours *Xanthomonas campestris* pv. *vesicatoria* culture. Adjusting inoculum concentration of bacteria-cellular 10^7 .

Execution of test

Growth stage of plants: 6th to 8th true leaves
Temperature: 24 °C night, 25°C day
Relative humidity: 80%

Light: 30 000 lx, day length 16 hours

Growing method: Sowing in boxes in climate chamber or in glasshouse

Method of inoculation: Infiltration into abaxial surface of a leaf in 13-15 mm diameter spots

Duration of the test: 10-14 days

Number of plants tested: 15 to 30 plants

Remarks

Genetics of bacteria pathotypes and resistant genotypes:

Resistant varieties: Aladin, Camelot, ECR-20R, Kaldóm, Kalorez, Lancelot, Pasa

9. Literature

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10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
<p style="text-align: center;">TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights</p>		
<p>1. Subject of the Technical Questionnaire</p> <p>1.1 Botanical name <input type="text" value="Capsicum annuum L."/></p> <p>1.2 Common Name <input type="text" value="Sweet Pepper, Hot Pepper, Paprika, Chili"/></p>		
<p>2. Applicant</p> <p>Name <input type="text"/></p> <p>Address <input type="text"/></p> <p>Telephone No. <input type="text"/></p> <p>Fax No. <input type="text"/></p> <p>E-mail address <input type="text"/></p> <p>Breeder (if different from applicant) <input type="text"/></p>		
<p>3. Proposed denomination and breeder's reference</p> <p>Proposed denomination (if available) <input type="text"/></p> <p>Breeder's reference <input type="text"/></p>		

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<p>4. Information on the breeding scheme and propagation of the variety</p> <p>4.1 Breeding scheme</p> <p>Variety resulting from:</p> <p>4.1.1 Crossing</p> <p>(a) controlled cross [] (please state parent varieties)</p> <p>(b) partially known cross [] (please state known parent variety(ies))</p> <p>(c) unknown cross []</p> <p>4.1.2 Mutation [] (please state parent variety)</p> <p>4.1.3 Discovery and development [] (please state where and when discovered and how developed)</p> <p>4.1.4 Other [] (please provide details)</p> <p>4.2 Method of propagating the variety</p> <p>4.2.1 Seed-propagated varieties</p> <p>(a) Self-pollination []</p> <p>(b) Cross-pollination []</p> <p>(c) Hybrid []</p> <p>(d) Other [] (please provide details)</p> <p>4.2.2 Other [] (please provide details)</p>		

TECHNICAL QUESTIONNAIRE		Page {x} of {y}	Reference Number:
<p>5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).</p>			
Characteristics	Example Varieties	Note	
5.1 Seedling: anthocyanin coloration of hypocotyl (1)			
absent	Laris	1[]	
present	IPB Ungara	9[]	
5.2 Plant: shortened internode (in upper part) (4)			
absent	Tombak	1[]	
present	IPB92	9[]	
5.3 Peduncle: attitude (19)			
erect	Bara	1[]	
semi-drooping	-	2[]	
drooping	Tanjung	3[]	
5.4 Fruit: color (<u>before</u> maturity) (21)			
greenish white	Solok, Bianca	1[]	
yellow	-	2[]	
green	Tanamo	3[]	
purple	IPBUngara	4[]	

Characteristics	Example Varieties	Note
5.5 Fruit: shape in longitudinal section (28)		
oblate	-	1[]
circular	-	2[]
cordate	IPB Ungara	3[]
square	Edison	4[]
rectangular	-	5[]
trapezoidal	Bianca	6[]
moderately triangular	Genie, Solok	7[]
narrow triangular	Bara	8[]
hornshaped	IPBPerisai	9[]
5.6 Fruit: color (<u>at</u> maturity) (33)		
yellow	Suniya	1[]
orange	Magno	2[]
red	Tombak	3[]
brown	Tequila	4[]
green	-	5[]
5.7 Fruit: number of locules (40)		
predominantly two	Gada	1[]
equally two and three	-	2[]
predominantly three	Tanjung	3[]
equally three and four	-	4[]
predominantly four and more	Edison	5[]
Characteristics	Example Varieties	Note
5.8 Fruit: capsaicin in placenta (45)		
absent	Edison	1[]
present	Bara	9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
5.9(i) Resistance to Tobamovirus - (48.1) Pathotype 0 (Tobacco MosaicVirus (0))		
absent	-	1[]
present	-	9[]
5.9(ii) Resistance to Tobamovirus - (48.2) Pathotype 1-2 (Tomato MosaicVirus (1-2))		
absent	-	1[]
present	-	9[]
5.9(iii) Resistance to Tobamovirus - (48.3) Pathotype 1-2-3 (Pepper Mild Mottle Virus (1-2-3))		
absent	-	1[]
present	-	9[]
5.10 Resistance to Potato Virus Y (PVY) - (49.1) Pathotype 0		
absent	-	1[]
present	-	9[]

6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
<i>Example</i>	<i>Fruit: color after first color change</i>	<i>yellow</i>	<i>red</i>

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<p>Comments:</p>		

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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<p>#7. Additional information which may help in the examination of the variety</p> <p>7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?</p> <p>Yes [] No []</p> <p>(If yes, please provide details)</p> <p>7.2 Are there any special conditions for growing the variety or conducting the examination?</p> <p>Yes [] No []</p> <p>(If yes, please provide details)</p> <p>7.3 Other information</p>
<p>8. Authorization for release</p> <p>(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?</p> <p>Yes [] No []</p> <p>(b) Has such authorization been obtained?</p> <p>Yes [] No []</p> <p>If the answer to (b) is yes, please attach a copy of the authorization.</p>

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
-------------------------	-----------------	-------------------

9. Information on plant material to be examined or submitted for examination

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a) Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [<input type="checkbox"/>]	No [<input type="checkbox"/>]
(b) Chemical treatment (e.g. growth retardant, pesticide)	Yes [<input type="checkbox"/>]	No [<input type="checkbox"/>]
(c) Tissue culture	Yes [<input type="checkbox"/>]	No [<input type="checkbox"/>]
(d) Other factors	Yes [<input type="checkbox"/>]	No [<input type="checkbox"/>]

Please provide details for where you have indicated “yes”.

.....

9.3 Has the plant material to be examined been tested for the presence of virus or other pathogens?

Yes [☐]

(please provide details as specified by the Authority)

No [☐]

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant's name			
Signature			