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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
 GENEVA

DRAFT

**SWEET PEPPER, HOT PEPPER,
 PAPRIKA, CHILI**

UPOV Code: CAPSI_ANN

Capsicum annuum L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Hungary

*to be considered by the
 Technical Working Party for Vegetables at its thirty-eighth session,
 to be held in Seoul, from June 7 to 11, 2004*

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Capsicum annuum</i> L.	Sweet Pepper, Hot Pepper, Paprika, Chili	Piment, Poivron(s)}	Paprika	Pimiento

The purpose of these guidelines (“Test Guidelines”) is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

ASSOCIATED DOCUMENTS

These guidelines (“Test Guidelines”) should be read in conjunction with document TG/1/3, “General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants” (hereinafter referred to as the “General Introduction”) and its associated “TGP” documents.

Other associated UPOV documents:

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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:

3000 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
VS: visual assessment by observation of individual 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 for a glasshouse trial between two replicates at least and 40 plants for an open air trial should be divided between 2 replicates at least.

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 in the glasshouse or, if the test is conducted in the open air, on 40 plants or parts taken from each of 40 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 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 a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 40 plants 2 off type are allowed, and 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.

4.3.3 Where appropriate, or in cases of doubt, the stability of a hybrid variety may, in addition to an examination of the hybrid variety itself, also be assessed by examination of the uniformity and stability of its parent lines. [REMARKS Bouty: Not necessary for vegetables up to now]

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)** [REMARKS Bouty: Not opposition but 99.9% of the varieties present anthocyanin coloration]
- (b) Plant: shortened internode (in upper part) (characteristic 4)
- (c) Fruit: color before maturity (characteristic 19)
- (d) Fruit: predominant shape of longitudinal section (characteristic 25)
- (e) Fruit: color at maturity (characteristic 29)

- (f) Fruit: capscicine in placenta (characteristic 42)
- (g) Resistance to Tobamovirus - Pathotype P₀, (characteristic 45.1)
- (h) Resistance to Tobamovirus - Pathotype P₁₋₂ (characteristic 45.3)

[REMARKS] Bouty: To add

- (i) Resistance to Pepper Mild Mottle Virus (1-2),
- (j) Resistance to Pepper Mild Mottle Virus (1-2-3),
- (k) Resistance to Potato Virus Y (0),
- (l) Resistance to Potato Virus Y (1),
- (m) Resistance to Potato Virus Y (1-2),
- (n) Resistance to *Phytophthora capsici*,
- (o) Resistance to Tomato Spotted Wilt Virus
- (p) Resistance to Cucumber Mozaic Virus

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 Union 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 General Introduction.

6.4 *Example Varieties*

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

6.5 *Legend*

(*) Asterisk characteristic – see Chapter 6 (Section 6.1.2)

QL Qualitative characteristic – see Chapter 6 (Section 6.3)

QN Quantitative characteristic – see Chapter 6 (Section 6.3)

PQ Pseudo-qualitative characteristic – see Chapter 6 (Section 6.3)

(+) See Explanations on the Table of Characteristics in Chapter 8.

MG: single measurement of a group of plants or parts of plants - see Section 3.3.2

MS: measurement of a number of individual plants or parts of plants - see Section 3.3.2

VG: visual assessment by a single observation of a group of plants or parts of plants -
see Section 3.3.2

VS: visual assessment by observation of individual plants or parts of plants -
see Section 3.3.2

