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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-third session, to be held in Seoul, Republic of Korea,
from 2019-05-20 to 2019-05-24

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

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

In the case of ornamental 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 without fruits, plant height 20-40 cm, at least 2 growing points per plant. For testing of resistance characteristics, additional plants may be required.

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 For vegetatively propagated varieties the minimum duration of test should normally be a single growing cycle. In case additional growing cycle is necessary the plants might be propagated.

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.

3.5 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

In the case of seed-propagated varieties, unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observation made on all plants in the test, disregarding any off-type plants.

In the case of vegetatively propagated varieties, unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 20 plants or parts taken from each of 20 plants and any other observation 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. For varieties with other types of propagation the recommendation 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 varieties should be according to the recommendations for cross-pollinated varieties in the General Introduction.

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

4.2.5 The assessment of uniformity for hybrid varieties depends on the type of hybrid and should be according to the recommendations for hybrid varieties in the General Introduction.

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

4.2.7 For the assessment of uniformity of 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 (in upper part) (characteristic 4)
(b) Flower: anthocyanin coloration in anther (characteristic 22)
(c) Fruit: color (before maturity) (characteristic 24)
(d) Fruit: ratio length/diameter (characteristic 30)
(e) Fruit: shape in longitudinal section (characteristic 31)
(f) Fruit: color at maturity (characteristic 38)
(g) Fruit: number of locules (characteristic 43)
(h) Fruit: capsaicin in placenta (characteristic 45)
(i) Resistance to Tobamovirus - *Tobacco mosaic virus* **-** Pathotype 0 (TMV: 0) (characteristic 51)
(j) Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2 (PMMoV: 1.2) (characteristic 52)
(k) Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2.3 (PMMoV: 1.2.3) (characteristic 53)
(l) Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0) (characteristic 54)
(m) Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0) (characteristic 59)

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 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	*Note*
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	*Note*
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

