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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

SWEET PEPPER, HOT PEPPER, PAPRIKA, CHILI *

UPOV Code(s): CAPSI_ANN

Capsicum annuum L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from the Netherlands
to be considered by the
Technical Working Party for Vegetables
at its fifty-seventh session, to be held in Antalya, Türkiye,
from 2023-05-01 to 2023-05-05

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Capsicum annuum L.	Sweet Pepper, Hot Pepper, Paprika, Chili	Piment, Poivron	Paprika	Aji, Chile, 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.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* 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.]

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1. Subject of these Test Guidelines

1.1 These Test Guidelines apply to all varieties of Capsicum annuum L. including rootstocks and ornamentals.

1.2 In the case of ornamental and rootstock varieties, in particular, it may be necessary to use additional characteristics or additional states of expression to those included in the Table of Characteristics in order to examine Distinctness, Uniformity and Stability.

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 or plants.

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

(a)	seed-propagated varieties:	2,500 seeds
(b)	vegetatively propagated varieties:	25 non grafted young plants not yet bearing flowers and fruits, with at least 2 growing points per plant. For disease resistance testing, additional plants may be requested.

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

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

2.5 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

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

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

3.1.3 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

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

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.

3.4 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 at least 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.

3.4.3 When resistance characteristics are used for assessing distinctness, uniformity and stability of seed-propagated varieties, records must be taken under conditions of controlled infection and, unless otherwise specified, on at least 20 plants.

In the case of vegetatively propagated varieties, when resistance characteristics are used for assessing distinctness, uniformity and stability, records must be taken on at least 10 plants.

3.5 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.

4.1.4 Number of Plants or Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 10 plants or parts of plants taken from each of 10 plants and any other observations made on all plants in the test, disregarding any off-type plants.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the Table of Characteristics (see document TGP/9 “Examining Distinctness”, Section 4 “Observation 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

Type of observation: visual (V) or measurement (M)

“Visual” observation (V) is an observation made on the basis of the expert’s judgment. For the purposes of this document, “visual” observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, “G” provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

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 These Test Guidelines have been developed for the examination of seed-propagated varieties and vegetatively propagated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed.

4.2.3 The assessment of uniformity for cross-pollinated should be according to the recommendations for cross-pollinated varieties in the General Introduction.

4.2.4 For the assessment of uniformity of self-pollinated varieties, hybrids and vegetatively propagated varieties, 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 further examined by testing a new seed or plant stock to ensure that it exhibits the same characteristics as those shown by the initial 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) Plant: shortened internodes (characteristic 4)
(b) Flower: anthocyanin coloration of anther (characteristic 23)
(c) Immature fruit: color (characteristic 26)
(d) Fruit: length (characteristic 30)
(e) Fruit: diameter (characteristic 31)
(f) Fruit: ratio length/diameter (characteristic 32)
(g) Fruit: shape in longitudinal section (characteristic 33)
(h) Fruit: color (characteristic 41)
(i) Fruit: capsaicin in placenta (characteristic 48)
(j) Resistance to Tobamovirus - *Tobacco mosaic virus* **-** Group 0 (TMV: 0) (characteristic 54)
(k) Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 2 (PMMoV: 1.2) (characteristic 55)
(l) Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 3 (PMMoV: 1.2.3) (characteristic 56)
(m) Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0) (characteristic 57)
(n) Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0) (characteristic 62)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

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

6.2.1 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.

6.2.2 All relevant states of expression are presented in the characteristic.

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”.

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1 2	**3 4**	**5 6**	**7**			
	Name of characteristics in English	**Nom du caractère en français**	**Name des Merkmals auf Deutsch**	**Nombre del carácter en español**		
	states of expression	types d’expression	Ausprägungsstufen	tipos de expresión		

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression
QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)
MG, MS, VG, VS – see Chapter 4.1.5

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

6 (a)-(d) See Explanations on the Table of Characteristics in Chapter 8.1

7 Not applicable

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.		**QL VG**					
		Seedling: anthocyanin coloration of hypocotyl					
		absent				Albaregia	1
		present				Lamuyo	9
2.		**QN VG**	**(+)** **(a)**				
		Plant: habit					
		upright				De Cayenne, Doux très long des Landes, Piquant d'Algérie	1
		semi-upright				Sonar	2
		prostrate					3
3.	(*)	**QN MG/MS/VG**	**(+)** **(a)**				
		Plant: height					
		very short					1
		very short to short					2
		short				Bravia	3
		short to medium					4
		medium				HRF	5
		medium to tall					6
		tall				Century	7
		tall to very tall					8
		very tall				Brutus	9
4.	(*)	**QL VG**	**(+)** **(a)**				
		Plant: shortened internodes					
		absent				California wonder, De Cayenne	1
		present				Bucano	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	**PQ MS**	**(+) (a)**				
	<u>Only varieties with plant: shortened internodes: present</u>: number of internodes between the first flower and shortened internodes					
	none					1
	one to three					2
	more than three					3
6.	**QN MS/VG**	**(+) (a)**				
	<u>Only varieties with plant: shortened internodes: absent:</u> length of internodes					
	very short				Albaregia	1
	short to very short					2
	short				Tenor	3
	short to medium					4
	medium				Florian	5
	medium to long					6
	long				Corno di toro rosso	7
	long to very long					8
	very long				Fenice	9
7.	**QN MS/VG**	**(+) (a)**				
	Stem: length					
	very short					1
	very short to short					2
	short				Bomenta, Corvinus	3
	short to medium					4
	medium				Bravia, Lamuyo, Nestoss, Remus	5
	medium to long					6
	long				Lipari, Marconi	7
	long to very long					8
	very long					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8.	**QN** **VG**	**(a)**				
	Stem: intensity of anthocyanin coloration of nodes					
	absent or very weak				Bravia, Nestoss, Remus	1
	very weak to weak					2
	weak				California wonder	3
	weak to medium					4
	medium				Lamuyo, Sonar	5
	medium to strong					6
	strong				Piquant d'Algérie	7
	strong to very strong					8
	very strong				Smolder	9
9.	**QN** **VG**	**(a)**				
	Stem: hairiness of nodes					
	absent or very weak				Arlequin	1
	very weak to weak					2
	weak				Bravia, Nestoss	3
	weak to medium					4
	medium				Doux très long des Landes, Farnese	5
	medium to strong					6
	strong				Fenice, Solario	7
	strong very strong					8
	very strong				Brutus	9
10.	**QN** **MS/VG**	**(+)** **(a)**				
	Leaf blade: length					
	very short				Macska sárga	1
	very short to short					2
	short				De Cayenne	3
	short to medium					4
	medium				Marconi	5
	medium to long					6
	long				Allrounder	7
	long to very long					8
	very long				Solario	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.	**QN MS/VG**	**(+) (a)**				
	Leaf blade: width					
	very narrow				Macska sárga	1
	very narrow to narrow					2
	narrow				De Cayenne	3
	narrow to medium					4
	medium				Marconi	5
	medium to broad					6
	broad				Allrounder	7
	broad to very broad					8
	very broad				Solario	9
12.	**PQ VG**	**(+) (a)**				
	Leaf blade: ratio length/width					
	low				Solario	1
	medium				Balico, Sonar	2
	high				Brutus, De Cayenne	3
13.	**QN VG**	**(a)**				
	Leaf blade: intensity of green color					
	very light					1
	very light to light					2
	light				Blondy	3
	light to medium					4
	medium				Allrounder, Frazier	5
	medium to dark					6
	dark				Rioverde	7
	dark to very dark					8
	very dark				Japo, Morrón de conserva 3, Roial	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	**QN VG**	**(+)**	**(a)**			
	Leaf blade: intensity of anthocyanin coloration of upper side					
	absent or very weak					1
	weak				Omiyamurasaki , Purple Rain	2
	medium				Calico	3
	strong				Black Pearl	4
	very strong				Purple Flash, Takiama Purple to Red, TF802	5
15.	**PQ VG**	**(+)**	**(a)**			
	Leaf blade: distribution of anthocyanin coloration of lower side					
	absent					1
	on veins throughout				Takiama Purple to Red	2
	on veins and diffuse on distal part					3
	on veins and diffuse throughout				Black Pearl, Purple Flash	4
	throughout				TF802	5
16.	**QL VG**	**(+)**	**(a)**			
	Leaf blade: variegation					
	absent				Omiyamurasaki	1
	present				Calico, Purple Rain	9
17.	**QN VG**		**(a)**			
	Leaf blade: undulation of margin					
	absent or very weak				De Cayenne	1
	very weak to weak					2
	weak				Doux très long des Landes	3
	weak to medium					4
	medium				Tenor	5
	medium to strong					6
	strong				Tosca	7
	strong to very strong					8
	very strong					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18.	**QN VG**	**(a)**				
	Leaf blade: blistering					
	very weak				Brutus	1
	very weak to weak					2
	weak				Pusztagold	3
	weak to medium					4
	medium				Bravia, Nestoss	5
	medium to strong					6
	strong				Greygo	7
	strong to very strong					8
	very strong				Florian	9
19.	**QN VG**	**(a)**				
	Leaf blade: glossiness					
	very weak					1
	very weak to weak					2
	weak				Brutus, Doux très long des Landes	3
	weak to medium					4
	medium				Bravia	5
	medium to strong					6
	strong				Floridor	7
	strong to very strong					8
	very strong					9
20.	**QN VG**	**(+)**				
	Time of beginning of flowering					
	very early					1
	very early to early					2
	early				Brutus	3
	early to medium					4
	medium				Allrounder, Lamuyo	5
	medium to late					6
	late				Piquant d'Algérie	7
	late to very late					8
	very late					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21.		**PQ VG**	**(+)**	**(b)**			
		Flower: attitude of peduncle					
		erect				Floridor	1
		semi-drooping				Bravia	2
		drooping				Brutus, Lamuyo	3
22.		**PQ VG**		**(b)**			
		Flower: color					
		white				Lamuyo	1
		light purple					2
		medium purple					3
		dark purple				Black Pearl	4
23.	**(*)**	**QL VG**	**(+)**	**(b)**			
		Flower: anthocyanin coloration of anther					
		absent				Bravia	1
		present				Brutus, Lamuyo	9
24.		**QL VG**	**(+)**	**(b)**			
		Flower: anthocyanin coloration of filament					
		absent				AG33	1
		present				Bao-11, Morningput	9
25.		**QN VS**	**(+)**	**(b)**			
		Male sterility					
		absent				California wonder	1
		partially present					2
		totally present				Angelito	3
26.	**(*)**	**PQ VG**	**(+)**	**(c)**			
		Immature fruit: color					
		greenish white				Bravia	1
		greenish yellow				Don, Sweet banana	2
		green				Allrounder, Black Bullet, Cornus, Hitman, Impala, Syrto	3
		purple				Cardinal, Lilo, Loco, Tequila, Tonaya	4