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
1. VS (*)	Seedling: anthocyanin coloration of hypocotyl					
QL	absent				Albargia, Albena	1
	present				Lamuyo	9
REMARKS Bouty: Not opposition but 99.9% of the varieties present anthocyanin coloration						
2. VS	Plant: attitude					
QN	erect				De Cayenne, Doux long des Landes, Piquant d'Algérie	3
	semi-erect				Clovis, Sonar	5
	prostrate				Delphin, Trophy	7
3. MS	Plant: length of stem (from cotyledons to first flower/branching)					
QN	short				Delphin, Trophy	3
	medium				Belsir, Lamuyo	5
	long				Lipari, Marconi, Rouge long ordinaire	7
4 VS (*) (+)	Plant: shortened internode (in upper part)					
QL	absent				California Wonder, De Cayenne	1
	present				Fehér, Kalocsai 601	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota	
5. MS	<u>Varieties with shortened internodes only:</u>						
(+)	Plant: number of internodes between the first flower and shortened internodes (test to be done on non-pruned plants)						
QL	none				Kalocsai 601	1	
	one to three				Fehér	2	
	more than three				Kalocsai 702	3	
6. MS	<u>Varieties without shortened internodes only:</u>						
	Plant: Length of internode (on primary side shoots)						
QN	very short				Albaregia	1	
	short				Blondy, Bandero, Danubia, Tenor	3	
	medium				Dolmi, Florian, Órias	5	
	long				Coro di toro rosso	7	
	very long				Fenice, Kalocsai M, Sienor	9	
7. VS	Plant: anthocyanin coloration at level of nodes						
QN	absent or very weak				Albaregia	1	
	weak				Clio, Doux d'Espagne, Doux long des Landes, Golden Calwonder, California Wonder	3	
	medium				Clovis, Lamuyo, Sonar	5	
	strong				Piquant d'Algérie, Zarai	7	
	very strong				Alwin, Koral, Lito, Pusztagold	9	

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
8. VG	Stem : hairiness	Pilosité de la tige				
QN	absent or very weak	Nulle ou très faible			Arlequin	1
	weak	faible			Andevalo, Clovis	3
	medium	moyenne			Doux très long des landes, Farmese	5
	strong	forte			Fenice, Solario	7
	very strong	très forte			Alby, Ibleor	9
9. VS/ MS	Plant: vigour (timing?)					
QN	very weak				Kalocsai 601	1
	weak				Albaregia	3
	medium					5
	strong					7
	very strong				Hot chilli	9
REMARK Bouty: dependant of the growing conditions, not a useful characteristic for us						
REMARK Feherandras: before maturity						
10. MS/ VG	Leaf: length of blade					
QN	very short				Macska sárga, Tüzes piros	1
	short				De Cayenne, Szentesi cseresznye	3
	medium				Atol, Blondy, Marconi, Merit Anthea	5
	long				Dolmy, Cupido, Encore, Mazurka, Monte	7
	very long				Predi, Solario	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
11. MS/ VG	Leaf: width of blade					
QN	very narrow				Macska sárga, Recio, Tüzes piros	1
	narrow				De Cayenne, Pusztagold Szentesi csereznye	3
	medium				Albargia, Balaton, Danubia, Marconi, Merit	5
	broad				California wonder, Golden calwonder, Sienor, Solario	7
	very broad					9
12. VG	Leaf: green color					
QN	very light				Amaryllis, Lombardo	1
	light				Piquant d'Algérie, Pusztagold	3
	medium				Doux long des Landes, Merit	5
	dark				Dolmy, Tinto	7
	very dark				Hot chilli, Recio, Soleor	9
13. VS	Leaf: shape	Feuille : Forme				
QL	lanceolate	lanceolée			Diavolo, Recio	1
	elliptic	elliptique			Balico, Sonar	2
	deltoid	deltoïde			Solario	3

