



TG/76/9

ORIGINAL: English

DATE: 2024-08-09

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

**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

Alternative names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Capsicum annuum</i> L.	Sweet Pepper, Hot Pepper, Paprika, Chili	Piment, Poivron	Paprika	Ají, 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.]

TABLE OF CONTENTS	PAGE
1. SUBJECT OF THESE TEST GUIDELINES.....	3
2. MATERIAL REQUIRED.....	3
3. METHOD OF EXAMINATION.....	3
3.1 Number of Growing Cycles.....	3
3.2 Testing Place.....	3
3.3 Conditions for Conducting the Examination.....	3
3.4 Test Design.....	3
3.5 Additional Tests.....	4
4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY.....	4
4.1 Distinctness.....	4
4.2 Uniformity.....	5
4.3 Stability.....	5
5. GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL.....	5
6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS.....	6
6.1 Categories of Characteristics.....	6
6.2 States of Expression and Corresponding Notes.....	6
6.3 Types of Expression.....	6
6.4 Example Varieties.....	7
6.5 Legend.....	7
7. TABLE OF CHARACTERISTICS/TABLEAU DES CARACTÈRES/MERKMALSTABELLE/TABLA DE CARACTERES.....	8
8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS.....	26
8.1 Explanations covering several characteristics.....	26
8.2 Explanations for individual characteristics.....	26
9. LITERATURE.....	52
10. TECHNICAL QUESTIONNAIRE.....	54

1. Subject of these Test Guidelines

- 1.1 These Test Guidelines apply to all varieties of *Capsicum annuum* L. including rootstock and ornamental varieties.
- 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 young plants

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.

3.5 *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		Plantule : pigmentation anthocyanique de l'hypocotyle		Keimpflanze: Anthocyanfärbung des Hypokotyls	Plántula: pigmentación antociánica del hipocotilo		
	absent		absente		fehlend	ausente	Albaregia	1
	present		présente		vorhanden	presente	Lamuyo	9
2.	QN	VG	(+)	(a)				
	Plant: habit		Plante : port		Pflanze: Wuchsform	Planta: porte		
	upright		dressé		aufrecht	erguido	De Cayenne, Doux très long des Landes, Piquant d'Algérie	1
	semi-upright		demi-dressé		halbaufrecht	semierguido	Sonar	2
	prostrate		étalé		liegend	postrado		3
3. (*)	QN	MG/MS/VG	(+)	(a)				
	Plant: height		Plante : hauteur		Pflanze: Höhe	Planta: altura		
	very short		très basse		sehr niedrig	muy baja		1
	very short to short		très basse à basse		sehr niedrig bis niedrig	muy baja a baja		2
	short		basse		niedrig	baja	Bravia	3
	short to medium		basse à moyenne		niedrig bis mittel	baja a media		4
	medium		moyenne		mittel	media	HRF	5
	medium to tall		moyenne à haute		mittel bis hoch	media a alta		6
	tall		haute		hoch	alta	Century	7
	tall to very tall		haute à très haute		hoch bis sehr hoch	alta a muy alta		8
	very tall		très haute		sehr hoch	muy alta	Brutus	9
4. (*)	QL	VG	(+)	(a)				
	Plant: shortened internodes		Plante : entre-nœuds raccourcis		Pflanze: verkürzte Internodien	Planta: entrenudos acortados		
	absent		absents		fehlend	ausentes	California wonder, De Cayenne	1
	present		présents		vorhanden	presentes	Bucano	9