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27.	**(*)**	**QN**	**VG**		**(c)**				
		Only varieties with immature fruit green or purple: intensity of color							
		very light							1
		very light to light							2
		light						Cornus, Loco, Syrto	3
		light to medium						Tequila	4
		medium						Allrounder	5
		medium to dark						Cardinal	6
		dark						Impala, Lilo, Tonaya	7
		dark to very dark							8
		very dark						Black Bullet, Hitman	9
28.		**QN**	**VG**		**(c)**				
		<u>Excluding varieties with immature fruit color: purple:</u> **Immature fruit: anthocyanin coloration**							
		absent or weak						Lamuyo	1
		medium							2
		strong						Sweet banana	3
29.		**PQ**	**VG**	**(+)**	**(d)**				
		Fruit: attitude							
		erect						Pusztagold	1
		horizontal						PAZ szentesi	2
		drooping						De Cayenne, Lamuyo	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30. **(*)**	**QN** **MS/VG**	**(+)** **(d)**				
	Fruit: length					
	very short				Cherry Bomb, PAZ szentesi	1
	very short to short					2
	short				Ophelia, Smolder	3
	short to medium					4
	medium				California wonder	5
	medium to long					6
	long				Bravia, De Cayenne	7
	long to very long					8
	very long				Carboni, Corno di toro rosso, Doux très long des Landes	9
31. **(*)**	**QN** **MS/VG**	**(+)** **(d)**				
	Fruit: diameter					
	very small				De Cayenne	1
	very small to small					2
	small				Cherry Bomb	3
	small to medium					4
	medium				Doux italien	5
	medium to large					6
	large				Lamuyo, Maduro	7
	large to very large					8
	very large				Floridor, Ibleor	9
32. **(*)**	**QN** **MS/VG**	**(+)** **(d)**				
	Fruit: ratio length/diameter					
	very low				Liebesapfel, PAZ szentesi	1
	very low to low					2
	low				Bucano	3
	low to medium					4
	medium				Maduro	5
	medium to high					6
	high				Lamuyo, Vidi	7
	high to very high					8
	very high				De Cayenne, Doux très long des Landes	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
33.	**(*)**	**PQ**	**VG**	**(+)**	**(d)**				
		Fruit: shape in longitudinal section							
		triangular						Bravia, Corno di toro rosso, De Cayenne	1
		ovate						Jalapeño	2
		cordate						Morrón de conserva 3	3
		elliptic							4
		circular						Capperino	5
		oblate						Koral	6
		rectangular						Raggio	7
		square						Maranello	8
		transverse rectangular						Liebesapfel, PAZ szentesi	9
		trapezoid						Altea	10
34.		**PQ**	**VG**	**(+)**	**(d)**				
		Fruit: curvature							
		absent						Kappy, Lamuyo	1
		C-shaped						Sweet banana	2
		S-shaped						Doux italien	3
35.		**QN**	**VG**	**(+)**	**(d)**				
		Fruit: twisting							
		absent or weak						California wonder	1
		medium						Bubión	2
		strong						BN8707	3
36.		**PQ**	**VG**	**(+)**	**(d)**				
		Fruit: shape in cross section							
		elliptic						Sweet banana	1
		angular						Solario	2
		circular						Doux très long des Landes	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
37.		**QN VG**	**(+) (d)**				
		Fruit: sinuation of pericarp at basal part					
		absent or very weak				Smolder	1
		very weak to weak					2
		weak				Donat, Kappy	3
		weak to medium					4
		medium				Banán	5
		medium to strong					6
		strong				Hawker	7
		strong to very strong					8
		very strong				Doux italien, Gelber Spiral	9
38.	**(*)**	**QN VG**	**(+) (d)**				
		Fruit: sinuation of pericarp excluding basal part					
		absent or weak				Sonar, Yolo Wonder	1
		medium				Rodri	2
		strong				De Cayenne, Doux italien	3
39.	**(*)**	**PQ VG**	**(d)**				
		Fruit: shape of apex					
		strongly acute				De Cayenne	1
		moderately acute				Kappone	2
		rounded				Red Tinkerbell	3
		moderately depressed				Maduro	4
		strongly depressed				Monte	5
40.		**QN VG**	**(+) (d)**				
		Fruit: texture of surface					
		smooth or very slightly wrinkled				Smolder	1
		slightly wrinkled					2
		strongly wrinkled					3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
41.	**(*)**	**PQ VG**	**(+) (d)**				
		Fruit: color					
		yellow				Allrounder	1
		orange				Arancia	2
		red				Lamuyo	3
		brown				Bastan, Chocolony	4
		green				Raymond	5
42.	**(*)**	**QN VG**	**(+) (d)**				
		Fruit: intensity of color					
		very light					1
		very light to light					2
		light					3
		light to medium					4
		medium					5
		medium to dark					6
		dark					7
		dark to very dark					8
		very dark					9
43.		**QN VG**	**(d)**				
		Fruit: glossiness					
		very weak					1
		very weak to weak					2
		weak				Macska sárga	3
		weak to medium					4
		medium				Sonar	5
		medium to strong					6
		strong				Doux italien	7
		strong to very strong					8
		very strong				Ocelot	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44.	**(*)**	**QN**	**VG**		**(d)**				
		Fruit: depth of peduncle cavity							
		absent or very shallow						Sweet banana	1
		very shallow to shallow							2
		shallow						Doux italien	3
		shallow to medium							4
		medium						Lamuyo, Maduro	5
		medium to deep							6
		deep						Baquero	7
		deep to very deep							8
		very deep						Dumbo34	9
45.		**QN**	**VG**	**(+)**	**(d)**				
		Fruit: depth of interlocular grooves							
		absent or very shallow						De Cayenne	1
		very shallow to shallow							2
		shallow						Kappone	3
		shallow to medium							4
		medium						Lamuyo, Marconi	5
		medium to deep							6
		deep						Round of Hungary	7
		deep to very deep							8
		very deep							9
46.	**(*)**	**QN**	**MG/VG**		**(d)**				
		Fruit: number of locules							
		predominantly two						De Cayenne	1
		equally two and three						Banán	2
		predominantly three						Century	3
		equally three and four						Lamuyo, Sonar	4
		predominantly four						PAZ szentesi	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
47.	**(*)**	**QN VG**	**(d)**				
		Fruit: thickness of flesh					
		very thin				De Cayenne, Macska sárga	1
		very thin to thin					2
		thin				Banán, Doux très long des Landes	3
		thin to medium					4
		medium				Lamuyo	5
		medium to thick					6
		thick				Deimos	7
		thick to very thick					8
		very thick				Solario	9
48.	**(*)**	**QL VG**	**(+)** **(d)**				
		Fruit: capsaicin in placenta					
		absent				Sonar, Sweet banana	1
		present				De Cayenne	9
49.		**QL VG**	**(+)** **(d)**				
		Fruit: seeds					
		absent				Angelito	1
		present				Lamuyo	9
50.		**QN MS/VG**	**(d)**				
		Peduncle: length					
		very short				Jablina	1
		very short to short					2
		short				Corvinus, Yolo Wonder	3
		short to medium					4
		medium				Sonar	5
		medium to long					6
		long				De Cayenne	7
		long to very long					8
		very long				Farnese, Lipari	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
51.		**QN MS/VG**	**(+) (d)**				
		Peduncle: thickness					
		very thin				De Cayenne, Doux très long des Landes, Macska sárga	1
		very thin to thin					2
		thin				Sweet banana	3
		thin to medium					4
		medium				Doux italien	5
		medium to thick					6
		thick				Lamuyo	7
		thick to very thick					8
		very thick					9
52.		**QN VG**	**(+) (d)**				
		Calyx: aspect					
		non enveloping				Lamuyo, Sonar	1
		semi enveloping					2
		enveloping				De Cayenne, Sweet banana	3
53.	**(*)**	**QN VG**	**(+)**				
		Time of maturity					
		very early				Macska sárga, Madison	1
		early				Kosmik	3
		early to medium					4
		medium				Lamuyo, Sonar	5
		medium to late					6
		late				Doux d'Espagne	7
		late to very late					8
		very late				Teseo	9
54.		**QL VG**	**(+)**				
		Resistance to Tobamovirus - *Tobacco mosaic virus* - Group 0 (TMV: 0)					
		absent				Lamu, Pepita, Piquillo	1
		present				Fehérözön, Ultron, Yolo Wonder	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
55.	**QL VG**	**(+)**				
	Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 2 (PMMoV: 1.2)					
	absent				Fehérözön, Lamu, Yolo Wonder	1
	present				Achille, Candela, Ferrari, Fudji, Novi 3	9
56.	**QL VG**	**(+)**				
	Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 3 (PMMoV: 1.2.3)					
	absent				Candela, Ferrari, Oida, Yolo Wonder	1
	present				Ettore, Friendly, Tom4	9
57.	**QL VG**	**(+)**				
	Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0)					
	absent				Ferrari, Murillo, Piquillo, Yolo Wonder	1
	present				Andalus, Goleador, Vidi, Yolo Y	9
58.	**QL VG**	**(+)**				
	Resistance to *Potato Y virus* (PVY) - Pathotype 1 (PVY: 1)					
	absent				Yolo Wonder, Yolo Y	1
	present				Florida VR2, Ribatejo	9
59.	**QL VG**	**(+)**				
	Resistance to *Potato Y virus* (PVY) - Pathotype 1.2 (PVY: 1.2)					
	absent				Florida VR2, Yolo Wonder, Yolo Y	1
	present				Chouca, Serrano Criollo de Morelos 334	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
60.	**QL VG**	**(+)**				
	Resistance to *Phytophthora capsici* (Pc)					
	absent				Yolo Wonder	1
	present				Chistera, Favolor, Phyo 636, Solario	9
61.	**QL VG**	**(+)**				
	Resistance to *Cucumber mosaic virus* (CMV)					
	absent				Yolo Wonder	1
	present				Alby, Ducato, Favolor	9
62.	**QL VG**	**(+)**				
	Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0)					
	absent				Yolo Wonder	1
	present				Galileo, Jackal, Jackpot, Piamonte	9
63.	**QL VG**	**(+)**				
	Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 1					
	absent				Yolo Wonder	1
	present				Filidor, San Marco	9
64.	**QL VG**	**(+)**				
	Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 2					
	absent				Yolo Wonder	1
	present				Filidor, San Marco	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
65.	**QL VG**	**(+)**				
	Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 3					
	absent				Yolo Wonder	1
	present				Filidor, San Marco	9
66.	**QL MS/VG**	**(+)**				
	Resistance to *Meloidogyne incognita* (Mi)					
	absent				Tom4, Yolo Wonder	1
	present				Bastion, Capital, Kation, W4	9