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
14. VG	Leaf: undulation of margin	Feuille : Ondulation du bord				
QN	absent or very weak	très faible			De Cayenne	1
	weak	faible			Doux très long des Landes	3
	medium	moyenne			Tenor	5
	strong	forte			Sucette de Provence, Tosca	7
	very strong	très forte			Farya	9
15. VG	Leaf: blistering					
QN	very weak				Century, Recio, Sofiane	1
	weak				Pusztagold	3
	medium				Merit	5
	strong				Greygo, PAZ pallagi	7
	very strong				Florian	9
16. VG	Leaf: profile in cross section	Feuille : profil en section transversale				
QN	flat	plat			de Cayenne, Recio	3
	curved	incurvé			Doux Italien, Favolor	5
	very curved	fortement incurvé			Ducato, Tinto	7
17. VG	Leaf: Glossiness	Feuille : brillance				
QN	very weak	très faible			Diavolo	1
	weak	faible			De cayenne, Doux très long des Landes	3
	medium	moyenne			Alby, Eolo	5
	strong	forte			Andevalo, Floridor	7
	very strong	très forte			Cubor, Petit marseillais	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
18. VS (* (+)	Flower: attitude of peduncle					
QL	erect				Fehér, Red Chili	1
	intermediate				Blondy	2
	dropping				Heldor, Lamuyo	3
19. VS (*	Fruit: color <u>before</u> maturity					
QL	yellowish				Fehér, Sweet Banana	1
	green				California Wonder, Lamuyo	2
	purple				Violetta	3
REMARK Bouty: Keep the level “greenish white” with Twiggy and Blanc d’Espagne as example varieties						
REMARK Feherandras: greenish white = very light green						
20. VS (*	Fruit: intensity of color <u>before</u> maturity					
QN	very light				Savó, Kaméleon, Milka, Sofiane, Jackson	1
	light				Anthea, Daras, PCR	3
	medium				Demon, PAZ szentesi	5
	dark				California wonder, Greygo	7
	very dark				Amato, Hot chilli, Kalocsai A, Olimpo	9
21. VS	Fruit: attitude					
QL	erect				Kalocsai 601, Red Chili	1
	horizontal				PAZ szentesi, Vinedale	2
	drooping				De Cayenne, Lamuyo	3

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
22. VS/ MS	Fruit: length					
QN	very short				Cherry Sweet, Topgirl	1
	short				Delphin, Petit carré doux	3
	medium				Fehér, Lamuyo	5
	long				Doux d'Espagne, Majister	7
	very long				Arabal, Corno di toro, Marconi	9
23. VS/ MS	Fruit: diameter					
QN	very small				De Cayenne, Recio	1
	small				Doux long des Landes	3
	medium				Doux italien, Corno di toro	5
	large				Clovis, Lamuyo	7
	very large				Floridor, Ibleor , Inca, Joly rosso, Quadrato d'Asti, Surpas,	9
24 MS (*).	Fruit: ratio length/diameter					
QN	very small (< 0,5)				Liebesapfel, PAZszentesi, Rotopa	1
	small (0,65-0,80)				Bucano, Topgirl	3
	medium (0,94-1,25)				Adra, Cherry Sweet, Daniel, Delphin, Edino	5
	large (1,75-2,75)				Heldor, Lamuyo, Magister, Tenno, Vidi	7
	very large (>4)				De Cayenne, Doux italien, Kusamon, Spadi, Ursus	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota	
25. VG	Fruit: predominant shape of longitudinal section						
(*)							
(+)							
PQ	flattened				Liebesapfel, PAZ szentesi, Topepo rosso	1	
	round				Cherry Sweet	2	
	heartshaped				Daniel, Pimiento L.	3	
	square				Delphin, Yolo Wonder	4	
	rectangular				Clovis, Nocera rosso	5	
	trapezoid				Piperade, Delta	6	
	triangular				Marconi, Fehér	7	
	narrow triangular				Demon, De Cayenne	8	
	hornshaped				Corno di toro rosso, Lipari	9	
26. VG	Fruit: predominant shape of cross section (at level of placenta)						
PQ	elliptic				Sweet Banana	1	
	angular				Vinedale	2	
	circular				Cherry Sweet, Doux long des Landes	3	
27. VS	Fruit: sination of pericarp at basal part						
QN	absent or very weak				Delphin, Milord	1	
	weak				Clovis, Sonar	3	
	medium				Ursus	5	
	strong				De Cayenne, Doux italien	7	
	very strong				Arabal	9	