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)-(c) 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.		**QN VG**	**(+) (a)**				
		Plant: habit	**Plante: port**	**Pflanze: Wuchsform**	**Planta: porte**		
		upright	érigé	aufrecht	erecto	De Cayenne, Doux très long des Landes, Piquant d'Algérie	1
		semi-upright	demi- érigé	halbaufrecht	semierecto	Sonar	2
		prostrate	étalé	liegend	postrado		3
2.		**QN MS/VG**	**(+) (a)**				
		Plant: height	**Plante: hauteur**	**Pflanze: Höhe**	**Planta: altura**		
		very short	très basse	sehr niedrig	muy baja		1
		short	basse	niedrig	baja	Bravia	3
		medium	moyenne	mittel	media	HRF	5
		tall	haute	hoch	alta	Century	7
		very tall	très haute	sehr hoch	muy alta	Brutus	9
3.		**QN MS/VG**	**(+)**				
		Plant: length of stem	**Plante: longueur de la tige**	**Pflanze: Länge des Stengels**	**Planta: longitud del tallo**		
		short	courte	kurz	corta	Bomenta, Corvinus	3
		medium	moyenne	mittel	media	Bravia, Lamuyo, Nestoss, Remus	5
		long	longue	lang	larga	Lipari, Marconi	7
4.	**(*)**	**QL VG**	**(+) (a)**				
		Plant: shortened internodes (in upper part)					
		absent				California wonder, De Cayenne	1
		present				Bucano	9
5.		**PQ MS**	**(+) (a)**				
		<u>Varieties with shortened internodes only</u>: Plant: number of internodes between the first flower and shortened internodes	**<u>Variétés à entre-nœuds raccourcis seulement</u>: Plante: nombre d'entre-nœuds entre la première fleur et les entre-nœuds raccourcis**	**<u>Nur Sorten mit verkürzten Internodien</u>: Pflanze: Anzahl Internodien zwischen der ersten Blüte und den verkürzten Internodien**	**<u>Variedades con entrenudos acortados únicamente</u>: Planta: número de entrenudos entre la primera flor y los entrenudos acortados**		
		none	aucun	keine	ninguno		1
		one to three	un à trois	eins bis drei	uno a tres		2
		more than three	plus de trois	mehr als drei	más de tres		3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.	**QN MS/VG**	**(+) (a)**				
	<u>Varieties without shortened internodes only</u>: Plant: length of internode (on primary side shoots)					
	very short				Albaregia	1
	short				Tenor	3
	medium				Florian	5
	long				Corno di toro rosso	7
	very long				Fenice	9
7.	**QN VG**	**(+) (a)**				
	Stem: intensity of anthocyanin coloration of nodes	**Tige: intensité de la pigmentation anthocyanique des nœuds**	**Stengel: Intensität der Anthocyanfärbung der Knoten**	**Tallo: intensidad de la pigmentación antociánica de los nudos**		
	absent or very weak				Bravia, Nestoss, Remus	1
	weak	faible	gering	débil	California wonder	3
	medium	moyenne	mittel	media	Lamuyo, Sonar	5
	strong	forte	stark	fuerte	Piquant d'Algérie	7
	very strong	très forte	sehr stark	muy fuerte	Smolder	9
8.	**QN VG**	**(+) (a)**				
	Stem: hairiness of nodes	**Tige: pilosité des nœuds**	**Stengel: Behaarung der Knoten**	**Tallo: pilosidad de los nudos**		
	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Arlequin	1
	weak	faible	gering	débil	Bravia, Nestoss	3
	medium	moyenne	mittel	media	Doux très long des Landes, Farnese	5
	strong	forte	stark	fuerte	Fenice, Solario	7
	very strong	très forte	sehr stark	muy fuerte	Brutus	9
9.	**QN MS/VG**	**(a)**				
	Leaf: length of blade	**Feuille: longueur du limbe**	**Blatt: Länge der Blattspreite**	**Hoja: longitud del limbo**		
	very short	très courte	sehr kurz	muy corta	Macska sárga	1
	short	courte	kurz	corta	De Cayenne	3
	medium	moyenne	mittel	media	Marconi	5
	long	longue	lang	larga	Allrounder	7
	very long	très longue	sehr lang	muy larga	Solario	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10.	**QN MS/VG**	**(a)**				
	Leaf: width of blade	**Feuille: largeur du limbe**	**Blatt: Breite der Blattspreitee**	**Hoja: anchura del limbo**		
	very narrow	très étroite	sehr schmal	muy estrecha	Macska sárga	1
	narrow	étroite	schmal	estrecha	De Cayenne	3
	medium	moyenne	mittel	media	Marconi	5
	broad	large	breit	ancha	Allrounder	7
	very broad				Solario	9
11.	**PQ VG**	**(+) (a)**				
	Leaf: shape	**Feuille: forme**	**Blatt: Form**	**Hoja: forma**		
	lanceolate	lancéolée	lanzettlich	lanceolada	Brutus, De Cayenne	1
	ovate	ovale	eiförmig	oval	Balico, Sonar	2
	broad elliptic	elliptique large	breit elliptisch	elíptica ancha	Solario	3
12.	**QN VG**	**(a)**				
	Leaf: intensity of green color	**Feuille: intensité de la couleur verte**	**Blatt: Intensität der Grünfärbung**	**Hoja: intensidad del color verde**		
	very light	très claire	sehr hell	muy claro		1
	light	claire	hell	claro		3
	medium	moyenne	mittel	medio		5
	dark	foncée	dunkel	oscuro		7
	very dark	très foncée	sehr dunkel	muy oscuro		9
13.	**QN VG**	**(+) (a)**				
	Leaf: distribution of anthocyanin coloration of lower side					
	absent or very weak				Lamuyo	1
	only on veins				Takiama Purple to Red	2
	partially on veins and diffuse					3
	on veins and partially diffuse				Black Pearl, Purple Flash	4
	entirely				TF802	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	**QN VG**	**(+)**	**(a)**			
	Leaf: intensity of anthocyanin coloration of upper side					
	absent or very weak					1
	weak				Omiyamurasaki, Purple Rain	2
	medium	faible	schwach	baja	Calico	3
	strong				Black Pearl	4
	very strong	moyenne	mittel	media	Purple Flash, Takiama Purple to Red, TF802	5
15.	**QL VG**	**(+)**	**(a)**			
	Leaf blade: variegation					
	absent	absente	fehlend	ausente	Omiyamurasaki	1
	present	présente	vorhanden	presente	Calico, Purple Rain	9
16.	**QN VG**		**(a)**			
	Leaf: undulation of margin	**Feuille: ondulation du bord**	**Blatt: Randwellung**	**Hoja: ondulación del margen**		
	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	De Cayenne	1
	weak	faible	gering	débil	Doux très long des Landes	3
	medium	moyenne	mittel	media	Tenor	5
	strong	forte	stark	fuerte	Tosca	7
	very strong	très forte	sehr stark	muy fuerte		9
17.	**QN VG**		**(a)**			
	Leaf: blistering	**Feuille: cloqûre**	**Blatt: Blasigkeit**	**Hoja: abullonado**		
	very weak	très faible	sehr gering	muy débil	Brutus	1
	weak	faible	gering	débil	Pusztagold	3
	medium	moyenne	mittel	medio	Bravia, Nestoss	5
	strong	forte	stark	fuerte	Greygo	7
	very strong	très forte	sehr stark	muy fuerte	Florian	9
18.	**QN VG**		**(a)**			
	Leaf: glossiness	**Feuille: brillance**	**Blatt: Glanz**	**Hoja: brillo**		
	very weak	très faible	sehr gering	muy débil		1
	weak	faible	gering	débil	Brutus, Doux très long des Landes	3
	medium	moyenne	mittel	medio	Bravia	5
	strong	forte	stark	fuerte	Floridor	7
	very strong	très forte	sehr stark	muy fuerte		9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19.		**PQ VG**	**(+)**				
		Peduncle: attitude	**Pédoncule: port**	**Blütenstiel: Haltung**	**Pedúnculo: porte**		
		predominantly erect				Floridor	1
		predominantly semi-drooping				Bravia	2
		predominantly drooping				Brutus, Lamuyo	3
20.		**QN VG**					
		Time of beginning of flowering (first flower on second flowering node)	**Époque de début de floraison (première fleur au deuxième nœud florifère)**	**Zeitpunkt des Blühbeginns (erste Blüte am zweiten blütentragenden Knoten)**	**Época de comienzo de la floración (primera flor en el segundo nudo floral)**		
		early	précoce	früh	temprana	Brutus	3
		medium	moyenne	mittel	media	Allrounder, Lamuyo	5
		late	tardive	spät	tardía	Piquant d'Algérie	7
21.		**PQ VG**					
		Flower: color					
		white					1
		purple					2
22.	**(*)**	**QL VG**					
		Flower: anthocyanin coloration in anther	**Fleur: pigmentation anthocyanique de l'anthère**	**Blüte: Anthocyanfärbung des Staubbeutels**	**Flor: pigmentación antociánica de la antera**		
		absent	absente	fehlend	ausente	Bravia	1
		present	présente	vorhanden	presente	Brutus, Lamuyo	9
23.		**QL VS**	**(+)**				
		Male sterility					
		absent					1
		partially					2
		present					3
24.	**(*)**	**PQ VG**		**(b)**			
		Fruit: color (<u>before</u> maturity)	**Fruit: couleur (<u>avant</u> maturité)**	**Frucht: Farbe (<u>vor</u> der Reife)**	**Fruto: color (<u>antes</u> de la madurez)**		
		whitish yellow				Bravia	1
		yellow					2
		yellowish green	vert	grün	verde	Sweet banana	3
		greenish white	pourpre	purpurn	púrpura		4
		green				California wonder, Lamuyo	5
		purple				Lilo	6