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a) Observations on plant, stem, internodes and leaves should be made at the time of the first color change of the fruit. Furthermore observations on stem and leaves should be made at the middle third of the plant and observations on leaves should be made on fully developed leaves.

(b) Observations should be made at the middle third of the plant on fresh fully open flowers.

(c) Observations should be made before the first color change of the fruit.

(d) Observations should be made at maturity, after the time of the color change.

8.2 Explanations for individual characteristics

Ad. 2: Plant: habit

Observations only to be made when plants do not have prominent influence of pruning, guiding or stakes on their natural habit.

Ad. 3: Plant: height

Observations should be made after a fruit set on several nodes. Poor fruit set may influence the vigor and thus the height of the plant.

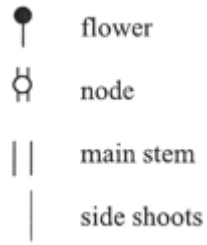
Ad. 4: Plant: shortened internodes

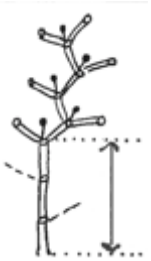
Observations should be made on plants which have not been pruned, in the upper part. The shoot system of pepper consists of main stems developing from the main axis, and side shoots which develop from the nodes on the main axis and on the main stems.

Absent: The main stems grow indeterminately; one or two flowers develop per node and shortened internodes never develop.

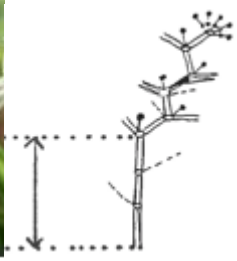
Present: After the first branching of the main axis, shorter internodes appear and the growth of the main stem ends in a bunch of flowers.

Explanation of plant parts





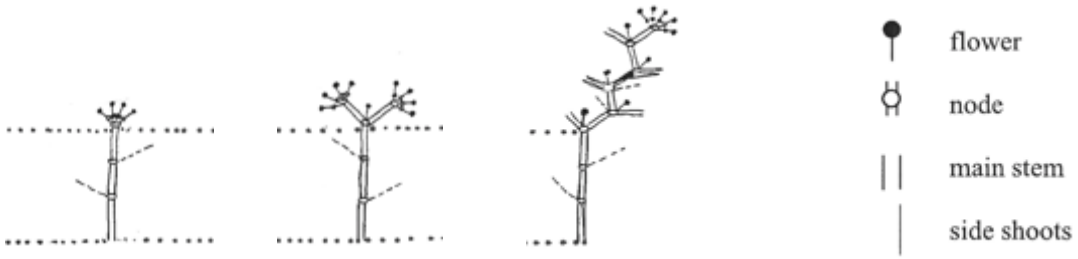
1
absent



9
present

Ad. 5: Only varieties with plant: shortened internodes: present: number of internodes between the first flower and shortened internodes

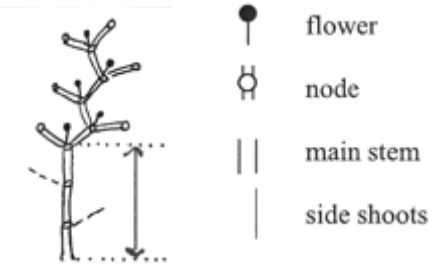
Observations should be made on plants which have not been pruned, in the upper part, after the first branching of the main axis, to where the shorter internodes appear and the main stem ends in a bunch of flowers.



1	2	3	
none	one to three	more than 3	explanation of plant parts

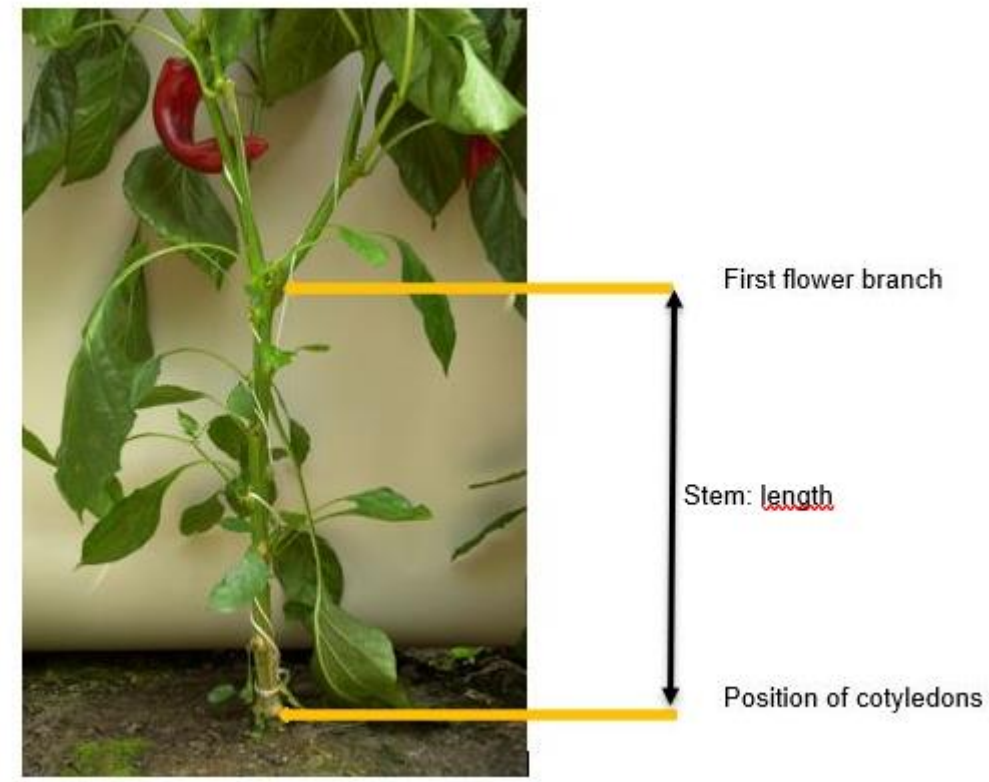
Ad. 6: Only varieties with plant: shortened internodes: absent: length of internodes

Observations should be made on plants which have not been pruned, in the upper part after the first branching of the main axis, on primary side shoots.

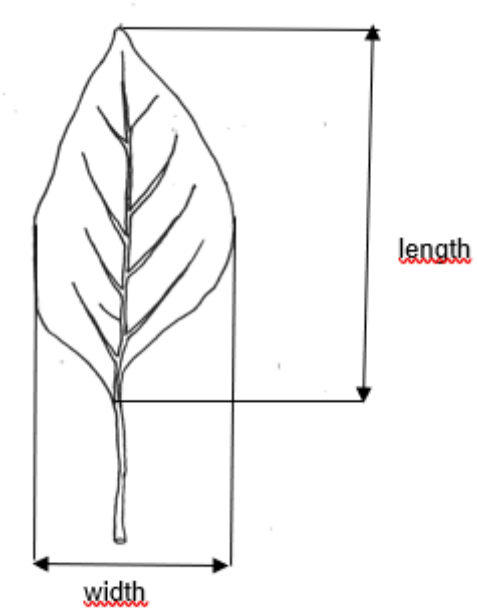


Ad. 7: Stem: length

Observations should be made from the cotyledons to the node of the first flower branch.



Ad. 10: Leaf blade: length



Ad. 11: Leaf blade: width

See Ad.10

Ad. 12: Leaf blade: ratio length/width

See Ad. 10

Ad. 14: Leaf blade: intensity of anthocyanin coloration of upper side

Observations should be made on leaves when they are just fully developed.

Ad. 15: Leaf blade: distribution of anthocyanin coloration of lower side

See Ad. 14 for time of observation.