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
28. VS (*)	Fruit: texture of surface					
QL	smooth				Milord, Pimiento L.	1
	slightly wrinkled				Doux long des Landes	2
	strongly wrinkled				Sierra Nevada	3
29. VS (*)	Fruit: color <u>at</u> maturity					
PQ	yellow				Golden Calwonder, Heldor	1
	orange				Ariane	2
	red				Fehér, Lamuyo	3
	brown				Brupa, Negral	4
30. VG	Fruit: intensity of color <u>at</u> maturity					
QN	very light					1
	light				Brilor, Pikanta	3
	medium				Andevalo, Dolmy, Galaxy, Solario	5
	dark				Joselito, Paripa, Regolo	7
	very dark				Alby, Láva, Shewesh	9
31. VG	Fruit: glossiness					
QN	very weak				Macska sárga, Pikanta	1
	weak				Doux très long des Landes	3
	medium				Carré doux extra hâtif, Lamuyo, Sonar	5
	strong				Doux italien, Trophy,	7
	very strong				Floridor, Kappy	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
32. VG	Fruit: stalk cavity					
	(*)					
QL	absent				Corinto, Corno di toro, Sweet Banana, Sucette de Provence	1
	present				Bingor, Lamuyo	9
33. VS	Fruit: depth of stalk cavity					
QN	very shallow				Flush, Kaméleon, Niagara	1
	shallow				Delphin, Doux italien, Fehér Latino	3
	medium				Lamuyo, Magister	5
	deep				Osir, Quadrato d'Asti rosso, Surpas	7
	very deep				Cancun, Cubor, Pablor, Shy Beauty	9
34. VS	Fruit: shape of apex					
QN	very acute				De Cayenne, Hot chilli	1
	acute				Pimiento L	3
	rounded				Cherry Sweet	5
	depressed				Quadrato d'Asti rosso	7
	very depressed				Kerala, Monte, Osir	9
35. VS	Fruit: depth of inter loculary grooves					
QN	absent or very shallow				De Cayenne	1
	shallow				Milord, Topgirl	3
	medium				Clovis, Lamuyo, Marconi	5
	deep				Majister, Surpas	7
	very deep					9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
36. MS (*)	Fruit: predominant number of locules					
QL	only two				De Cayenne	1
	two and three				Fehér	2
	three				Century	3
	three and four				Lamuyo, Sonar	4
	four and more				Palio, PAZ szentesi	5
37. VG (*)	Fruit: thickness of flesh					
QN	very thin				Macska sárga, De Cayenne, Petit Marseillais, Recio	1
	thin				Banán, Carré doux extra hâtif, Doux long des landes	3
	medium				Fehér, Lamuyo	5
	thick				Andevalo, Bingo, Daniel, Pimiento L., Topgirl	7
	very thick				DragoxRoda, Regolo, Solario	9
38. VG/ MS	Placenta: size					
QN	very small				De Cayenne, Macska sárga	1
	small				Hot Cherry, Liebesapfel	3
	medium				Lamuyo	5
	large				Atar, Daniel	7
	very large				Pierrot	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
39. VS/ MS	Stalk: length					
QN	very short				Greygo, Golden calwonder	1
	short				Surpas, Yolo Wonder, Zenith	3
	medium				Fehér, Sonar	5
	long				De Cayenne, Sierra Nevada, Sweet Banana	7
	very long				Farnese, Lipari, Oasis	9
40. VS/ MS	Stalk: thickness					
QN	very thin				De Cayenne, Doux long des Landes, Macska sárga, Recio	1
	thin				Sweet Banana	3
	medium				Doux italien, Surpas	5
	thick				Lamuyo, Trophy Palio	7
	very thick				Domingo, Galaxy, Paraiso	9
41. VS (+)	Calyx: aspect					
QL	non enveloping				Lamuyo, Sonar	1
	enveloping				De Cayenne, Sweet Banana	2
42. MS (*)	Fruit: capsaicin in placenta					
QL	absent				Sonar	1
	present				De Cayenne	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
43. VG	Time of beginning of flowering (first flower on second flowering node on 50% of plants)					
QN	early				Carré doux extra hâtif, Cupido, Fehér, Flaviano, Lito, Trophy	3
	medium				Lamuyo, Latino	5
	late				Daniel, Piquant d'Algérie, Zingaro	7
44. VG	Time of ripening (color change of fruits on 50% of plants)					
QN	very early				Macska sárگا, Koral, Madison	1
	early				Fehér, Lady Bell, Topgirl	3
	medium				Lamuyo, Latino, Sonar	5
	late				Daniel, Douxd'Espagne	7
	very late				Cancun, California wonder	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
45.	Resistance to Tobamovirus					
(+)						
45.1	pathotype P₀					
(*)	(Tobacco Mozaic Virus (0))					
QL	absent				Doux italien, Piperade	1
	present				Lamuyo, Sonar, Yolo Wonder	9
45.2	Pathotype P₁					
	Pepper Mild Mottle Virus (1)					
QL	absent				Piperade, Yolo Wonder	1
	present				'Tabasco' (C. frutescens)	9
45.3	pathotype P₁₋₂					
	Pepper Mild Mottle Virus (1-2)					
QL	absent				Piperade, Yolo Wonder	1
	present				Delgado, Festos, Novi, Orion	9
45.4	pathotype P₁₋₂₋₃					
	Pepper Mild Mottle Virus (1-2-3)					
QL	absent				Piperade, Yolo Wonder	1
	present				Cuby, Tasty	9
46.	Resistance to Potato Virus Y (PVY)					
(+)						
46.1	pathotype 0					
(*)						
QL	absent				Yolo Wonder	1
	present				Yolo Y	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
46.2	pathotype 1					
QL	absent				Yolo Wonder, Yolo Y	1
	present				Florida VR2	9
46.3	pathotype 1-2					
QL	absent				Florida VR2, Yolo Wonder, Yolo Y	1
	present				Criollo de Morenos, Serrano	9
47.	Resistance to					
(+)	<i>Phytophthora capsici</i>					
QL	absent				Yolo Wonder	1
	present				Phyo 636, Picador, PM 217	9
48.	Resistance to					
	<i>Tomato Spotted Wilt Virus</i>					
QL	absent				Yolo Wonder	1
	present				PH 1106/01, Filon , Mitico	9
49.	Resistance to					
	<i>Xanthomonas vesicatoria</i>					
QL	absent				Feher	1
	present Bs-2				Kaldom, Pasa	2
	present Bs-3				Kaldom, Pasa	3
	present gds				Kaldom, Pasa	4
50.	Resistance to					
	<i>Cucumber Mozaic Virus</i>					
QL	absent				Yolo Wonder	1
	present				Alby, Favolor	9