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25.		**QN**	**VG**		**(b)**				
		<u>Only varieties with fruit color green or purple before maturity:</u> Fruit: intensity of color before maturity							
		very light							1
		light							3
		medium							5
		dark							7
		very dark							9
26.		**QL**	**VG**	**(+)**	**(b)**				
		<u>Varieties with fruit color purple before maturity excluded:</u> Fruit: anthocyanin coloration before maturity							
		absent or weak						Lamuyo	1
		medium							2
		strong						Sweet banana	3
27.		**PQ**	**VG**		**(c)**				
		Fruit: attitude		**Fruit: port**		**Frucht: Haltung**	**Fruto: porte**		
		erect		dressé		aufrecht	erecto	Pusztagold	1
		horizontal		horizontal		waagerecht	horizontal	PAZ szentesi	2
		drooping		retombant		hängend	colgante	De Cayenne, Lamuyo	3
28.	**(*)**	**QN**	**MS/VG**		**(c)**				
		Fruit: length		**Fruit: longueur**		**Frucht: Länge**	**Fruto: longitud**		
		very short		très courte		sehr kurz	muy corta	Cherry Bomb, PAZ szentesi	1
		short		courte		kurz	corta	Ophelia, Smolder	3
		medium		moyenne		mittel	media	California wonder	5
		long		longue		lang	larga	Bravia, De Cayenne	7
		very long		très longue		sehr lang	muy larga	Corno di toro rosso, Sweet banana	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
29. (*)	**QN MS/VG**	**(+) (c)**				
	Fruit: diameter	**Fruit: diamètre**	**Frucht: Durchmesser**	**Fruto: diámetro**		
	very narrow	très étroit	sehr schmal	muy estrecho	De Cayenne	1
	narrow	étroit	schmal	estrecho	Cherry Bomb	3
	medium	moyen	mittel	medio	Doux italien	5
	broad	large	breit	ancho	Lamuyo, Maduro	7
	very broad	très large	sehr breit	muy ancho	Floridor, Ibleor	9
30. (*)	**QN MS/VG**	**(+) (c)**				
	Fruit: ratio length/diameter	**Fruit: rapport longueur/diamètre**	**Frucht: Verhältnis Länge/Durchmesser**	**Fruto: relación entre la longitud y el diámetro**		
	very small	très faible	sehr klein	muy pequeña	Liebesapfel, PAZ szentesi	1
	small	faible	klein	pequeña	Bucano	3
	medium	moyen	mittel	media	Acorde, Maduro	5
	large	élevé	groß	grande	Lamuyo, Vidi	7
	very large	très élevé	sehr groß	muy grande	De Cayenne, Spadi	9
31. (*)	**PQ VG**	**(+) (c)**				
	Fruit: shape in longitudinal section	**Fruit: forme de la section longitudinale**	**Frucht: Form des Längsschnitts**	**Fruto: forma en sección longitudinal**		
	oblate	aplatie	breitrund	plana	Liebesapfel, PAZ szentesi	1
	circular	circulaire	kreisförmig	circular	Cherry Bomb	2
	cordate	cordiforme	herzförmig	acorazonada	Morrón de conserva 3	3
	square	quadrangulaire	quadratisch	cuadrada	Maranello, Yolo Wonder	4
	rectangular	rectangulaire	rechteckig	rectangular	Raggio	5
	trapezoidal	trapézoïdale	trapezförmig	trapezoidal	Altea	6
	moderately triangular	modérément triangulaire	leicht dreieckig	moderadamente triangular	Bravia	7
	narrowly triangular	triangulaire étroite	schmal dreieckig	triangular estrecha	De Cayenne	8
32.	**PQ VG**	**(+) (c)**				
	Fruit: curvature					
	straight	droite	gerade	recto	Kappy, Lamuyo	1
	predominantly curved				Sweet banana	2
	predominantly sinuate				Doux italien	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
33.	**PQ VG**	**(c)**				
	Fruit: shape in cross section (at the middle of the fruit)					
	elliptic				Sweet banana	1
	angular				Solario	2
	circular				Doux très long des Landes	3
34.	**QN VG**	**(+) (c)**				
	Fruit: sinuation of pericarp at basal part	**Fruit: sinuosité du péricarpe sur la partie basale**	**Frucht: Wellung des Perikarps am basalen Teil**	**Fruto: sinuosidad del pericarpio de la parte basal**		
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Acorde, Smolder	1
	weak	faible	gering	débil	Donat, Kappy	3
	medium	moyenne	mittel	media	Banán	5
	strong	forte	stark	fuerte	Hawker	7
	very strong	très forte	sehr stark	muy fuerte	Doux italien, Gelber Spiral	9
35.	**QN VG**	**(+) (c)**				
	Fruit: sinuation of pericarp excluding basal part	**Fruit: sinuosité du péricarpe hors base**	**Frucht: Wellung des Perikarps ohne basalen Teil**	**Fruto: sinuosidad del pericarpio excluida la parte basal**		
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Acorde, Yolo Wonder	1
	weak	faible	gering	débil	Sonar	3
	medium	moyenne	mittel	media	Rodri	5
	strong	forte	stark	fuerte	De Cayenne, Doux italien	7
	very strong	très forte	sehr stark	muy fuerte		9
36.	**PQ VG**	**(c)**				
	Fruit: shape of apex	**Fruit: forme du sommet**	**Frucht: Form der Spitze**	**Fruto: forma del ápice**		
	very acute	très pointue	sehr spitz	muy aguda	De Cayenne	1
	moderately acute	pointue	spitz	aguda	Kappone	2
	rounded	arrondie	abgerundet	redondeada	Red Tinkerbell	3
	moderately depressed	déprimée	eingesenkt	hundida	Maduro	4
	very depressed	très déprimée	stark eingesenkt	muy hundida	Monte	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
37.	**QN VG**	**(+) (c)**				
	Fruit: texture of surface					
	smooth or very slightly wrinkled				Smolder	1
	slightly wrinkled					2
	strongly wrinkled					3
38. (*)	**PQ VG**	**(c)**				
	Fruit: color at maturity					
	yellow				Allrounder	1
	orange				Ariane	2
	red				Lamuyo	3
	brown					4
	green				Sweet46	5
39.	**QN VG**	**(c)**				
	Fruit: intensity of color at maturity					
	light					3
	medium					5
	dark					7
40.	**QN VG**	**(c)**				
	Fruit: glossiness	**Fruit: brillance**	**Frucht: Glanz**	**Fruto: brillo**		
	very weak	très faible	sehr gering	muy débil		1
	weak	faible	gering	débil	Macska sárga	3
	medium	moyenne	mittel	medio	Sonar	5
	strong	forte	stark	fuerte	Doux italien	7
	very strong	très forte	sehr stark	muy fuerte	Ocelot	9
41.	**QN VG**	**(c)**				
	Fruit: depth of stalk cavity	**Fruit: profondeur de la dépression pédonculaire**	**Frucht: Tiefe der Stielhöhle**	**Fruto: profundidad de la cavidad peduncular**		
	absent or very shallow				Sweet banana	1
	shallow	peu profonde	flach	poco profunda	Doux italien	3
	medium	moyenne	mittel	media	Lamuyo, Maduro	5
	deep	profonde	tief	profunda	Baquero	7
	very deep	très profonde	sehr tief	muy profunda	Dumbo34	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42.	**QN VG**	**(+) (c)**				