	English		français		deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
5.	QN	MS	(+)	(a)				
	Only varieties with plant: shortened internodes: present: number of internodes between the first flower and shortened internodes		Seulement variétés avec plante : entre-nœuds raccourcis : présents : nombre d'entre-nœuds entre la première fleur et les entre-nœuds raccourcis		Nur Sorten mit Pflanze: verkürzte Internodien: vorhanden: Anzahl Internodien zwischen der ersten Blüte und den verkürzten Internodien	Solo variedades con planta: entrenudos acortados: presentes: número de entrenudos entre la primera flor y los entrenudos acortados		
	none		aucun		keine	ninguno		1
	one to three		un à trois		ein bis drei	uno a tres		2
	more than three		plus de trois		mehr als drei	más de tres		3
6.	QN	MS/VG	(+)	(a)				
	Only varieties with plant: shortened internodes: absent: length of internodes		Seulement variétés avec plante : entre-nœuds raccourcis : absents : longueur des entre-nœuds		Nur Sorten mit Pflanze: verkürzte Internodien: fehlend: Länge der Internodien	Sólo variedades con planta: entrenudos acortados: ausentes: longitud de los entrenudos		
	very short		très courte		sehr kurz	muy corta	Albaregia	1
	short to very short		courte à très courte		kurz bis sehr kurz	muy corta a corta		2
	short		courte		kurz	corta	Tenor	3
	short to medium		courte à moyenne		kurz bis mittel	corta a media		4
	medium		moyenne		mittel	media	Florian	5
	medium to long		moyenne à longue		mittel bis lang	media a larga		6
	long		longue		lang	larga	Corno di toro rosso	7
	long to very long		longue à très longue		lang bis sehr lang	larga a muy larga		8
	very long		très longue		sehr lang	muy larga	Fenice	9
7.	QN	MS/VG	(+)	(a)				
	Stem: length		Tige : longueur		Stängel: Länge	Tallo: longitud		
	very short		très courte		sehr kurz	muy corta		1
	very short to short		très courte à courte		sehr kurz bis kurz	muy corta a corta		2
	short		courte		kurz	corta	Bomenta, Corvinus	3
	short to medium		courte à moyenne		kurz bis mittel	corta a media		4
	medium		moyenne		mittel	media	Bravia, Lamuyo, Nestoss, Remus	5
	medium to long		moyenne à longue		mittel bis lang	media a larga		6
	long		longue		lang	larga	Lipari, Marconi	7
	long to very long		longue à très longue		lang bis sehr lang	larga a muy larga		8
	very long		très longue		sehr lang	muy larga		9

	English		français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
8.	QN	VG	(a)				
	Stem: intensity of anthocyanin coloration of nodes	Tige : intensité de la pigmentation anthocyanique des nœuds	Stängel: Intensität der Anthocyanfärbung der Knoten	Tallo: intensidad de la pigmentación antocianica de los nudos			
	absent or very weak	absente ou très faible à faible	fehlend oder sehr gering	ausente o muy débil	Bravia, Nestoss, Remus	1	
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2	
	weak	faible	gering	débil	California wonder	3	
	weak to medium	faible à moyenne	gering bis mittel	débil a media		4	
	medium	moyenne	mittel	media	Lamuyo, Sonar	5	
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte		6	
	strong	forte	stark	fuerte	Piquant d'Algérie	7	
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte		8	
	very strong	très forte	sehr stark	muy fuerte	Smolder	9	
9.	QN	VG	(a)				
	Stem: hairiness of nodes	Tige : pilosité des nœuds	Stängel: Behaarung der Knoten	Tallo: pilosidad de los nudos			
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Arlequin	1	
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2	
	weak	faible	gering	débil	Bravia, Nestoss	3	
	weak to medium	faible à moyenne	gering bis mittel	débil a media		4	
	medium	moyenne	mittel	media	Doux très long des Landes, Farnese	5	
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte		6	
	strong	forte	stark	fuerte	Fenice, Solario	7	
	strong very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte		8	
	very strong	très forte	sehr stark	muy fuerte	Brutus	9	
10.	QN	MS/VG	(+)	(a)			
	Leaf blade: length	Limbe : longueur	Blattspreite: Länge	Limbo: longitud			
	very short	très courte	sehr kurz	muy corta	Macska sárga	1	
	very short to short	très courte à courte	sehr kurz bis kurz	muy corta a corta		2	
	short	courte	kurz	corta	De Cayenne	3	
	short to medium	courte à moyenne	kurz bis mittel	corta a media		4	
	medium	moyenne	mittel	media	Marconi	5	
	medium to long	moyenne à longue	mittel bis lang	media a larga		6	
	long	longue	lang	larga	Allrounder	7	
	long to very long	longue à très longue	lang bis sehr lang	larga a muy larga		8	
	very long	très longue	sehr lang	muy larga	Solario	9	