2
on veins throughout

3
on veins and diffuse on distal part

4
on veins and diffuse throughout

5
throughout

Ad. 16: Leaf blade: variegation

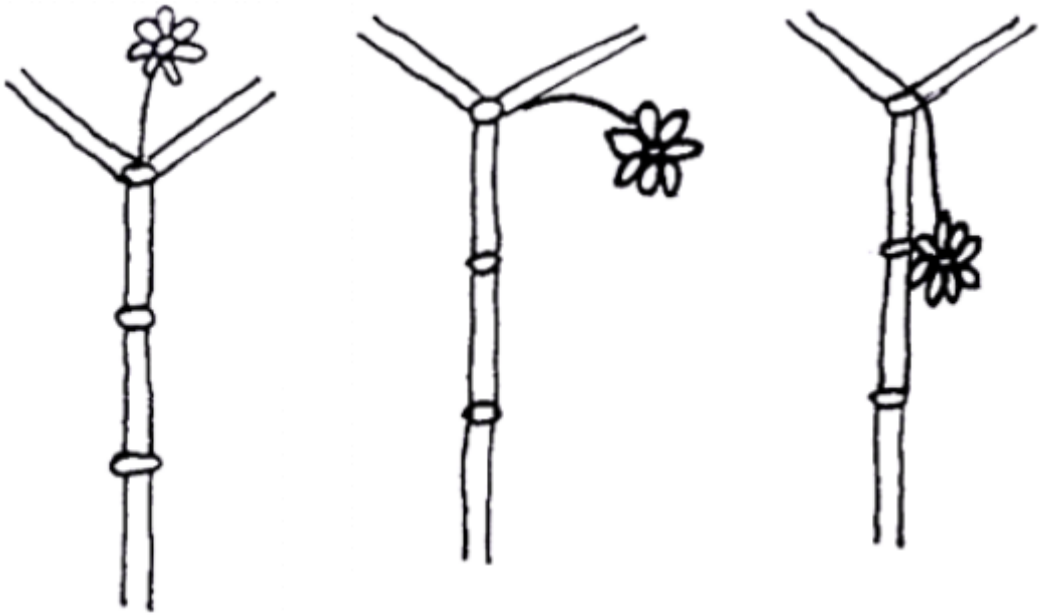
9
present

Ad. 20: Time of beginning of flowering

Time of beginning of flowering is reached when 50% of the plants have the first open flower of the second flowering node.

Ad. 21: Flower: attitude of peduncle

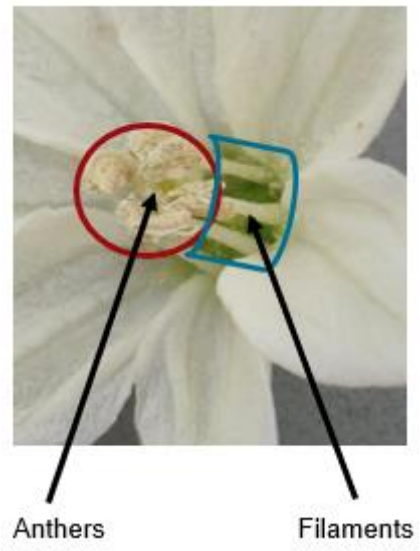
The predominant state of expression should be scored.



1	2	3
erect	semi-drooping	drooping

Ad. 23: Flower: anthocyanin coloration of anther

Observations should be made on the part of the stamen that normally produces pollen, i.e. the anther.



Ad. 24: Flower: anthocyanin coloration of filament

See Ad. 23
Observations should be made on the stalk of the stamen, i.e. the filament.

Ad. 25: Male sterility

Observations should be made on anthers of fresh, fully open flowers. Male sterile flowers do not have pollen.

Partial sterility
A partially male sterile variety (a parent line) consists of 50% plants with male sterile flowers and 50% of plants with male fertile flowers. This segregation (ref. TG/1/3 and TGP/10 section 2.4) is a result of the method of propagation of the variety. The heredity of this segregation is known, and behaves in the predicted manner.

Inbreeding and maintenance of the variety (parent line)
GMS (genetic male sterility) is caused by a recessive gene with alleles A (fertile) and a (sterile). Through inbreeding a line is created that is phenotypically stable and uniform for all traits but still segregates for the GSM locus: aa (gms, male sterile) x AA (normalgermplasm, male fertile) results in Aa. After selfing the offspring will be 50% Aa, 25% aa and 25% AA. By crossing aa x Aa individuals, it is possible to maintain a population where 50% of all plants have sterile flowers and 50% fertile flowers.

In a hybrid production this population is used as a mother. The 50% fertile plants are removed before pollination, thus leaving only the sterile plants to be pollinated.

1
absent

3
present

Ad. 26: Immature fruit: color

For immature greenish white and greenish yellow varieties, particular attention is needed to make observations before the start of the color change.

Ad. 29: Fruit: attitude

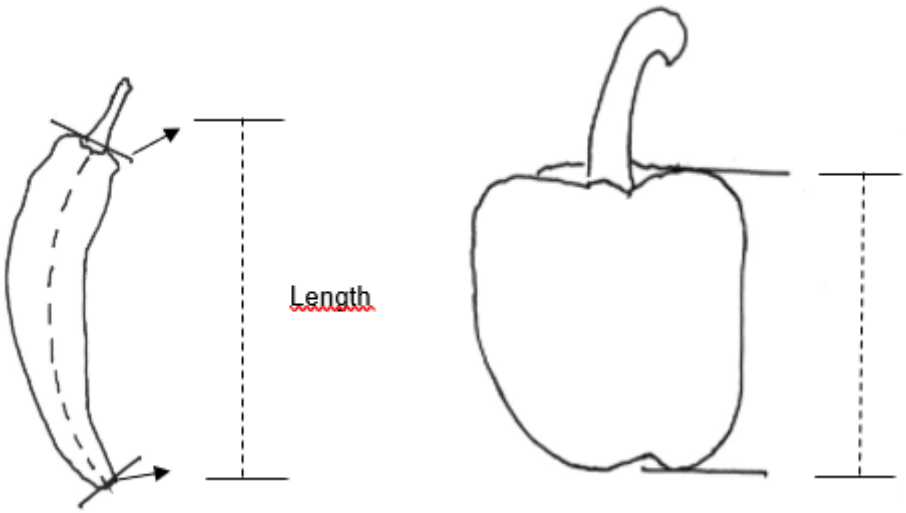
The predominant state of expression should be scored.

Ad. 30: Fruit: length

Observations should be made excluding the peduncle.

The length of the fruit for curved or s-shaped fruits should be observed following the C- shape or S-shape.

The length of the fruit with peduncle cavity or/and depressed apex should be observed without taking into account the cavity and depressed apex.

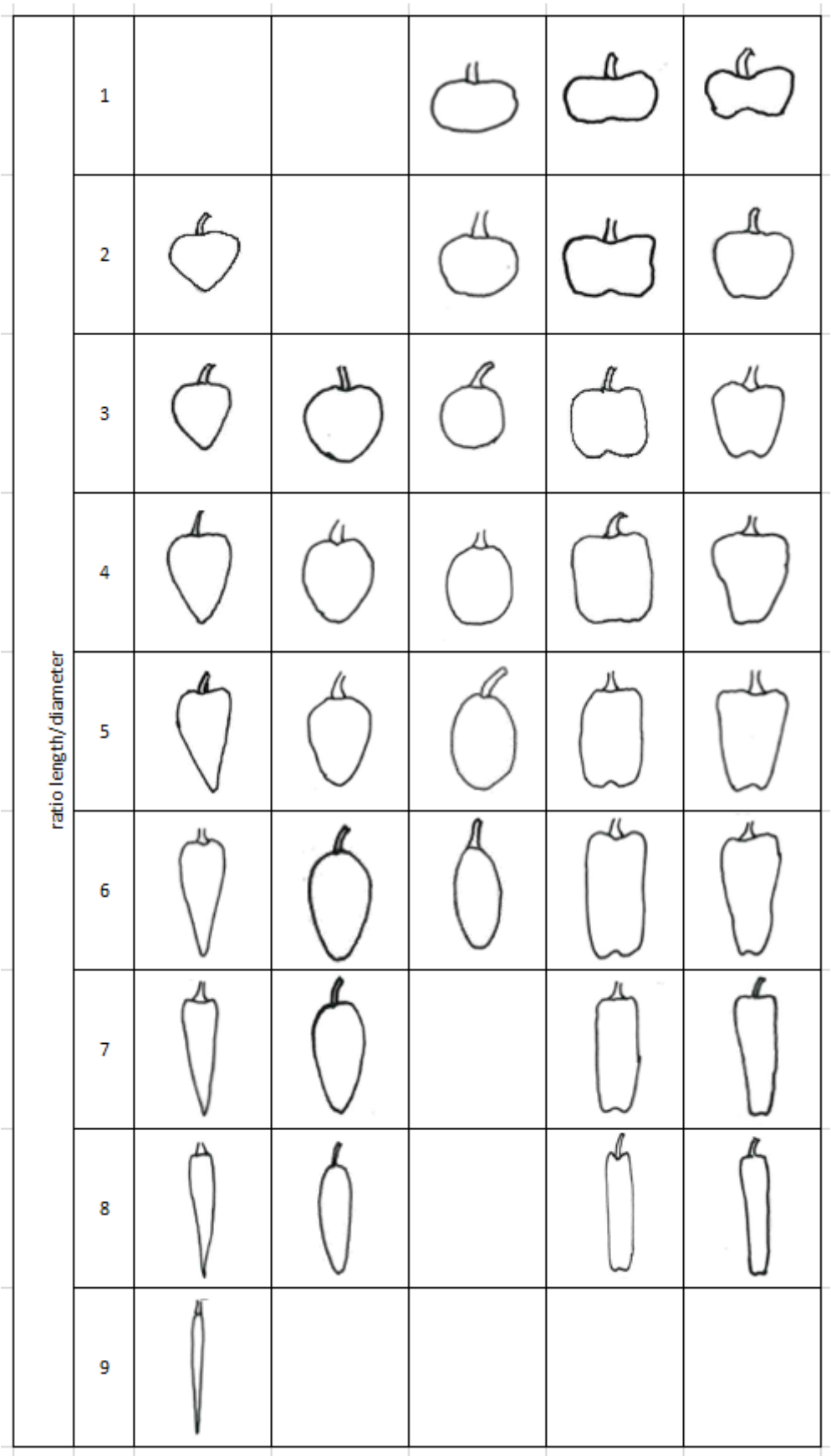


Ad. 31: Fruit: diameter

Observations should be made at the broadest part of the fruit.

Ad. 32: Fruit: ratio length/diameter

Observations should be made by comparing the ratio of the fruit with the illustrations for the ratios of shapes in the table.



Ad. 33: Fruit: shape in longitudinal section

		 6 oblate	 9 transverse rectangular	
	 3 cordate	 5 circular	 8 square	
 1 triangular	 2 ovate	 4 elliptic	 7 rectangular	 10 trapezoid

Ad. 34: Fruit: curvature

Observations should be made excluding the extreme point of the tip. The predominant state of expression should be scored.