	Fruit: depth of interlocular grooves	**Fruit: profondeur des dépressions interloculaires**	**Frucht: Tiefe der Furchen zwischen den Kammern**	**Fruto: profundidad de los surcos interloculares**		
	absent or very shallow	nulles ou très peu profondes	fehlend oder sehr flach	ausente o muy poco profunda	De Cayenne	1
	shallow	peu profondes	flach	poco profunda	Kappone	3
	medium	moyennes	mittel	media	Lamuyo, Marconi	5
	deep	profondes	tief	profunda	Round of Hungary	7
43. (*)	**QN MG**		**(c)**			
	Fruit: number of locules	**Fruit: nombre de loges**	**Frucht: Anzahl Kammern**	**Fruto: número de lóculos**		
	predominantly two	le plus souvent deux	vorwiegend zwei	predominante dos	De Cayenne	1
	equally two and three	également deux et trois	gleichermaßen zwei und drei	igualmente dos y tres	Banán	2
	predominantly three	le plus souvent trois	vorwiegend drei	predominante tres	Century	3
	equally three and four	également trois et quatre	gleichermaßen drei und vier	igualmente tres y cuatro	Lamuyo, Sonar	4
	predominantly four				PAZ szentesi	5
44. (*)	**QN VG**		**(c)**			
	Fruit: thickness of flesh	**Fruit: épaisseur de la chair**	**Frucht: Dicke des Fleisches**	**Fruto: espesor de la pulpa**		
	very thin	très mince	sehr dünn	muy delgado	De Cayenne, Macska sárga	1
	thin	mince	dünn	delgado	Banán, Doux très long des Landes	3
	medium	moyenne	mittel	medio	Lamuyo	5
	thick	épaisse	dick	grueso	Deimos	7
	very thick	très épaisse	sehr dick	muy grueso	Solario	9
45. (*)	**QL VG**	**(+) (c)**				
	Fruit: capsaicin in placenta	**Fruit: capsaicine dans le placenta**	**Frucht: Capsaicin in der Plazenta**	**Fruto: capsaicina en la placenta**		
	absent	absent	fehlend	ausente	Sonar, Sweet banana	1
	present	présent	vorhanden	presente	De Cayenne	9
46.	**QL VS**		**(c)**			
	Fruit: seeds					
	absent				SLP2B131	1
	present				Lamuyo	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
47.		**QN MS/VG**	**(c)**				
		Stalk: length	**Pédoncule: longueur**	**Fruchtstiel: Länge**	**Pedúnculo: longitud**		
		very short	très courte	sehr kurz	muy corta	Jablina	1
		short	courte	kurz	corta	Corvinus, Yolo Wonder	3
		medium	moyenne	mittel	media	Sonar	5
		long	longue	lang	larga	De Cayenne	7
		very long	très longue	sehr lang	muy larga	Farnese, Lipari	9
48.		**QN MS/VG**	**(+) (c)**				
		Stalk: thickness	**Pédoncule: grosseur**	**Fruchtstiel: Dicke**	**Pedúnculo: espesor**		
		very thin	très mince	sehr dünn	muy delgado	De Cayenne, Doux très long des Landes, Macska sárga	1
		thin	mince	dünn	delgado	Sweet banana	3
		medium	moyenne	mittel	medio	Doux italien	5
		thick	épaisse	dick	grueso	Lamuyo	7
		very thick	très épaisse	sehr dick	muy grueso		9
49.		**QL VG**	**(+) (c)**				
		Calyx: aspect	**Calice: aspect**	**Kelch: Aussehen**	**Cáliz: aspecto**		
		non enveloping	non enrobant	nicht umhüllend	no envolvente	Lamuyo, Sonar	1
		enveloping	enrobant	umhüllend	envolvente	De Cayenne, Sweet banana	2
50.		**QN VG**	**(+)**				
		Time of maturity	**Époque de maturité**	**Zeitpunkt der Reife**	**Época de madurez**		
		very early	très précoce	sehr früh	muy temprana	Macska sárga, Madison	1
		early	précoce	früh	temprana	Kosmik	3
		medium	moyenne	mittel	media	Lamuyo, Sonar	5
		late	tardive	spät	tardía	Doux d'Espagne	7
		very late	très tardive	sehr spät	muy tardía	Teseo	9
51.	**(*)**	**QL VG**	**(+)**				
		Resistance to Tobamovirus - *Tobacco mosaic virus* - Pathotype 0 (TMV: 0)					
		absent				Lamu, Pepita, Piquillo	1
		present				Fehérözön, Turia, Yolo Wonder	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
52.	**(*)**	**QL VG**	**(+)**				
		Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2 (PMMoV: 1.2)					
		absent				Fehérözön, Lamu, Turia, Yolo Wonder	1
		present				Candela, Ferrari	9
53.	**(*)**	**QL VG**	**(+)**				
		Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2.3 (PMMoV: 1.2.3)					
		absent				Solario, Yolo Wonder	1
		present				Allrounder	9
54.	**(*)**	**QL VG**	**(+)**				
		Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0)					
		absent				Ferrari, Piquillo, Yolo Wonder	1
		present				Florida VR2	9
55.		**QL VG**	**(+)**				
		Resistance to *Potato Y virus* (PVY) - Pathotype 1 (PVY: 1)					
		absent				Yolo Wonder, Yolo Y	1
		present				Florida VR2	9
56.		**QL VG**	**(+)**				
		Resistance to *Potato Y virus* (PVY) - Pathotype 1.2 (PVY: 1.2)					
		absent				Florida VR2, Yolo Wonder, Yolo Y	1
		present				Serrano Criollo de Morenos	9
57.		**QL VG**	**(+)**				
		Resistance to *Phytophthora capsici* (Pc)	**Résistance à *Phytophthora capsici* (Pc)**	**Resistenz gegen *Phytophthora capsici* (Pc)**	**Resistencia al *Phytophthora capsici* (Pc)**		
		absent	absente	fehlend	ausente	Jupiter, Yolo Wonder	1
		present	présente	vorhanden	presente	Favolor, Solario	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
58.		**QL VG**	**(+)**				
		Resistance to *Cucumber mosaic virus* (CMV)					
		absent				Yolo Wonder	1
		present				Favolor, Solario	9
59.	**(*)**	**QL VG**	**(+)**				
		Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0)					
		absent				Lamuyo, Yolo Wonder	1
		present				Galileo	9
60.		**QL VG**	**(+)**				
		Resistance to *Xanthomonas campestris* pv. *vesicatoria* (Xcv) - Pathotype 1					
		absent				Yolo Wonder	1
		present				Filidor, San Marco	9
61.		**QL VG**	**(+)**				
		Resistance to *Xanthomonas campestris* pv. *vesicatoria* (Xcv) - Pathotype 2					
		absent				Yolo Wonder	1
		present				Filidor, San Marco	9
62.		**QL VG**	**(+)**				
		Resistance to *Xanthomonas campestris* pv. *vesicatoria* (Xcv) - Pathotype 3					
		absent				Yolo Wonder	1
		present				Filidor, San Marco	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 and leaves to be made at the time of the first color change of the fruit. Secondly observations on stem and leaves should be made at the middle third of the plant.
(b) Observations should be made before the first color change of the fruit.
(c) Observations should be made at maturity, after the time of the color change.