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.	QN	MS/VG	(+)	(a)				
	Leaf blade: width	Limbe : largeur	Blattspreite: Breite	Limbo: anchura				
	very narrow	très étroite	sehr schmal	muy estrecha	Macska sárga		1	
	very narrow to narrow	très étroite à étroite	sehr schmal bis schmal	muy estrecha a estrecha			2	
	narrow	étroite	schmal	estrecha	De Cayenne		3	
	narrow to medium	étroite à moyenne	schmal bis mittel	estrecha a media			4	
	medium	moyenne	mittel	media	Marconi		5	
	medium to broad	moyenne à large	mittel bis breit	media a ancha			6	
	broad	large	breit	ancha	Allrounder		7	
	broad to very broad	large à très large	breit bis sehr breit	ancha muy ancha			8	
	very broad	très large	sehr breit	muy ancha	Solario		9	
12.	PQ	VG	(+)	(a)				
	Leaf blade: ratio length/width	Limbe : rapport longueur/largeur	Blattspreite: Verhältnis Länge/Breite	Limbo: relación longitud/anchura				
	low	bas	klein	baja	Solario		1	
	medium	moyen	mittel	media	Balico, Sonar		2	
	high	élevé	groß	alta	Brutus, De Cayenne		3	
13.	QN	VG		(a)				
	Leaf blade: intensity of green color	Limbe : intensité de la couleur verte	Blattspreite: Intensität der Grünfärbung	Limbo: intensidad del color verde				
	very light	très claire	sehr hell	muy clara			1	
	very light to light	très claire à claire	sehr hell bis hell	muy clara a clara			2	
	light	claire	hell	clara	Blondy		3	
	light to medium	claire à moyenne	hell bis mittel	clara a media			4	
	medium	moyenne	mittel	media	Allrounder, Frazier		5	
	medium to dark	moyenne à foncée	mittel bis dunkel	media a oscura			6	
	dark	foncée	dunkel	oscura	Rioverde		7	
	dark to very dark	foncée à très foncée	dunkel bis sehr dunkel	oscura a muy oscura			8	
	very dark	très foncée	sehr dunkel	muy oscura	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	Limbe : intensité de la pigmentation anthocyanique de la face supérieure	Blattspreite: Intensität der Anthocyanfärbung der Oberseite	Limbo: intensidad de la pigmentación antocianica del haz				
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil				1
	weak	faible	gering	débil	Omiyamurasaki, Purple Rain			2
	medium	moyenne	mittel	media	Calico			3
	strong	forte	stark	fuerte	Black Pearl			4
	very strong	très forte	sehr stark	muy fuerte	Purple Flash, Takiama Purple to Red, TF802			5
15.	PQ	VG	(+)	(a)				
	Leaf blade: distribution of anthocyanin coloration of lower side	Limbe : répartition de la pigmentation anthocyanique de la face inférieure	Blattspreite: Verteilung der Anthocyanfärbung der Unterseite	Limbo: distribución de la pigmentación antocianica del envés				
	absent	absente	fehlend	ausente				1
	on veins throughout	partout le long des nervures	überall entlang der Adern	a lo largo de los nervios en la totalidad	Takiama Purple to Red			2
	on veins and diffuse on distal part	le long des nervures et diffuse sur la partie distale	entlang der Adern und flächig im distalen Teil	a lo largo de los nervios y difusa en la parte distal				3
	on veins and diffuse throughout	le long des nervures et diffuse partout	entlang der Adern und flächig überall	a lo largo de los nervios y difusa en la totalidad	Black Pearl, Purple Flash			4
	throughout	partout	überall	en la totalidad	TF802			5
16.	QL	VG	(+)	(a)				
	Leaf blade: variegation	Limbe : panachure	Blattspreite: Panaschierung	Limbo: variegación				
	absent	absente	fehlend	ausente	Omiyamurasaki			1
	present	présente	vorhanden	presente	Calico, Purple Rain			9