1
absent

2
C-shaped

3
S-shaped

Ad. 35: Fruit: twisting

1
absent or weak

2
medium

3
strong

Ad. 36: Fruit: shape in cross section

Observations should be made at level of the placenta.

Ad. 37: Fruit: sinuation of pericarp at basal part

1
absent or very weak

3
weak

5
medium

7
strong

9
very strong

Ad. 38: Fruit: sinuation of pericarp excluding basal part

1
absent or weak

2
medium

3
strong

Ad. 40: Fruit: texture of surface

1
smooth or very slightly wrinkled

2
slightly wrinkled

3
strongly wrinkled

Ad. 41: Fruit: color

Fruit: intensity of color (Char. 42)	Fruit: color				
	1 yellow	2 orange	3 red	4 brown	5 green
1 very light					
3 light	Deseo, Lumos, Gialte		Doyum, Healey,Teseo		
5 medium	Allrounder, Rialto, Valdor	Arancia, DSP 7054, Jack Miller	Baquero, California Wonder, Greygo	Chocolony	Raymond
7 dark	Lalin, Tenor, Verdial	Delirio, Zajda	Angelito, Doux italien, Ettore		
9 very dark			Szegedi 20	Bastan	

Ad. 42: Fruit: intensity of color

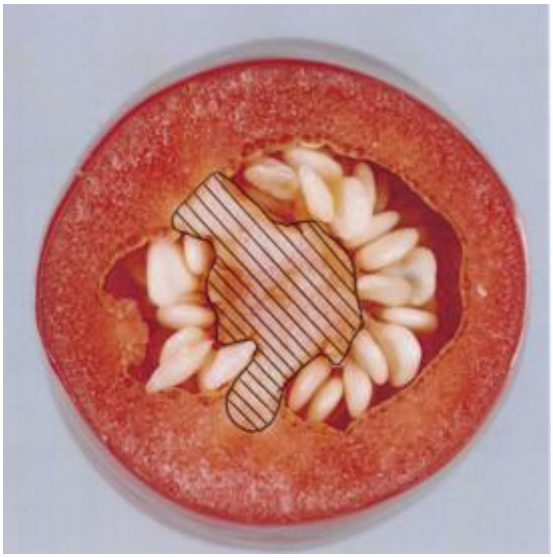
See Ad. 41 for example varieties.

Ad. 45: Fruit: depth of interloculary grooves

Observations should be made on the middle third of the fruit.

Ad. 48: Fruit: capsaicin in placenta

Observations should be made by tasting the placenta. The placenta is the tissue to which the seeds are attached to.



Ad. 49: Fruit: seeds

1
absent

9
present

Ad. 51: Peduncle: thickness

Observations should be made at the middle of the peduncle.

Ad. 52: Calyx: aspect

Observations should be made on whether the calyx is not enveloping (1) the fruit, or enveloping the fruit including (3) its shoulder, or partly enveloping the fruit, except the shoulder (2).

1
non enveloping

2
semi enveloping

3
enveloping

Ad. 53: Time of maturity

Observations should be made when at least 50% of the plants show the color change of the fruit.

Ad. 54: Resistance to Tobamovirus - *Tobacco mosaic virus* **-** Group 0 (TMV: 0)

1.	Pathogen	Tobamovirus (the genus containing *Tobacco mosaic virus* (TMV), and *Pepper mild mottle virus* (PMMoV))
2.	Quarantine status	No
3.	Host species	Sweet pepper, hot pepper, paprika and chili – *Capsicum annuum* L.
4.	Source of inoculum	GEVES[1] (FR), Naktuinbouw[2] (NL) or INIA - CSIC[3] (SP)
5.	Isolate	- *Tobacco mosaic virus* group 0 (TMV: 0) strain Vi-6 - *Pepper mild mottle virus* group 2 (PMMoV: 1.2) strain nt203 - *Pepper mild mottle virus* group 3 (PMMoV: 1.2.3) strain Eve The test protocols have been validated in a CPVO co-funded project[4] with these 3 isolates/races
6.	Establishment isolate identity	genetically defined pepper differentials (ref. ISF site Feb. 2020: http://www.worldseed.org/isf/differential_hosts.html)

	Pepper Tobamovirus Group	0	1	2	3
	ISF Code →	TMV: 0,1,2 ToMV: 0,1,2 BPMoV	TMGMV PaMMV	PMMoV: 1.2	PMMoV: 1.2.3
Differential hosts	**Gene**				
Lamu, Early Calwonder	-	S	S	S	S
Tisana, Yolo Wonder	*L1*	HR	S	S	S
Tabasco	*L2*	HR	HR	S	S
Solario F1, Novi 3, PI159236	*L3*	HR	HR	HR	S
Tom4, PI260429	*L4*	HR	HR	HR	HR

S = susceptible; HR = highly resistant;
TMV= *Tobacco mosaic virus*; ToMV= *Tomato mosaic virus*;
PMMoV= *Pepper mild mottle virus;* TMGMV= *Tobacco mild green mosaic virus*;
BPMoV= *Bell pepper mottle virus*; PaMMV= *Paprika mild mottle virus*

7.	Establishment pathogenicity	Test on susceptible plants
8.	Multiplication inoculum	
8.1	Multiplication medium	Regeneration of the virus of plant material before inoculum preparation.
8.2	Multiplication variety	On susceptible pepper variety, Tobamovirus groups may be multiplied on varieties which are selective for each particular group. For TMV, because tomato and tobacco *Nicotiana tabacum* cv. Samsun have large leaves and can produce a lot of inoculum, they are recommended for the multiplication of TMV: 0.
8.3	Plant stage at inoculation	see 10.3
8.4	Inoculation medium	see 10.1
8.5	Inoculation method	see 10.4
8.6	Harvest of inoculum	Symptomatic fresh leaves
8.7	Check of harvested inoculum	option: on young leaves of *Nicotiana tabacum* “Xanthi”, check for local lesions after 5-7 days at 20-25°C.
8.8	Shelf life/viability inoculum	fresh > 1 day in fridge, desiccated > 1 year in fridge, or juice > 1 year in freezer at - 20°C.

[1] matref@geves.fr

[2] resistentie@naktuinbouw.nl

[3] resistencias@inia.es

[4] Harmores 2 CPVO project (http://www.cpvo.europa.eu/main/en/home/documents-and-publications/technical-projects-reports)

9.	Format of the test	
9.1	Number of plants per genotype	At least 20 plants
9.2	Number of replicates	-
9.3	Control varieties	TMV: 0: - Susceptible controls: Lamu, Pepita, Piquillo - Resistant controls: Fehérözön, Yolo Wonder PMMoV: 1.2: - Susceptible controls: Fehérözön, Lamu, Yolo Wonder - Resistant controls: Ferrari, Novi 3 PMMoV: 1.2.3: - Susceptible controls: Ferrari, Yolo Wonder - Resistant controls: Friendly, Tom 4 For PMMoV: 1.2.3, it is advised to choose Ferrari as susceptible control because it is resistant to PMMoV: 1.2 or to add the differentials in tests to confirm the group.
9.4	Test design	add non-inoculated plants
9.5	Test facility	Climate room or greenhouse
9.6	Temperature	20-25°C
9.7	Light	12 hours or longer
9.8	Season	-
9.9	Special measures	-
10.	Inoculation	
10.1	Preparation inoculum	1 g leaf with symptoms with 10 mL PBS or similar buffer or dilution of juice in water. Homogenize, add carborundum to buffer
10.2	Quantification inoculum	-
10.3	Plant stage at inoculation	TMV: 0, cotyledons to first leaf stage PMMoV: 1.2 and PMMoV: 1.2.3, cotyledon stage
10.4	Inoculation method	rubbing with the virus suspension
10.5	First observation	TMV:0: 4-7 days post-inoculation for observation of local necrosis. PMMoV: 1.2 and PMMoV: 1.2.3: 4-7 days post-inoculation for observation of local necrotic lesions which can lead to cotyledon drop. After this date these necrosis can hardly be seen on fallen cotyledons
10.6	Second observation	TMV: 0: two weeks post-inoculation for observation of symptoms of susceptibility. PMMoV: 1.2 and PMMoV: 1.2.3: two weeks post-inoculation for observation of symptoms of susceptibility.
10.7	Final observations	TMV: 0: three weeks post-inoculation. PMMoV: 1.2 and PMMoV: 1.2.3: three weeks post-inoculation. For TMV:0, PMMoV: 1.2 and PMMoV: 1.2.3, two of these three observations may be sufficient; the third notation is optional for observation of evolution of symptoms (depending on symptoms on controls or heterogeneous behaviour)
11.	Observations	
11.1	Method	Visual

11.2	Observation scale	TMV: 0: - Susceptibility: mosaic (Aucuba in case of Aucuba strain as Vi-6), growth reduction, death of plants. - Resistance: local necrotic lesions which can lead to leave drop, systemic necrosis, vein necrosis, stem necrosis. PMMoV: 1.2 and PMMoV: 1.2.3: - Susceptibility: mosaic (green), growth reduction. - Resistance: local necrotic lesions which can lead to cotyledon drop, systemic necrosis
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
11.4	Off-types	-
12.	Interpretation of data in terms of UPOV characteristic states	absent ..... [1] susceptible, see 11.2 present ..... [9] resistant, see 11.2
13.	Critical control points	- For TMV: 0, plants with no symptoms at all have to be interpreted as escapes of inoculation. - Recommended dates of notation should be adapted depending of expression of symptoms on controls. - Environmental conditions can have an effect on the expression of symptoms over time. In this case a third notation could be necessary.