8.2 Explanations for individual characteristics

Ad. 1: Plant: habit

Observations only to be made on when plants have their natural habit without being pruned, guided or staked.

Ad. 2: Plant: height

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

Ad. 3: Plant: length of stem

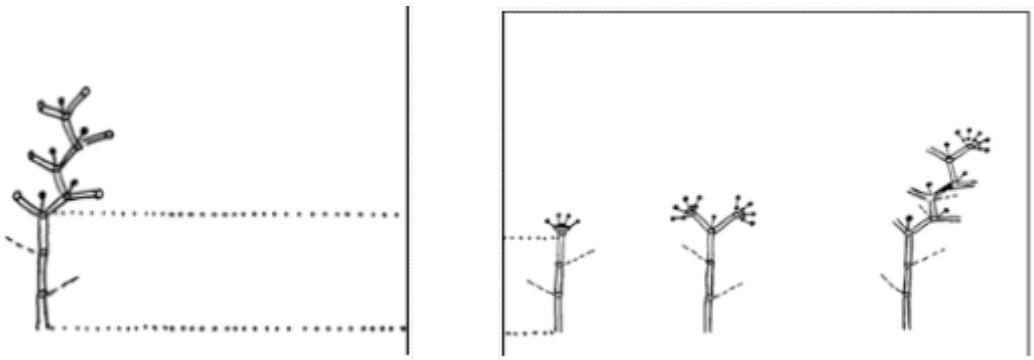
Observations should be made from the cotyledons to the node of the first flower branch.

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

Observations should be made on plants which have not been pruned. 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 (it appears as if there are more than two flowers per node).



1
absent

9
present

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

See Ad. 4

Ad. 6: Varieties without shortened internodes only: Plant: length of internode (on primary side shoots)

See Ad. 4

Ad. 11: Leaf: shape

1
lanceolate

2
ovate

3
broad elliptic

Ad. 13: Leaf: distribution of anthocyanin coloration of lower side

Observations should be made on fresh leaves.

2
only on veins

3
partially on veins and diffuse

4
on veins and partially diffuse

5
entirely

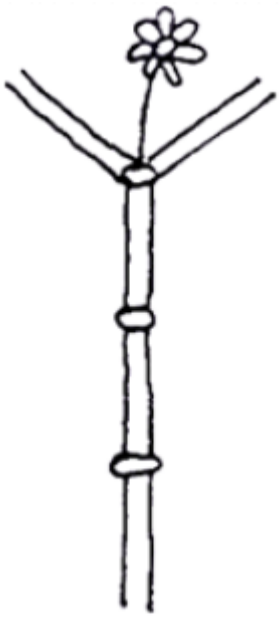
Ad. 14: Leaf: intensity of anthocyanin coloration of upper side

Observations should be made on fresh leaves.

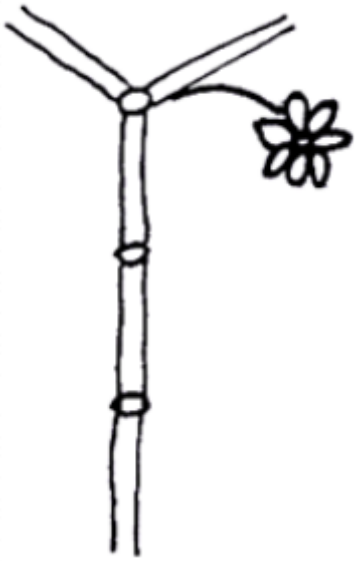
Ad. 15: Leaf blade: variegation

9
present

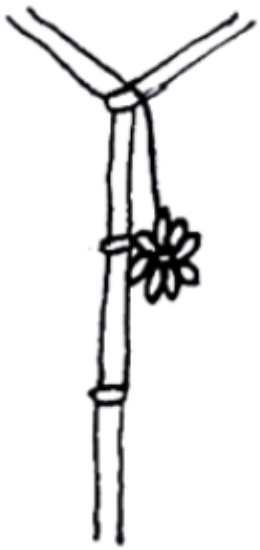
Ad. 19: Peduncle: attitude



1
erect



2
semi-drooping



3
drooping

Ad. 23: Male sterility

Observations should be made on the anthers at full flowering. Male sterile flowers do not have pollen.

For a partially male sterile variety the standard splitting ratio for genetic male sterile is 50% fertile plants and 50% sterile plants. This can sometimes for a small number of plants deviate up to 30:70/70:30.

1
absent

3
present

Ad. 26: Varieties with fruit color purple before maturity excluded: Fruit: anthocyanin coloration before maturity