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
17.	QN	VG	(a)			
	Leaf blade: undulation of margin	Limbe : ondulation du bord	Blattspreite: Randwellung	Limbo: ondulación del margen		
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	De Cayenne	1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
	weak	faible	gering	débil	Doux très long des Landes	3
	weak to medium	faible à moyenne	gering bis mittel	débil a media		4
	medium	moyenne	mittel	media	Tenor	5
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte		6
	strong	forte	stark	fuerte	Tosca	7
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte		8
	very strong	très forte	sehr stark	muy fuerte		9
18.	QN	VG	(a)			
	Leaf blade: blistering	Limbe : cloûre	Blattspreite: Blasigkeit	Limbo: abullonado		
	very weak	très faible	sehr gering	muy débil	Brutus	1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
	weak	faible	gering	débil	Pusztagold	3
	weak to medium	faible à moyenne	gering bis mittel	débil a medio		4
	medium	moyenne	mittel	medio	Bravia, Nestoss	5
	medium to strong	moyenne à forte	mittel bis stark	medio a fuerte		6
	strong	forte	stark	fuerte	Greygo	7
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte		8
	very strong	très forte	sehr stark	muy fuerte	Florian	9
19.	QN	VG	(a)			
	Leaf blade: glossiness	Limbe : brillance	Blattspreite: Glanz	Limbo: brillo		
	very weak	très faible	sehr gering	muy débil		1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
	weak	faible	gering	débil	Brutus, Doux très long des Landes	3
	weak to medium	faible à moyenne	gering bis mittel	débil a medio		4
	medium	moyenne	mittel	medio	Bravia	5
	medium to strong	moyenne à forte	mittel bis stark	medio a fuerte		6
	strong	forte	stark	fuerte	Floridor	7
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte		8
	very strong	très forte	sehr stark	muy fuerte		9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20.	QN	MG/VG	(+)			
	Time of beginning of flowering	Époque de début de la floraison	Zeitpunkt des Blühbeginns	Época de inicio de la floración		
	very early	très précoce	sehr früh	muy temprana		1
	very early to early	très précoce à précoce	sehr früh bis früh	muy temprana a temprana		2
	early	précoce	früh	temprana	Brutus	3
	early to medium	précoce à moyenne	früh bis mittel	temprana a media		4
	medium	moyenne	mittel	media	Allrounder, Lamuyo	5
	medium to late	moyenne à tardive	mittel bis spät	media a tardía		6
	late	tardive	spät	tardía	Piquant d'Algérie	7
	late to very late	tardive à très tardive	spät bis sehr spät	tardía a muy tardía		8
	very late	très tardive	sehr spät	muy tardía		9
21.	PQ	VG	(+)	(b)		
	Flower: attitude of pedicel	Fleur : port du pédicelle	Blüte: Haltung des Blütenstiels	Flor: porte del pedicelo		
	erect	dressé	aufrecht	erecto	Floridor	1
	semi-drooping	semi-retombant	halbüberhängend	semicolgante	Bravia	2
	drooping	retombant	überhängend	colgante	Brutus, Lamuyo	3
22.	PQ	VG		(b)		
	Flower: color	Fleur : couleur	Blüte: Farbe	Flor: color		
	white	blanc	weiß	blanco	Lamuyo	1
	light purple	pourpre clair	hellpurpurn	púrpura claro		2
	medium purple	pourpre moyen	mittelpurpurn	púrpura medio		3
	dark purple	pourpre foncé	dunkelpurpurn	púrpura oscuro	Black Pearl	4
23. (*)	QL	VG	(+)	(b)		
	Flower: anthocyanin coloration of anther	Fleur : pigmentation anthocyanique de l'anthere	Blüte: Anthocyanfärbung der Antheren	Flor: pigmentación antociánica de la antera		
	absent	absente	fehlend	ausente	Bravia	1
	present	présente	vorhanden	presente	Brutus, Lamuyo	9
24.	QL	VG	(+)	(b)		
	Flower: anthocyanin coloration of filament	Fleur : pigmentation anthocyanique du filament	Blüte: Anthocyanfärbung der Filamente	Flor: pigmentación antociánica del filamento		
	absent	absente	fehlend	ausente	AG33	1
	present	présente	vorhanden	presente	Bao-11, Morningput	9