8. Explanations on the Table of Characteristics

Ads. 4 and 5: Plant: shortened internode (4), number of internodes between the first flower and shortened internodes only (5)

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:

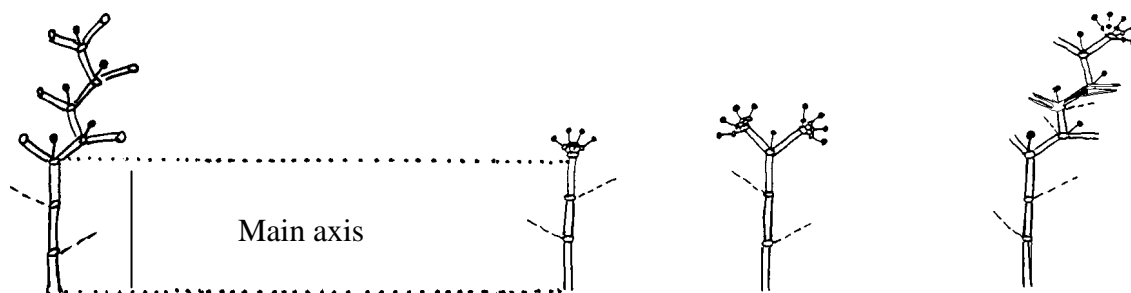
Growth type A: the main stems grow indeterminately; one or two flowers develop per node and shortened internodes never develop.