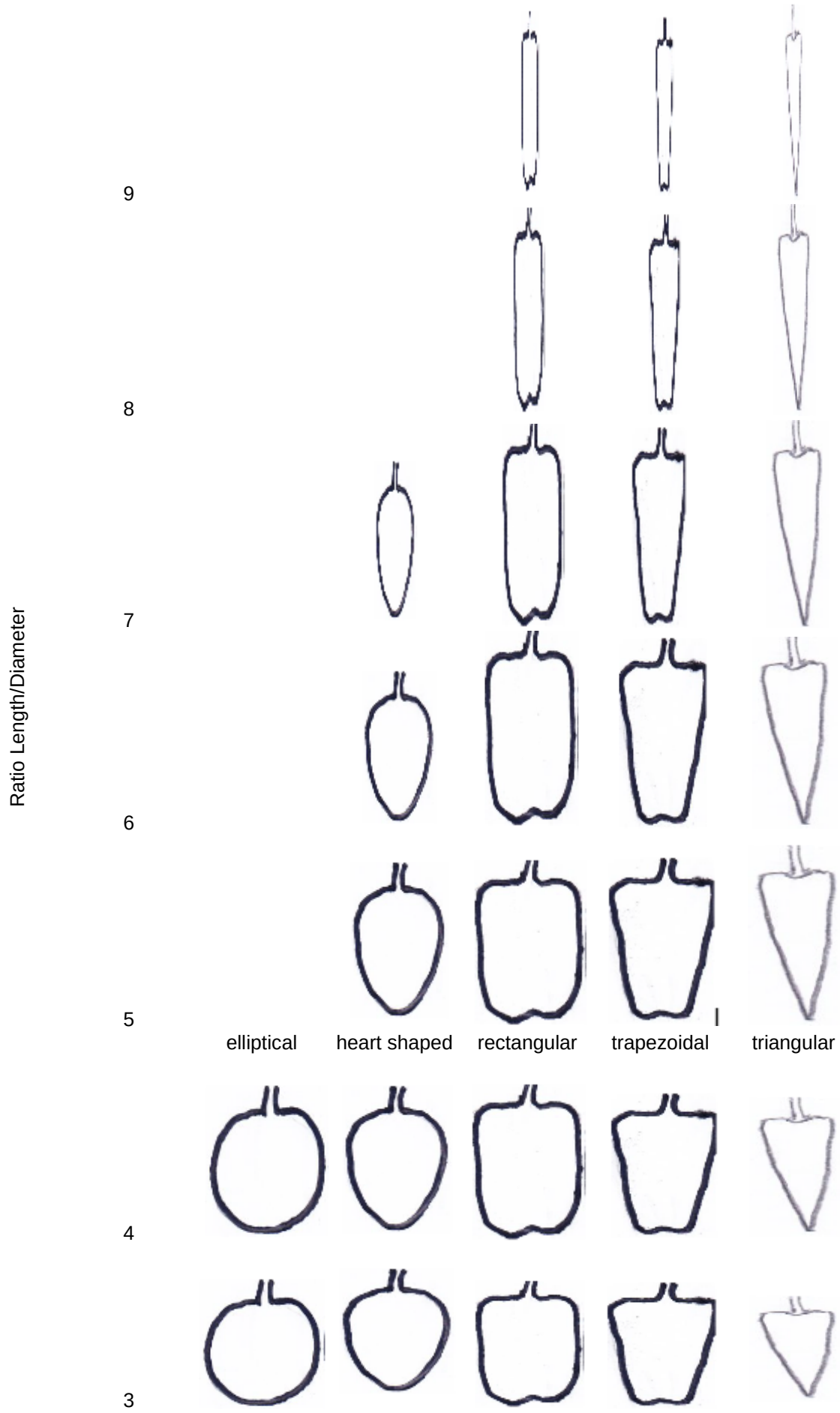
1
absent

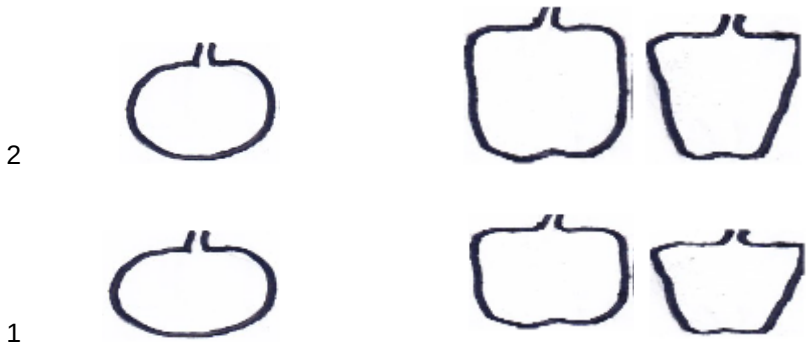
9
present

Ad. 29: Fruit: diameter

Observations should be made at the widest diameter of the fruit.

Ad. 30: Fruit: ratio length/diameter





Ad. 31: Fruit: shape in longitudinal section

1
oblate

2
circular

3
cordate

4
square

5
rectangular

6
trapezoidal

7
moderately triangular

8
narrowly triangular

Ad. 32: Fruit: curvature

1
straight

2
predominantly curved

3
predominantly sinuate

Ad. 34: Fruit: sinuation of pericarp at basal part

1
absent or very weak

3
weak

5
medium

7
strong

9
very strong

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

1
absent or very weak

3
weak

5
medium

7
strong

9
very strong

Ad. 37: Fruit: texture of surface

1
smooth or very slightly wrinkled

2
slightly wrinkled

3
strongly wrinkled

Ad. 42: Fruit: depth of interloculary grooves

Observations should be made in the middle part of the fruit.

Ad. 45: Fruit: capsaicin in placenta

The presence of capsaicin is observed by tasting the pepper flesh together with the locules, in the placenta area.

Ad. 48: Stalk: thickness

Observations should be made at the middle of the stalk.

Ad. 49: Calyx: aspect

1
non enveloping

2
enveloping

Observations should be made whether or not the calyx is enveloping the fruit including its shoulder.

Ad. 50: Time of maturity

Maturity is reached at the first color change of the fruit.

Ad. 51: Resistance to Tobamovirus - *Tobacco mosaic virus* **-** Pathotype 0 (TMV: 0)

See Ad. 46
See Ad. 14

1.	Pathogen	Tobamovirus (the genus containing *Tobacco mosaic virus* (TMV), and *Pepper mild mottle virus* (PMMoV))
2.	Quarantine status	no
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	GEVES (FR), Naktuinbouw (NL), INIA (ES)
5.	Isolate	Pathotype 0, Pathotype 1.2, and Pathotype 1.2.3
6.	Establishment isolate identity	on differentials (S = susceptible, R = resistant)

		Tobamovirus Pathotypes on Pepper			
		TMV: 0	PMMoV: 1.2	PMMo: 1.2.3	
Resistance code	Resistance gene	0	1.2	1.2.3	Differentials
	L0	S	S	S	Lamu, Pepita
Tm0	L1	R	S	S	Explorer, Lamuyo, Sonar, Yolo Wonder
Tm1	L2*	R	S	S	*C. frutescens* 'Tabasco'*
Tm2	L3	R	R	S	Ferrari, Novi 3, Solario
Tm3	L4	R	R	R	Tom 4