	English		français		deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
25.	QN	VS	(+)	(b)				
	Male sterility		Stérilité mâle		Männliche Sterilität	Androesterilidad		
	absent		absente		fehlend	ausente	California wonder	1
	partially present		partiellement présente		teilweise vorhanden	parcialmente presente		2
	totally present		totalement présente		vollständig vorhanden	totalmente presente	Angelito	3
26. (*)	PQ	VG	(+)	(c)				
	Immature fruit: color		Fruit immature : couleur		Unreife Frucht: Farbe	Fruto no maduro: color		
	greenish white		blanc verdâtre		grünlichweiß	blanco verdoso	Bravia	1
	greenish yellow		jaune verdâtre		grünlichgelb	amarillo verdoso	Don, Sweet banana	2
	green		vert		grün	verde	Allrounder, Black Bullet, Cornus, Hitman, Impala, Syrto	3
	purple		pourpre		purpurn	púrpura	Cardinal, Lilo, Loco, Tequila, Tonaya	4
27. (*)	QN	VG		(c)				
	<u>Only varieties with immature fruit: color: green or purple:</u> Immature fruit: intensity of color		<u>Seulement les variétés avec Fruit immature : couleur : vert ou pourpre :</u> Fruit immature : intensité de la couleur		<u>Nur Sorten mit Unreife Frucht: Farbe: grün oder purpurn: Unreife Frucht: Intensität der Farbe</u>	<u>Solo variedades con Fruto no maduro: color: verde o púrpura: Fruto no maduro: intensidad del color</u>		
	very light		très claire		sehr hell	muy clara		1
	very light to light		très claire à claire		sehr hell bis hell	muy clara a clara		2
	light		claire		hell	clara	Cornus, Loco, Syrto	3
	light to medium		claire à moyenne		hell bis mittel	clara a media	Tequila	4
	medium		moyenne		mittel	media	Allrounder	5
	medium to dark		moyenne à foncée		mittel bis dunkel	media a oscura	Cardinal	6
	dark		foncée		dunkel	oscura	Impala, Lilo, Tonaya	7
	dark to very dark		foncée à très foncée		dunkel bis sehr dunkel	oscura a muy oscura		8
	very dark		très foncée		sehr dunkel	muy oscura	Black Bullet, Hitman	9
28.	QN	VG		(c)				
	<u>Excluding varieties with Immature fruit: color: purple:</u> Immature fruit: anthocyanin coloration		<u>À l'exclusion des variétés avec Fruit immature: couleur : pourpre :</u> Fruit immature : pigmentation anthocyanique		<u>Ohne Sorten mit Unreife Frucht: Farbe: purpurn: Unreife Frucht: Anthocyanfärbung</u>	<u>Excluidas las variedades con Fruto no maduro: color: púrpura: Fruto no maduro: pigmentación antociánica</u>		
	absent or weak		absente ou faible		fehlend oder gering	ausente o débil	Lamuyo	1
	medium		moyenne		mittel	media		2
	strong		forte		stark	fuerte	Sweet banana	3