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 were more than two flowers per node).

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

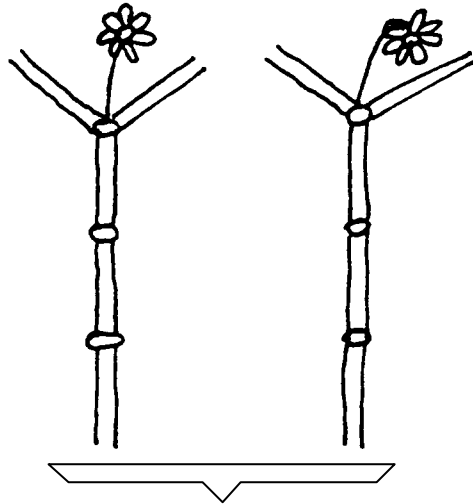
Growth type A

Growth type B



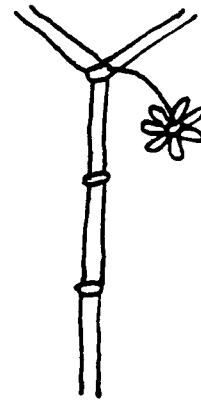
●	Flower	1.	2.	3.
○	Node	none	one to three	more than three
	Main stem			
	Side shoots	Number of internodes between the first flower and shortened internodes		

Ad. 18: Flower: attitude of peduncle



1

erect



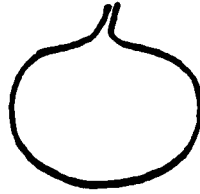
2

(non-erect) drooping

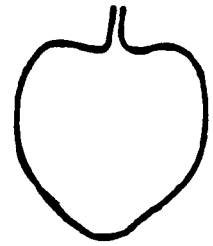
Ad. 25: Fruit: predominant shape of longitudinal section



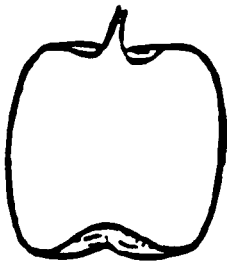
1
flattened



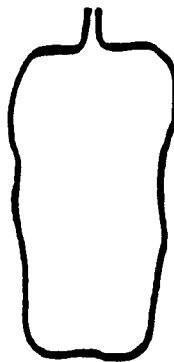
2
round



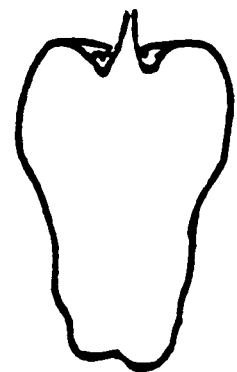
3
heartshaped



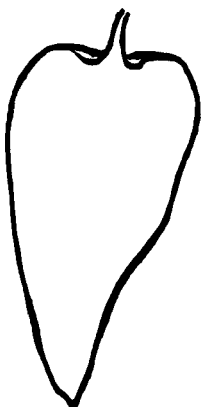
4
square



5
rectangular



6
trapezoid



7
triangular



8
narrow triangular



9
hornshaped

Ad. 41: Calyx: aspect



1

non enveloping



2

enveloping

Ads. 45.1 to 45.4: 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 in “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

Remarks Avoid the test performance at high temperatures or using too far developed plants (risk of necrosis).