Ad. 55: Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 2 (PMMoV: 1.2)

See Ad. 54

Ad. 56: Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 3 (PMMoV: 1.2.3)

See Ad. 54

Ad. 57: Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0)

1.	Pathogen	*Potato Y virus* (PVY)
2.	Quarantine status	No
3.	Host species	Sweet pepper, hot pepper, paprika and chili – *Capsicum annuum* L
4.	Source of inoculum	GEVES[5] (FR), Naktuinbouw[6] (NL) or INIA - CSIC[7] (SP)
5.	Isolate	- For PVY: 0 strain zb6 (the test protocol has been validated in a CPVO co-funded project[8] with this isolate/race). - PVY race 1 - PVY race 2
6.	Establishment isolate identity	genetically defined pepper controls (ref. ISF site: nov. 2020: Differential Hosts – International Seed Federation (worldseed.org))

Differential Host	**gene present**	PVY: 0	PVY: 1	PVY: 1.2
Early Cal Wonder, Yolo Wonder	*pvr 0*	S	S	S
PI152225	*pvr 1*	HR	HR	-
Yolo Y	*pvr1[1] (pvr 2[1])*	HR	S	S
Florida VR2	*pvr1[2] (pvr 2[2])*	HR	HR	S
Florida VR4, Del Rey Bell, Agronomico 10	*pvr3*	HR	HR	HR
Serrano Criollo de Morelos 334	*pvr4*	HR	HR	HR

S= susceptible; HR= highly resistant

Note: In some scientific publications pvr 2^1 is referred to as pvr 1^1. Similarly, pvr 2^2 is referred to as pvr 1^2 .

7.	Establishment pathogenicity	Test on susceptible plants
8.	Multiplication inoculum	
8.1	Multiplication medium	Regeneration of the virus on plant material before inoculum preparation
8.2	Multiplication variety	On susceptible pepper variety, PVY races may be multiplied on varieties which are selective for each particular race. For PVY: 0, because tobacco *Nicotiana tabacum* cv. *Xanthi-nc* has large leaves and can produce a lot of inoculum and has a faster multiplication, it is recommended for the multiplication.
8.3	Plant stage at inoculation	see 10.3
8.4	Inoculation medium	see 10.1
8.5	Inoculation method	see 10.4
8.6	Harvest of inoculum	Symptomatic fresh leaves
8.7	Check of harvested inoculum	Option: on *Nicotiana tabacum* cv. *Xanthi-nc,* check mosaic presence and local lesion absence (contamination by Tobamovirus) after 5-7 days.
8.8	Shelf life/viability inoculum	fresh > 1 day, desiccated > 1 year. Because problem of stability of PVY: 0, shipments are recommended to be done with fresh infected leaves
9.	Format of the test	
9.1	Number of plants per genotype	At least 20 plants
9.2	Number of replicates	-

[5] matref@geves.fr

[6] resistentie@naktuinbouw.nl

[7] resistencias@inia.es

[8] Harmores 2 CPVO project (http://www.cpvo.europa.eu/main/en/home/documents-and-publications/technical-projects-reports)

9.3	Control varieties	PVY: 0: - Susceptible controls: Ferrari, Piquillo,Yolo Wonder - Resistant controls: Andalus, Vidi, Yolo Y PVV: 1: - Susceptible controls: Yolo Wonder, Yolo Y - Resistant controls: Florida VR2 PVY: 1.2: - Susceptible controls: Florida VR2, Yolo Wonder, Yolo Y - Resistant controls: Serrano Criollo de Morelos
9.4	Test design	add non inoculated plants
9.5	Test facility	Climate room or greenhouse. In case of test in greenhouse during period of low daylight, shadowy area should not be used
9.6	Temperature	18-25°C
9.7	Light	12 hours or longer
9.8	Season	-
9.9	Special measures	For PVY: 0, it is advised to choose Yolo Y as resistant control or to add the differentials in tests to be able to observe a possible contamination by PVY: 1 or 1.2
10.	Inoculation	
10.1	Preparation inoculum	1 g leaf with symptoms with 4 mL PBS with carborundum (80mg) and activated carbon (80mg) or similar buffer, homogenize
10.2	Quantification inoculum	-
10.3	Plant stage at inoculation	PVY: 0: cotyledons stage PVY: 1 and 1.2: cotyledons stage or first pointing leaf stage
10.4	Inoculation method	rubbing with the virus suspension
10.5	Final observations	Three weeks post-inoculation
11.	Observations	
11.1	Method	Visual
11.2	Observation scale	Susceptibility: mosaic (can be very light/faint), growth reduction, vein banding and vein necrosis. Resistance: no symptoms
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls.
11.4	Off-types	-
12.	Interpretation of data in terms of UPOV characteristic states	absent ..... [1] susceptible, see 11.2 present ..... [9] resistant, see 11.2
13.	Critical control points	Recommended dates of notation should be adapted depending of expression of symptoms on controls.

Ad. 58: Resistance to *Potato Y virus* (PVY) - Pathotype 1 (PVY: 1)

See Ad. 57

Ad. 59: Resistance to *Potato Y virus* (PVY) - Pathotype 1.2 (PVY: 1.2)

See Ad. 57

Ad. 60: Resistance to *Phytophthora capsici* (Pc)

1.	Pathogen	*Phytophthora capsici* (Pc)
2.	Quarantine status	no
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	INRAE GAFL (FR)
5.	Isolate	moderately aggressive (e.g. strain P0277)
6.	Establishment isolate identity	on standards Jupiter, Yolo Wonder (susceptible), Favolor (moderately resistant), Solario, Phyo 636 (resistant)
7.	Establishment pathogenicity	in biotest on plants
8.	Multiplication inoculum	
8.1	Multiplication medium	V8 juice-agar (1%) or 10% V8A or PDA+
8.2	Multiplication variety	-
8.3	Plant stage at inoculation	-
8.4	Inoculation medium	10% V8A or PDA+
8.5	Inoculation method	see 10.4
8.6	Harvest of inoculum	-
8.7	Check of harvested inoculum	-
8.8	Shelf life/viability inoculum	10% V8A 3 months, PDA+ 2 months
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 (2 untreated plants)
9.2	Number of replicates	e.g. 1
9.3	Control varieties	Jupiter, Yolo Wonder (susceptible), Favolor (moderately resistant), Solario (resistant)
9.4	Test design	-
9.5	Test facility	glasshouse
9.6	Temperature	22°C d/n
9.7	Light	at least 12h
9.8	Season	-
9.9	Special measures	-
10.	Inoculation	
10.1	Preparation inoculum	growing on Petri dishes
10.2	Quantification inoculum	-
10.3	Plant stage at inoculation	first flower bud
10.4	Inoculation method	Stem is cut just below point of first branching, a 4mm-agar plug is placed carefully on the wound and covered with aluminum foil
10.5	First observation	7 days post inoculation
10.6	Second observation	14 days post inoculation
10.7	Final observations	21 days post inoculation
11.	Observations	
11.1	Method	visual, comparative or measurement of stem necrosis length; for repeated measurements, the stem is marked with permanent ink
11.2	Observation scale	
	- susceptible	e.g. length increase > 0.8 cm/week
	- moderately resistant	e.g. length increase ≥ 0.5 cm ≤ 0.8 cm/week
	- highly resistant	e.g. length increase < 0.5 cm/week
11.3	Validation of test	Evaluation of variety resistance should be based on the stem necrosis increase compared to the control varieties.
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	Absent…… [1] susceptible Present……[9] moderately resistant and higly resistant
13.	Critical control points	- Absence of differential interactions between host and pathogen - Maintenance of viability of the strains in the collection

Ad. 61: Resistance to *Cucumber mosaic virus* (CMV)

1.	Pathogen	*Cucumber mosaic virus* (CMV)
2.	Quarantine status	no
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	INRAE GAFL (FR)
5.	Isolate	e.g. 'Fulton'
6.	Establishment isolate identity	-
7.	Establishment pathogenicity	-
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant
8.2	Multiplication variety	e.g. *Vinca rosea*
8.3	Plant stage at inoculation	-
8.4	Inoculation medium	0.03 M PBS + 0.1% DIECA
8.5	Inoculation method	rubbing with carborundum
8.6	Harvest of inoculum	1 g on 4 ml buffer
8.7	Check of harvested inoculum	-
8.8	Shelf life/viability inoculum	-
9.	Format of the test	
9.1	Number of plants per genotype	50
9.2	Number of replicates	e.g. 1
9.3	Control varieties	Yolo Wonder (susceptible), Ducato (moderately resistant), Alby, Favolor (resistant)
9.4	Test design	-
9.5	Test facility	-
9.6	Temperature	20-22°C
9.7	Light	12h
9.8	Season	-
9.9	Special measures	-
10.	Inoculation	
10.1	Preparation inoculum	-
10.2	Quantification inoculum	-
10.3	Plant stage at inoculation	cotyledon, before emergence of first leaf (12-13 days after sowing)
10.4	Inoculation method	rubbing cotyledons with carborundum, followed by 48h darkness
10.5	First observation	10 days post inoculation
10.6	Second observation	15 days post inoculation
10.7	Final observations	21 days post inoculation
11.	Observations	
11.1	Method	visual, comparative
11.2	Observation scale	
	- susceptible	many local lesions, mosaic
	- moderately resistant	intermediate symptoms
	- highly resistant	few local lesions, no or light symptoms
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls.
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	Absent…… [1] susceptible Present……[9] moderately resistant and highly resistant
13.	Critical control points	-

Ad. 62: Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0)