*no seed of L2 varieties available; L2 is not used in breeding

7.	Establishment pathogenicity	use susceptible pepper standard or lesions on *Nicotiana tabacum* 'Xanthi' 2 days after inoculation
8.	Multiplication inoculum	
8.1	Multiplication medium	on living plant or desiccated leaves
8.2	Multiplication variety	tomato or pepper (e.g. Lamu) or *Nicotiana tabacum* (cv. Samsun)
8.3	Plant stage at inoculation	cotyledons fully developed or at "first leaf" pointed stage or 3-5 leaf
8.4	Inoculation medium	ice-cold PBS + carborundum
8.5	Inoculation method	rubbing
8.6	Harvest of inoculum	-
8.7	Check of harvested inoculum	-
8.8	Shelflife/viability inoculum	freeze-dried leaves dry storage at 4°C for ten years
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	e.g. 1
9.3	Control varieties	see table of example varieties below

Resistance to	ToMV: 0 – TMV: 0	PMMoV: 1.2	PMMoV: 1.2.3
absent	Gordo	Lamuyo, Yolo Wonder	Solario, Yolo Wonder
present	Lamuyo, Sonar, Yolo Wonder	Ferrari, Solario	Allrounder

9.4	Test design	to add untreated plant
9.5	Test facility	glasshouse or climatic chamber
9.6	Temperature	20-25°C
9.7	Light	at least 12h
9.8	Season	-
9.9	Special measures	-
10.	Inoculation	
10.1	Preparation inoculum	juice: PBS(1:9). To obtain the juice, it is preferable to use a mortar for grinding infected leaves

10.2	Quantification inoculum	150 plants with 100 ml virus suspension
10.3	Plant stage at inoculation	cotyledons fully developed or at “first leaf” pointed stage or 3-5th leaf
10.4	Inoculation method	rubbing with a virus suspension or using of brush for more equable inoculation and avoiding mechanical damage
10.5	First observation	5-6 days to 10 - 15 days post inoculation
10.6	Second observation	10-11 days post inoculation to 15 - 20 days post inoculation
10.7	Final observations	20 days post inoculation
11.	Observations	
11.1	Method	visual, comparative; necrosis signifies hypersensitivity and resistance
11.2	Observation scale	
	[1] absent:	mosaic (sometimes developing late, sometimes early and leading to plant death without hypersensitivity)
	[9] present	All these observations could be made: • systemic necrosis, stunting • local necrosis, leaf dropping • no virus symptoms, only mechanical damage They can be linked to several factors such as the earliness of contamination, the strain use for example (see CPVO project HARMORES 2 – 2012-2015), but not due to particular genotypes.
11.3	Validation of test	on standards
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	QL
13.	Critical control points	Tobamovirus pathotype is defined on differentials and may belong to TMV: 0, PMMoV: 1.2, PMMoV: 1.2.3

Ad. 52: Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2 (PMMoV: 1.2)

See Ad. 47

Ad. 53: Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2.3 (PMMoV: 1.2.3)

See Ad. 47

Ad. 54: Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0)

To be updated by CPVO protocol

1.	Pathogen	*Potato Y virus* (PVY)
2.	Quarantine status	no
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	GEVES (FR), Naktuinbouw (NL)
5.	Isolate	Pathotypes 0, 1, and 1.2
6.	Establishment isolate identity	on differential table (S = susceptible; R = resistant)

	PVY pathotypes		
Pepper variety	0	1	1.2
Yolo Wonder	S	S	S
Yolo Y	R	S	S
Florida VR2	R	R	S *
Serrano Criollo de Morelos 334, Solario, W4	R	R	R

* Florida VR2 may show vague and very late symptoms with pathotype 1.2

7.	Establishment pathogenicity	on susceptible plant (e.g. on *Nicotiana tabacum* 'Xanthi' and *N. glutinosa)*
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant
8.2	Multiplication variety	on susceptible variety (e.g. *N. tabacum* 'Xanthi')
8.3	Plant stage at inoculation	3 leaf stage
8.4	Inoculation medium	ice-cold buffer solution 0.03 M PBS + Carborundum + 0.2% DIECA
8.5	Inoculation method	rubbing
8.6	Harvest of inoculum	-
8.7	Check of harvested inoculum	-
8.8	Shelflife/viability inoculum	freeze-dried leaves dry storage at 4°C for ten years
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	e.g. 1
9.3	Control varieties	-

Resistance	PVY: 0	PVY: 1	PVY: 1.2
absent	Yolo Wonder	Yolo Wonder	Yolo Wonder
present	Balico, Gerico, Solario	Solario, Vidi	Fenice, Solario

9.4	Test design	to add untreated plant
9.5	Test facility	glasshouse or climatic chamber
9.6	Temperature	22°C constant
9.7	Light	at least 12h
9.8	Season	-
9.9	Special measures	-
10.	Inoculation	
10.1	Preparation inoculum	leaf in PBS - grinding with mortar
10.2	Quantification inoculum	-
10.3	Plant stage at inoculation	cotyledons fully developed or at “first leaf” stage or 3 leaf stage
10.4	Inoculation method	rubbing with a virus solution
10.5	First observation	6 - 14 days post inoculation
10.6	Second observation	14 - 21 days post inoculation
10.7	Final observations	21 days post inoculation
11.	Observations	
11.1	Method	visual, comparative
11.2	Observation scale	
	[1] absent	growth retardation, leaf malformation, light mosaic in youngest leaves, or red veins; stem necrosis, plant death
	[9] present	no symptoms.
11.3	Validation of test	on standards
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	QL
13.	Critical control points	remark: avoid high temperatures (>30°C)

Ad. 55: Resistance to *Potato Y virus* (PVY) - Pathotype 1 (PVY: 1)

See Ad. 50

Ad. 56: Resistance to *Potato Y virus* (PVY) - Pathotype 1.2 (PVY: 1.2)

See Ad. 50

Ad. 57: Resistance to *Phytophthora capsici* (Pc)

1.	Pathogen	*Phytophthora capsici* (Pc)
2.	Quarantine status	no
3.	Host species	*Capsicum annuum*
4.	Source of inoculum	Naktuinbouw (NL) - INRA GAFL (FR)
5.	Isolate	moderately aggressive (e.g. strain 101)
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	Shelflife/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	
	[1] absent	e.g. length increase > 0.8 cm/week
	[9] present (moderately resistant)	e.g. length increase ≥ 0.5 cm ≤ 0.8 cm/week
	[9] present (highly resistant)	e.g. length increase < 0.5 cm/week
11.3	Validation of test	on standards
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	QL Based on the stem necrosis increase compared to the standards. [1] susceptible: Jupiter, Yolo Wonder [9] moderately resistant: Favolor [9] resistant: Solario
13.	Critical control points	absence of differential interactions between host and pathogen