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

Pepper Tobamovirus Pathotypes					
Pepper Genotypes	Pepper Viruses:	P ₀ TMV, ToMV, BePMV, TMGMV, DYFV	P ₁ ToMV, TMGMV	P ₁₋₂ ToMV, PMMV	P ₁₋₂₋₃ PMMV
L-L-		S	S	S	S
L ¹ L ¹		R	S	S	S
L ² L ²		R	R	S	S
L ³ L ³		R	R	R	S
L ⁴ L ⁴		R	R	R	R

Legend: S = not resistant TMV = Tobacco Mosaic Virus
R = resistant ToMV = Tomato Mosaic Virus
BePMV = Bell Pepper Mosaic Virus
TMGMV = Tobacco Mild Green Mosaic Virus
DYFV = Dulcamara Yellow Fleck Virus

PMMV = Pepper Mild Mottle Virus

Ad. 46: Resistance to Potato Virus Y (PVY)

Maintenance of pathotypes

Type of medium: On susceptible plants.

Special conditions: For the common strain PVY(0): use the line TO72(A)
For the evolved strain PVY(1): use the line Sicile 15
For the evolved 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 + 0.2% diethyl dithiocaremate 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 at the shortest, 4 weeks at the longest)

Number of plants tested: 60 plants

Remarks: Avoid the carrying out of the test 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	Criollo de Morenos, Serrano

* Florida VR2 can examine diffused and very late symptoms.

Ad. 47: Resistance to *Phytophthora capsici*

Maintenance of inoculum

Type of medium: Phytophthora capsici isolate S 101 cultivated on agar (1%) V8 in Petri dish.

Preparation of inoculum

The inoculum is prepared from 4 mycelial plugs of 4 mm diameter cultured in Petri dishes.

Conduct of test

Growth stage of plants: When cotyledons are fully developed.

Temperature: 22°C

Light: 12h/day

Growing method: In climatic chamber in a mixture of peat and sand (1/1 by vol.).

Method of inoculation: The young plants should be pulled out cautiously and the roots washed in water. Then the plants should be regrouped in samples of 10 plants and put into liquid growth medium (Knop diluted twice) or onto a nutrient solution. After one week of culture in liquid medium the plants should be inoculated. The inoculation is realized by introduction of 4 mycelial plugs into the liquid growth medium. The roots are soaking in this environment and the inoculation takes place in a natural way by the free zoospores which infect the roots. The mycelial plugs are kept in this environment until reading.

Duration of test

From sowing to inoculation: 21 days

From inoculation to first reading: 7 days

Lay-out of test: 40 plants, in 4 replicates of 10 plants

Standard varieties:

After one week the plants should be observed one by one and a note from 1 to 5 is attributed to each plant depending on the degree of necrosis of the root system assessed. The level of resistance of a variety is expressed by a figure calculated as the average of 40 plants:

After inoculation by isolate S 101, for example:

Yolo Wonder = 5

Phyo 636 = 2.5

Picador, PM 217 = 0.5

Varieties which have received a figure 3 or higher than 3 should be regarded as non-resistant.

9. Literature

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Guerrero-Moreno, A., and Laborde, J.A., 1980: "Current status of pepper breeding for resistance to *Phytophthora capsici* in Mexico," Eucarpia Capsicum Working Group, 4th Meeting, October 14-16, 1980, Wageningen

Rast, A.Th.B., 1988: "Pepper tobamoviruses and pathotypes used in resistance breeding," Capsicum Newsletter 7, pp. 20-23

Smith, P.G., Kimbler, K.A., Grogan, R.G., and Millet, A.H., 1967: "Inheritance of Resistance in Peppers to *Phytophthora* Root Rot," Phytopathology 57, 377-379

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Gallais A. and Bannerot H., 1992, "Amélioration des espèces végétales cultivées" chapitre 5 Les plantes légumières p.420-435 « Le piment » INRA Edition

Pitrat M. and Foury C., 2003, "Histoire de légumes : des origines à l'orée du XXI^{ème} siècle" INRA Edition

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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	Application date: (not to be filled in by the applicant)
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TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

ASW 13

In the case of hybrid varieties which are the subject of an application for plant breeders' rights, and where the parent lines are to be submitted as a part of the examination of the hybrid variety, this Technical Questionnaire should be completed for each of the parent lines, in addition to being completed for the hybrid variety.