1.	Pathogen	*Tomato spotted wilt virus*, Pathotype 0 (TSWV: 0)
2.	Quarantine status	yes
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	GEVES (FR), Naktuinbouw (NL), INIA CSIC (ES)
5.	Isolate	e.g. LYE 51 or Br-01
6.	Establishment isolate identity	-
7.	Establishment pathogenicity	Test on susceptible plant or *Nicotiana benthamiana, N. rustica*
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant
8.2	Multiplication variety	Yolo Wonder or *N. benthamiana*, *N. rustica*
8.3	Plant stage at inoculation	Cotyledons fully developed or at “first leaf” pointed stage or 1-3 leaves
8.4	Inoculation medium	Ice-cold buffer suspension or 0.03 M PBS + optional addition of 0.1% sodium sulfite freshly added
8.5	Inoculation method	Rubbing with carborundum
8.6	Harvest of inoculum	-
8.7	Check of harvested inoculum	-
8.8	Shelf life/viability inoculum	Stability in ice cold suspension ca. 15-20 minutes
9.	Format of the test	
9.1	Number of plants per genotype	At least 20
9.2	Number of replicates	e.g. 1
9.3	Control varieties	Lamuyo, Yolo Wonder (susceptible), Galileo, Jackal, Jackpot, Prior (resistant)
9.4	Test design	-
9.5	Test facility	Growth chamber or insect proof glasshouse
9.6	Temperature	18-20°C or 20-22°C
9.7	Light	12h
9.8	Season	All seasons, but winter reduces the risk of thrips infestation
9.9	Special measures	Biohazard sign on compartment for countries with a TSWV quarantine status
10.	Inoculation	
10.1	Preparation inoculum	-
10.2	Quantification inoculum	-
10.3	Plant stage at inoculation	Cotyledons fully developed /at “first leaf” pointed stage or 1-3 leaves
10.4	Inoculation method	Rubbing with carborundum, then apply shading or darkness for 24h Option: repeat the inoculation 2-3 days later to reduce accidental escapes
10.5	First observation	5-6 days to10 - 15 days post inoculation
10.6	Second observation	10-11 days post inoculation to 15 - 21 days post inoculation
10.7	Final observations	21 days post inoculation
11.	Observations	
11.1	Method	Visual, comparative
11.2	Observation scale	
		Susceptibility: mosaic on young leaf, some leaf malformation
		Resistance: necrosis or only mechanical damage
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls.
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] susceptible, see 11.2 present [9] resistant, see 11.2
13.	Critical control points	- Monitor and control the presence of thrips. TSWV is transmitted by thrips (*Thrips tabaci* and *Frankliniella occidentalis*.). TSWV has a broad host range. - After a few multiplication the virus could be ineffective. New isolates can be obtained from practice by harvesting fruits of L4 pepper varieties infected naturally with TSWV. The fruits are kept at -70°C temperature. The presence of other viruses must be checked before using this material.

Ad. 63: Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 1

1.	Pathogen	Xanthomonas spp (ex Xanthomonas campestris pv. vesicatoria) (X spp (ex Xcv))
2.	Quarantine status	-
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	Natural; to be taken from any source of infection in the field
5.	Isolate	Expected reactions on resistant standard varieties
6.	Establishment isolate identity	on differentials

Differential	Pathotype 1	Pathotype 2	Pathotype 3
Early California Wonder	S	S	S
Early California Wonder-10R (gene Bs1)	S	R	S
Early California Wonder-20R (gene Bs2)	R	R	R
Early California Wonder-30R (gene Bs3)	R	S	S
PI 235047 (gene Bs4)	R	S	R

7.	Establishment pathogenicity	-
8.	Multiplication inoculum	
8.1	Multiplication medium	A bacterial growth medium, e.g. LPGA
8.2	Multiplication variety	-
8.3	Plant stage at inoculation	-
8.4	Inoculation medium	-
8.5	Inoculation method	-
8.6	Harvest of inoculum	48h culture
8.7	Check of harvested inoculum	-
8.8	Shelflife/viability inoculum	-
9.	Format of the test	
9.1	Number of plants per genotype	at least 20
9.2	Number of replicates	e.g. 1
9.3	Control varieties	Fehérözön, Yolo Wonder (susceptible), Emiro, Filidor, Gotico, San Marco, Solanor (resistant)
9.4	Test design	-
9.5	Test facility	-
9.6	Temperature	20-26°C day/night
9.7	Light	30.000 lux suggested, 16h/day
9.8	Season	-
9.9	Special measures	80% RH
10.	Inoculation	
10.1	Preparation inoculum	Harvest cells from LPGA plate after 48 h growing
10.2	Quantification inoculum	10^7 -10^8 cells per ml (Stronger reaction with the higher concentration.)
10.3	Plant stage at inoculation	6-8 true leaves
10.4	Inoculation method	Infiltration into abaxial surface of the interveinal region on either side of the midrib of a fully expanded leaf in 13-20mm diameter spots
10.5	First observation	2-5 days post inoculation
10.6	Second observation	6-8 days post inoculation
10.7	Final observations	10-14 days post inoculation
11.	Observations	
11.1	Method	Visual, comparative
11.2	Observation scale	
		Susceptibility: Water soaking near infiltration site
		Resistance; Necrotic reaction at infiltration site
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls.
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] susceptible, see 11.2 present [9] resistant, see 11.2
13.	Critical control points	-

Ad. 64: Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 2

See Ad. 63

Ad. 65: Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 3

See Ad. 63

Ad. 66: Resistance to *Meloidogyne incognita* (Mi)

1.	Pathogen	*Meloidogyne incognita* (Mi)
2.	Quarantine status	-
3.	Host species	Sweet pepper, hot pepper, paprika and chili – *Capsicum annuum* L.
4.	Source of inoculum	GEVES[9] (F)
5.	Isolate	non-resistance breaking
6.	Establishment isolate identity	use pepper standards
7.	Establishment pathogenicity	use pepper standards
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant of pepper or tomato
8.2	Multiplication variety	susceptible variety
8.3	Plant stage at inoculation	2 leaves stage
8.5	Inoculation method	Deposit of piece of contaminated roots in soil (around 5-10g per plant, to adapt depending of the population aggressivity)
8.6	Harvest of inoculum	6 to 10 weeks after inoculation, root systems are cut with scissors into pieces of about 1 cm length
8.7	Check of harvested inoculum	visual check for presence of root knots and ripe egg masses
8.8	Shelflife/viability inoculum	1 day
9.	Format of the test	
9.1	Number of plants per genotype	30 plants, plus at least 10 non-inoculated plants to observe if a possible lack of germination is due to nematode or not. It is recommended to sow more seeds to be sure to get enough plants.
9.2	Number of replicates	At least 2, preferably 3 .
9.3	Control varieties	Susceptible: Tom 4 and Yolo Wonder (as additional susceptible control for reduced susceptibility, indicating the border between S and R) Resistant: Capital and W4
9.4	Test design	3 replicates of 10 plants per variety, in separate trays with contaminated substrate (70% soil +30% sand) to allow statistical analysis. 10 plants in a separate tray with NON contaminated substrate.
9.5	Test facility	greenhouse or climate room
9.6	Temperature	20-26°C, the temperature must be adapted depending on the aggressivity of the test to obtain expected response of controls but should not be above 26°C.
9.7	Light	at least 12 h per day
10.1	Preparation inoculum	Small pieces of diseased roots mixed with soil

[9] GEVES; matref@geves.fr

10.2	Quantification inoculum	The ratio is depending of aggressiveness of test and laboratories conditions (e.g. between 15g to 30g of infested roots, for 40 plants in a tray of 30*30 cm containing approximately 3.5 kg of substrate,), galls should be mixed homogeneously with the soil.
10.3	Plant stage at inoculation	seed
10.4	Inoculation method	Seeds sown in soil contaminated with infested roots homogeneously mixed with soil
10.5	First observation	-
10.6	Second observation	-
10.7	Final observations	Around 45 days after inoculation depending on test conditions (temperature, season)
11.	Observations	
11.1	Method	root inspection
11.2	Observation scale	Class 0: healthy plant, no galls Class 1: few and little galls which are difficult to find (for example less than 5) Class 2: few galls, easy to observe but on few roots, still a lot of roots without galls, no chains Class 3: many individual galls on most but not all roots, presence of chains Class 4: many galls on all roots, can lead to dead plants and may suppress emergence.
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls.
11.4	Off-types	resistant varieties may have a few plants with a few galls
12.	Interpretation of data in terms of UPOV characteristic states	Variety very similar to resistant control is judged as resistant: Variety very similar to susceptible controls is judged as susceptible: Resistance is absent (1); If significantly different from resistant and susceptible controls (notations are between resistant and susceptible controls), the variety is judged as resistant; Yolo Wonder is the border control variety for susceptibility. Varieties with higher resistance than Yolo wonder are judged as resistant: Resistance is present (9); If results are not clear, statistical analysis is advised.  *The analysis of raw data of the couple Mi / Pepper is planned in the Pathostat tool (free statistic analysis dedicated to quantitative disease resistances)* https://pathostat.geves.fr
13.	Critical control points	Avoid rotting of roots; high temperature causes breakdown of resistance. In case of an aggressive test, put seeds in a layer of non-contaminated soil or decrease the quantity of inoculum. In class 4 heavy gall development is seldom observed, normally it can occur as loss of seedlings. If germination of non-inoculated seeds is 100%, non-germinated inoculated seeds are expected to be in class 4. If germination of non-inoculated seeds is less than 100%, equal lower germination percentage can be expected concerning the inoculated seeds.

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Szarka, J. and Csilléry, G., 1995: Defence system against *Xanthomonas campestris* pv. *vesicatoria*. Eucarpia IXth Meeting on Genetics and Breeding of Capsicum and Eggplant. Budapest, Hungary, August 21-25. pp. 184-187

TSWV

Moury, B., Pflieger, S., Blattes, A., Lefebvre, V., Palloix, A., 2000: A CAPS marker to assist selection of tomato spotted wilt virus (TSWV) resistance in pepper, Genome, CA, no. 43; pp.137-142

10. Technical Questionnaire

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

	Application date: (not to be filled in by the applicant)

TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

1. Subject of the Technical Questionnaire

1.1	Botanical name	*Capsicum annuum* L.
1.2	Common name	Sweet Pepper, Hot Pepper, Paprika, Chili

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

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

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

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(b) partially known cross [ ]

(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)

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:

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) Cross-pollination [ ]
(c) Hybrid [ ]
(d) Other (please provide details) [ ]