Ad. 58: 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	INRA 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	Shelflife/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	
	[1] susceptible	many local lesion, mosaic
	[9] moderately resistant	intermediate symptoms
	[9] highly resistant	few local lesions, no or light symptoms
11.3	Validation of test	on standards
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	QL
13.	Critical control points	-

Ad. 59: 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 (ES)
5.	Isolate	e.g. LYE 51 or Br-01
6.	Establishment isolate identity	-
7.	Establishment pathogenicity	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	Shelflife/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	12 h
9.8	Season	all seasons, but winter reduce 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	
	[1] absent	mosaic on young leaf, some leaf malformation
	[9] present	necrosis or only mechanical damage
11.3	Validation of test	on standards
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	QL

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. 60: Resistance to *Xanthomonas campestris* pv. *vesicatoria* (Xcv) - Pathotype 1

1.	Pathogen	*Xanthomonas campestris pv. vesicatoria* (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	
	[1] absent	water soaking near infiltration site
	[9] present	necrotic reaction at infiltration site
11.3	Validation of test	on standards
11.4	Off-types	maximum 1 on 20 plants
12.	Interpretation of data in terms of UPOV characteristic states	QL
13.	Critical control points	-

Ad. 61: Resistance to *Xanthomonas campestris* pv. *vesicatoria* (Xcv) - Pathotype 2

See Ad. 66

Ad. 62: Resistance to *Xanthomonas campestr*is pv. *vesicatoria* (Xcv) - Pathotype 3

See Ad. 66

9. Literature

10. Technical Questionnaire

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	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:

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 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 (4)	**Plant: shortened internodes (in upper part)**		
	absent	California wonder, De Cayenne	1 [ ]
	present	Bucano	9 [ ]
5.2 (19)	**Peduncle: attitude**		
	predominantly erect	Floridor	1 [ ]
	predominantly semi-drooping	Bravia	2 [ ]
	predominantly drooping	Brutus, Lamuyo	3 [ ]
5.3 (22)	**Flower: anthocyanin coloration in anther**		
	absent	Bravia	1 [ ]
	present	Brutus, Lamuyo	9 [ ]
5.4 (23)	**Male sterility**		
	absent		1 [ ]
	partially		2 [ ]
	present		3 [ ]
5.5 (24)	**Fruit: color (<u>before</u> maturity)**		
	whitish yellow	Bravia	1 [ ]
	yellow		2 [ ]
	yellowish green	Sweet banana	3 [ ]
	greenish white		4 [ ]
	green	California wonder, Lamuyo	5 [ ]
	purple	Lilo	6 [ ]

	Characteristics	Example Varieties	Note
5.6 (25)	**Only varieties with fruit color green or purple before maturity :** **Fruit: intensity of color before maturity**		
	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 [ ]
5.7 (28)	**Fruit: length**		
	very short	Cherry Bomb, PAZ szentesi	1 [ ]
	short	Ophelia, Smolder	3 [ ]
	medium	California wonder	5 [ ]
	long	Bravia, De Cayenne	7 [ ]
	very long	Corno di toro rosso, Sweet banana	9 [ ]
5.8 (29)	**Fruit: diameter**		
	very narrow	De Cayenne	1 [ ]
	narrow	Cherry Bomb	3 [ ]
	medium	Doux italien	5 [ ]
	broad	Lamuyo, Maduro	7 [ ]
	very broad	Floridor, Ibleor	9 [ ]
5.9 (31)	**Fruit: shape in longitudinal section**		
	oblate	Liebesapfel, PAZ szentesi	1 [ ]
	circular	Cherry Bomb	2 [ ]
	cordate	Morrón de conserva 3	3 [ ]
	square	Maranello, Yolo Wonder	4 [ ]
	rectangular	Raggio	5 [ ]
	trapezoidal	Altea	6 [ ]
	moderately triangular	Bravia	7 [ ]
	narrowly triangular	De Cayenne	8 [ ]

	Characteristics	Example Varieties	Note
5.10 (35)	**Fruit: sinuation of pericarp excluding basal part**		
	absent or very weak	Acorde, Yolo Wonder	1 [ ]
	very weak to weak		2 [ ]
	weak	Sonar	3 [ ]
	weak to medium		4 [ ]
	medium	Rodri	5 [ ]
	medium to strong		6 [ ]
	strong	De Cayenne, Doux italien	7 [ ]
	strong to very strong		8 [ ]
	very strong		9 [ ]
5.11 (38)	**Fruit: color at maturity**		
	yellow	Allrounder	1 [ ]
	orange	Ariane	2 [ ]
	red	Lamuyo	3 [ ]
	brown		4 [ ]
	green	Sweet46	5 [ ]
5.12 (43)	**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 [ ]
5.13 (45)	**Fruit: capsaicin in placenta**		
	absent	Sonar, Sweet banana	1 [ ]
	present	De Cayenne	9 [ ]
5.14 (51)	**Resistance to Tobamovirus - *Tobacco mosaic virus* - Pathotype 0 (TMV: 0)**		
	absent	Lamu, Pepita, Piquillo	1 [ ]
	present	Fehérözön, Turia, Yolo Wonder	9 [ ]

	Characteristics	Example Varieties	Note
5.15 (52)	**Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2 (PMMoV: 1.2)**		
	absent	Fehérözön, Lamu, Turia, Yolo Wonder	1 [ ]
	present	Candela, Ferrari	9 [ ]
5.16 (53)	**Resistance to Tobamovirus - *Pepper mild mottle virus* - Pathotype 1.2.3 (PMMoV: 1.2.3)**		
	absent	Solario, Yolo Wonder	1 [ ]
	present	Allrounder	9 [ ]
5.17 (54)	**Resistance to *Potato Y virus* (PVY) - Pathotype 0 (PVY: 0)**		
	absent	Ferrari, Piquillo, Yolo Wonder	1 [ ]
	present	Florida VR2	9 [ ]
5.18 (59)	**Resistance to *Tomato spotted wilt virus* Pathotype 0 (TSWV: 0)**		
	absent	Lamuyo, Yolo Wonder	1 [ ]
	present	Galileo	9 [ ]

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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
Example			

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

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]