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
29.	PQ	VG	(+)	(d)				
	Fruit: attitude	Fruit : port	Frucht: Haltung	Fruto: porte				
	erect	dressé	aufrecht	erecto		Pusztagold	1	
	horizontal	horizontal	waagrecht	horizontal		PAZ szentesi	2	
	drooping	retombant	überhängend	colgante		De Cayenne, Lamuyo	3	
30. (*)	QN	MS/VG	(+)	(d)				
	Fruit: length	Fruit : longueur	Frucht: Länge	Fruto: longitud				
	very short	très courte	sehr kurz	muy corta		Cherry Bomb, PAZ szentesi	1	
	very short to short	très courte à courte	sehr kurz bis kurz	muy corta a corta			2	
	short	courte	kurz	corta		Ophelia, Smolder	3	
	short to medium	courte à moyenne	kurz bis mittel	corta a media			4	
	medium	moyenne	mittel	media		California wonder	5	
	medium to long	moyenne à longue	mittel bis lang	media a larga			6	
	long	longue	lang	larga		Bravia, De Cayenne	7	
	long to very long	longue à très longue	lang bis sehr lang	larga a muy larga			8	
	very long	très longue	sehr lang	muy larga		Carboni, Corno di toro rosso, Doux très long des Landes	9	
31. (*)	QN	MS/VG	(+)	(d)				
	Fruit: diameter	Fruit : diamètre	Frucht: Durchmesser	Fruto: diámetro				
	very small	très petit	sehr klein	muy pequeño		De Cayenne	1	
	very small to small	très petit à petit	sehr klein bis klein	muy pequeño a pequeño			2	
	small	petit	klein	pequeño		Cherry Bomb	3	
	small to medium	petit à moyen	klein bis mittel	pequeño a medio			4	
	medium	moyen	mittel	medio		Doux italien	5	
	medium to large	moyen à grand	mittel bis groß	medio a grande			6	
	large	grand	groß	grande		Lamuyo, Maduro	7	
	large to very large	grand à très grand	groß bis sehr groß	grande a muy grande			8	
	very large	très grand	sehr groß	muy grande		Floridor, Ibleor	9	

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32. (*)	QN	MS/VG	(+)	(d)				
	Fruit: ratio length/diameter	Fruit : rapport longueur/diamètre	Frucht: Verhältnis Länge/Durchmesser	Fruto: relación longitud/diámetro				
	very low	très bas	sehr klein	muy baja	Liebesapfel, PAZ szentesi		1	
	very low to low	très bas à bas	sehr klein bis klein	muy baja a baja			2	
	low	bas	klein	baja	Bucano		3	
	low to medium	bas à moyen	klein bis mittel	baja a media			4	
	medium	moyen	mittel	media	Maduro		5	
	medium to high	moyen à élevé	mittel bis groß	media a alta			6	
	high	élevé	groß	alta	Lamuyo, Vidi		7	
	high to very high	élevé à très élevé	groß bis sehr groß	alta a muy alta			8	
	very high	très élevé	sehr groß	muy alta	De Cayenne, Doux très long des Landes		9	
33. (*)	PQ	VG	(+)	(d)				
	Fruit: shape in longitudinal section	Fruit: forme en section longitudinale	Frucht: Form im Längsschnitt	Fruto: forma en sección longitudinal				
	oblate	arrondie-aplatie	breitrund	achatada	Koral		1	
	circular	circulaire	kreisförmig	circular	Capperino		2	
	elliptic	elliptique	elliptisch	elíptica			3	
	transverse rectangular	transverse rectangulaire	verkehrt rechteckig	rectangular transversal	Liebesapfel, PAZ szentesi		4	
	square	quadrangulaire	quadratisch	cuadrada	Maranello		5	
	rectangular	rectangulaire	rechteckig	rectangular	Raggio		6	
	cordiform	cordiforme	herzförmig	cordiforme	Morrón de conserva 3		7	
	ovate	ovale	eiförmig	oval	Jalapeño		8	
	triangular	triangulaire	dreieckig	triangular	Bravia, Corno di toro rosso, De Cayenne		9	
	trapezoid	trapézoïdale	trapezförmig	trapezoidal	Altea		10	
34.	PQ	VG	(+)	(d)				
	Fruit: curvature	Fruit : courbure	Frucht: Krümmung	Fruto: curvatura				
	absent	absente	fehlend	ausente	Kappy, Lamuyo		1	
	C-shaped	en forme de C	C-förmig	en forma de C	Sweet banana		2	
	S-shaped	en forme de S	S-förmig	en forma de S	Doux italien		3	
35.	QN	VG	(+)	(d)				
	Fruit: twisting	Fruit : torsion	Frucht: Drehung	Fruto: torsión				
	absent or weak	absente ou faible	fehlend oder gering	ausente o débil	California wonder		1	
	medium	moyenne	mittel	media	Bubión		2	
	strong	forte	stark	fuerte	BN8707		3	