1. Subject of the Technical Questionnaire

1.1 Botanical name

1.2 Common Name

2. Applicant

Name

Address

Telephone No.

Fax No.

E-mail address

Breeder (if different from applicant)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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3. Proposed denomination and breeder's reference

Proposed denomination
(if available)

Breeder's reference

#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

ASW 15

(i) Variety resulting from:

4.1.1 Crossing

- (a) controlled cross
(please state parent varieties)
- (b) partially known cross
(please state known parent variety(ies))
- (c) unknown cross

4.1.2 Mutation
(please state parent variety)

4.1.3 Discovery and development
(please state where and when discovered and how developed)

4.1.4 Other
(please provide details)

4.2 Method of propagating the variety (see GN 31 and GN 32)

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:
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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).

Characteristics	Example Varieties	Note
5.1 Plant: shortened internode (in upper part) (4)		
absent	California Wonder, De Cayenne	1[]
present	Fehér, Kalocsai 601	9[]
5.2 Flower: attitude of peduncle (18)		
erect	Fehér, Red Chili	1[]
intermediate	Blondy	2[]
dropping	Heldor, Lamuyo	3[]
5.3 Fruit: color <u>before</u> maturity (19)		
yellowish	Fehér, Sweet Banana	1[]
green	California Wonder, Lamuyo	2[]
purple	Violetta	3[]
5.4 Fruit: intensity of color <u>before</u> maturity (20)		
very light	Jackson, Kaméleon, Milka, Savó, Sofiane,	1[]
light	Anthea, Daras, PCR	3[]
medium	Demon. PAZ szentesi	5[]
dark	California wonder, Greygo	7[]
very dark	Amato, Hot chilli, Kalocsai A, Olimpo	9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.5 Fruit: predominant shape of longitudinal section (25)		
flattened	Liebesapfel, PAZ szentesi, Topepo rosso	1[]
round	Cherry Sweet	2[]
heartshaped	Daniel, Pimiento L.	3[]
square	Delphin, Yolo Wonder	4[]
rectangular	Clovis, Nocera rosso	5[]
trapezoid	Delta, Piperade	6[]
triangular	Fehér, Marconi	7[]
narrow triangular	De Cayenne, Demon	8[]
hornshaped	Corno di toro rosso, Lipari	9[]
5.6 Fruit: color <u>at</u> maturity (29)		
yellow	Golden Calwonder, Heldor	1[]
orange	Ariane	2[]
red	Fehér, Lamuyo	3[]
brown	Brupa, Negral	4[]
5.7 Fruit: predominant number of locules (36)		
only two	De Cayenne	1[]
two and three	Fehér	2[]
three	Century	3[]
three and four	Lamuyo, Sonar	4[]
four and more	Palio, PAZ szentesi	5[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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	Characteristics	Example Varieties	Note
5.8 (42)	Fruit capsaicin in placenta		
	absent	Sonar	1[]
	present	De Cayenne	9[]

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

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

#7. Additional information which may help in the examination of the variety

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?

Yes [] No []

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [] No []

(If yes, please provide details)

7.3 Other information

ASW 16

A representative color photograph of the variety should accompany the Technical Questionnaire.

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [] No []

(b) Has such authorization been obtained?

Yes [] No []

If the answer to (b) is yes, please attach a copy of the authorization.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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 [] | No [] |
| (b) Chemical treatment (e.g. growth retardant, pesticide) | Yes [] | No [] |
| (c) Tissue culture | Yes [] | No [] |
| (d) Other factors | Yes [] | No [] |

Please provide details of where you have indicated "yes".

.....

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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

Date

[End of document]