4.2.2 Other [ ]
(Please provide details)

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

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 (3)	**Plant: height**		
	very short		1 [ ]
	very short to short		2 [ ]
	short	Bravia	3 [ ]
	short to medium		4 [ ]
	medium	HRF	5 [ ]
	medium to tall		6 [ ]
	tall	Century	7 [ ]
	tall to very tall		8 [ ]
	very tall	Brutus	9 [ ]
5.2 (4)	**Plant: shortened internodes**		
	absent	California wonder, De Cayenne	1 [ ]
	present	Bucano	9 [ ]
5.3 (14)	**Leaf blade: intensity of anthocyanin coloration of upper side**		
	absent or very weak		1 [ ]
	weak	Omiyamurasaki, Purple Rain	2 [ ]
	medium	Calico	3 [ ]
	strong	Black Pearl	4 [ ]
	very strong	Purple Flash, Takiama Purple to Red, TF802	5 [ ]
5.4 (15)	**Leaf blade: distribution of anthocyanin coloration of lower side**		
	absent		1 [ ]
	on veins throughout	Takiama Purple to Red	2 [ ]
	on veins and diffuse on distal part		3 [ ]
	on veins and diffuse throughout	Black Pearl, Purple Flash	4 [ ]
	throughout	TF802	5 [ ]
5.5 (16)	**Leaf blade: variegation**		
	absent	Omiyamurasaki	1 [ ]
	present	Calico, Purple Rain	9 [ ]

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

	Characteristics	Example Varieties	Note
5.6 (23)	**Flower: anthocyanin coloration of anther**		
	absent	Bravia	1 [ ]
	present	Brutus, Lamuyo	9 [ ]
5.7 (25)	**Male sterility**		
	absent	California wonder	1 [ ]
	partially present		2 [ ]
	totally present	Angelito	3 [ ]
5.8 (26)	**Immature fruit: color**		
	greenish white	Bravia	1 [ ]
	greenish yellow	Don, Sweet banana	2 [ ]
	green	Allrounder, Black Bullet, Cornus, Hitman, Impala, Syrto	3 [ ]
	purple	Cardinal, Lilo, Loco, Tequila, Tonaya	4 [ ]
5.9 (27)	**Only varieties with immature fruit green or purple: intensity of color**		
	very light		1 [ ]
	very light to light		2 [ ]
	light	Cornus, Loco, Syrto	3 [ ]
	light to medium	Tequila	4 [ ]
	medium	Allrounder	5 [ ]
	medium to dark	Cardinal	6 [ ]
	dark	Impala, Lilo, Tonaya	7 [ ]
	dark to very dark		8 [ ]
	very dark	Black Bullet, Hitman	9 [ ]
5.10 (30)	**Fruit: length**		
	very short	Cherry Bomb, PAZ szentesi	1 [ ]
	very short to short		2 [ ]
	short	Ophelia, Smolder	3 [ ]
	short to medium		4 [ ]
	medium	California wonder	5 [ ]
	medium to long		6 [ ]
	long	Bravia, De Cayenne	7 [ ]
	long to very long		8 [ ]
	very long	Carboni, Corno di toro rosso, Doux très long des Landes	9 [ ]

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

	Characteristics	Example Varieties	Note
5.11 (31)	**Fruit: diameter**		
	very small	De Cayenne	1 [ ]
	very small to small		2 [ ]
	small	Cherry Bomb	3 [ ]
	small to medium		4 [ ]
	medium	Doux italien	5 [ ]
	medium to large		6 [ ]
	large	Lamuyo, Maduro	7 [ ]
	large to very large		8 [ ]
	very large	Floridor, Ibleor	9 [ ]
5.12 (32)	**Fruit: ratio length/diameter**		
	very low	Liebesapfel, PAZ szentesi	1 [ ]
	very low to low		2 [ ]
	low	Bucano	3 [ ]
	low to medium		4 [ ]
	medium	Maduro	5 [ ]
	medium to high		6 [ ]
	high	Lamuyo, Vidi	7 [ ]
	high to very high		8 [ ]
	very high	De Cayenne, Doux très long des Landes	9 [ ]
5.13 (33)	**Fruit: shape in longitudinal section**		
	triangular	Bravia, Corno di toro rosso, De Cayenne	1 [ ]
	ovate	Jalapeño	2 [ ]
	cordate	Morrón de conserva 3	3 [ ]
	elliptic		4 [ ]
	circular	Capperino	5 [ ]
	oblate	Koral	6 [ ]
	rectangular	Raggio	7 [ ]
	square	Maranello	8 [ ]
	transverse rectangular	Liebesapfel, PAZ szentesi	9 [ ]
	trapezoid	Altea	10 [ ]

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

	Characteristics	Example Varieties	Note
5.14 (37)	**Fruit: sinuation of pericarp at basal part**		
	absent or very weak	Smolder	1 [ ]
	very weak to weak		2 [ ]
	weak	Donat, Kappy	3 [ ]
	weak to medium		4 [ ]
	medium	Banán	5 [ ]
	medium to strong		6 [ ]
	strong	Hawker	7 [ ]
	strong to very strong		8 [ ]
	very strong	Doux italien, Gelber Spiral	9 [ ]
5.15 (38)	**Fruit: sinuation of pericarp excluding basal part**		
	absent or weak	Sonar, Yolo Wonder	1 [ ]
	medium	Rodri	2 [ ]
	strong	De Cayenne, Doux italien	3 [ ]
5.16 (41)	**Fruit: color**		
	yellow	Allrounder	1 [ ]
	orange	Arancia	2 [ ]
	red	Lamuyo	3 [ ]
	brown	Bastan, Chocolony	4 [ ]
	green	Raymond	5 [ ]
5.17 (42)	**Fruit: intensity of color**		
	very light		1 [ ]
	very light to light		2 [ ]
	light		3 [ ]
	light to medium		4 [ ]
	medium		5 [ ]
	medium to dark		6 [ ]
	dark		7 [ ]
	dark to very dark		8 [ ]
	very dark		9 [ ]

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

	Characteristics	Example Varieties	Note
5.18 (44)	**Fruit: depth of peduncle cavity**		
	absent or very shallow	Sweet banana	1 [ ]
	very shallow to shallow		2 [ ]
	shallow	Doux italien	3 [ ]
	shallow to medium		4 [ ]
	medium	Lamuyo, Maduro	5 [ ]
	medium to deep		6 [ ]
	deep	Baquero	7 [ ]
	deep to very deep		8 [ ]
	very deep	Dumbo34	9 [ ]
5.19 (46)	**Fruit: number of locules**		
	predominantly two	De Cayenne	1 [ ]
	equally two and three	Banán	2 [ ]
	predominantly three	Century	3 [ ]
	equally three and four	Lamuyo, Sonar	4 [ ]
	predominantly four	PAZ szentesi	5 [ ]
5.20 (48)	**Fruit: capsaicin in placenta**		
	absent	Sonar, Sweet banana	1 [ ]
	present	De Cayenne	9 [ ]
5.21 (49)	**Fruit: seeds**		
	absent	Angelito	1 [ ]
	present	Lamuyo	9 [ ]
5.22 (53)	**Time of maturity**		
	very early	Macska sárga, Madison	1 [ ]
	early	Kosmik	3 [ ]
	early to medium		4 [ ]
	medium	Lamuyo, Sonar	5 [ ]
	medium to late		6 [ ]
	late	Doux d'Espagne	7 [ ]
	late to very late		8 [ ]
	very late	Teseo	9 [ ]

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

	Characteristics	Example Varieties	Note
5.23 (54)	**Resistance to Tobamovirus - *Tobacco mosaic virus* - Group 0 (TMV: 0)**		
	absent	Lamu, Pepita, Piquillo	1 [ ]
	present	Fehérözön, Ultron, Yolo Wonder	9 [ ]
5.24 (55)	**Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 2 (PMMoV: 1.2)**		
	absent	Fehérözön, Lamu, Yolo Wonder	1 [ ]
	present	Achille, Candela, Ferrari, Fudji, Novi 3	9 [ ]
5.25 (56)	**Resistance to Tobamovirus - *Pepper mild mottle virus* - Group 3 (PMMoV: 1.2.3)**		
	absent	Candela, Ferrari, Oida, Yolo Wonder	1 [ ]
	present	Ettore, Friendly, Tom4	9 [ ]
5.26 (57)	**Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0)**		
	absent	Ferrari, Murillo, Piquillo, Yolo Wonder	1 [ ]
	present	Andalus, Goleador, Vidi, Yolo Y	9 [ ]
5.27 (58)	**Resistance to *Potato Y virus* (PVY) - Pathotype 1 (PVY: 1)**		
	absent	Yolo Wonder, Yolo Y	1 [ ]
	present	Florida VR2, Ribatejo	9 [ ]
5.28 (59)	**Resistance to *Potato Y virus* (PVY) - Pathotype 1.2 (PVY: 1.2)**		
	absent	Florida VR2, Yolo Wonder, Yolo Y	1 [ ]
	present	Chouca, Serrano Criollo de Morelos 334	9 [ ]
5.29 (60)	**Resistance to *Phytophthora capsici* (Pc)**		
	absent	Yolo Wonder	1 [ ]
	present	Chistera, Favolor, Phyo 636, Solario	9 [ ]
5.30 (61)	**Resistance to *Cucumber mosaic virus* (CMV)**		
	absent	Yolo Wonder	1 [ ]
	present	Alby, Ducato, Favolor	9 [ ]

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

	Characteristics	Example Varieties	Note
5.31 (62)	**Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0)**		
	absent	Yolo Wonder	1 [ ]
	present	Galileo, Jackal, Jackpot, Piamonte	9 [ ]
5.32 (63)	**Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 1**		
	absent	Yolo Wonder	1 [ ]
	present	Filidor, San Marco	9 [ ]
5.33 (64)	**Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 2**		
	absent	Yolo Wonder	1 [ ]
	present	Filidor, San Marco	9 [ ]
5.34 (65)	**Resistance to *Xanthomonas* spp (ex *Xanthomonas campestris* pv. *vesicatoria*) (X spp (ex Xcv)) - Pathotype 3**		
	absent	Yolo Wonder	1 [ ]
	present	Filidor, San Marco	9 [ ]
5.35 (66)	**Resistance to *Meloidogyne incognita* (Mi)**		
	absent	Tom4, Yolo Wonder	1 [ ]
	present	Bastion, Capital, Kation, W4	9 [ ]

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

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
Example	*Fruit: length*	*long*	*very long*

Comments:

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

[#]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

Special conditions for the examination of the variety

Main use
- Strictly ornamental use [ ]
- Vegetable use [ ]
- Rootstock [ ]

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:

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.

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 for where you have indicated “yes”.

.....

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]