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36.	PQ	VG	(+)	(d)				
	Fruit: shape in cross section		Fruit : forme en section transversale		Frucht: Form im Querschnitt	Fruto: forma en sección transversal		
	elliptic		elliptique		elliptisch	elíptica	Sweet banana	1
	angular		angulaire		eckig	angular	Solario	2
	circular		circulaire		kreisförmig	circular	Doux très long des Landes	3
37. (*)	QN	VG	(+)	(d)				
	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	Smolder	1
	very weak to weak		très faible à faible		sehr gering bis gering	muy débil a débil		2
	weak		faible		gering	débil	Donat, Kappy	3
	weak to medium		faible à moyenne		gering bis mittel	débil a media		4
	medium		moyenne		mittel	media	Banán	5
	medium to strong		moyenne à forte		mittel bis stark	media a fuerte		6
	strong		forte		stark	fuerte	Hawker	7
	strong to very strong		forte à très forte		stark bis sehr stark	fuerte a muy fuerte		8
	very strong		très forte		sehr stark	muy fuerte	Doux italien, Gelber Spiral	9
38. (*)	QN	VG	(+)	(d)				
	Fruit: sinuation of pericarp excluding basal part		Fruit : sinuosité du péricarpe excluant la partie basale		Frucht: Wellung des Perikarps ohne basalen Teil	Fruto: sinuosidad del pericarpio excluida la parte basal		
	absent or weak		absente ou faible		fehlend oder gering	ausente o débil	Sonar, Yolo Wonder	1
	medium		moyenne		mittel	media	Rodri	2
	strong		forte		stark	fuerte	De Cayenne, Doux italien	3
39. (*)	PQ	VG		(d)				
	Fruit: shape of apex		Fruit : forme de l'apex		Frucht: Form des Apex	Fruto: forma del ápice		
	strongly acute		fortement pointue		sehr spitz	fuertemente aguda	De Cayenne	1
	moderately acute		modérément pointue		mäßig spitz	moderadamente aguda	Kappone	2
	rounded		arrondie		abgerundet	redondeada	Red Tinkerbell	3
	moderately depressed		modérément déprimée		mäßig eingesenkt	moderadamente deprimida	Maduro	4
	strongly depressed		fortement déprimée		sehr eingesenkt	fuertemente deprimida	Monte	5

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40.	QN	VG	(+)	(d)				
	Fruit: texture of surface	Fruit : texture de la surface	Frucht: Textur der Oberfläche	Fruto: textura de la superficie				
	smooth or weakly wrinkled	lisse ou légèrement ridée	glatt oder leicht gerieft	lisa o débilmente arrugada	Smolder			1
	moderately wrinkled	modérément ridée	mäßig gerieft	moderadamente arrugada				2
	strongly wrinkled	fortement ridée	stark gerieft	fuertemente arrugada				3
41. (*)	PQ	VG	(+)	(d)				
	Fruit: color	Fruit : couleur	Frucht: Farbe	Fruto: color				
	yellow	jaune	gelb	amarillo	Allrounder			1
	orange	orange	orange	naranja	Arancia			2
	red	rouge	rot	rojo	Lamuyo			3
	brown	marron	braun	marrón	Bastan, Chocology			4
	green	vert	grün	verde	Raymond			5
42. (*)	QN	VG	(+)	(d)				
	Fruit: intensity of color	Fruit : intensité de la couleur	Frucht: Intensität der Farbe	Fruto: intensidad del color				
	very light	très claire	sehr hell	muy clara				1
	very light to light	très claire à claire	sehr hell bis hell	muy clara a clara				2
	light	claire	hell	clara				3
	light to medium	claire à moyenne	hell bis mittel	clara a media				4
	medium	moyenne	mittel	media				5
	medium to dark	moyenne à foncée	mittel bis dunkel	media a oscura				6
	dark	foncée	dunkel	oscura				7
	dark to very dark	foncée à très foncée	dunkel bis sehr dunkel	oscura a muy oscura				8
	very dark	très foncée	sehr dunkel	muy oscura				9
43.	QN	VG		(d)				
	Fruit: glossiness	Fruit : brillance	Frucht: Glanz	Fruto: brillo				
	very weak	très faible	sehr gering	muy débil				1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil				2
	weak	faible	gering	débil	Macska sárga			3
	weak to medium	faible à moyenne	gering bis mittel	débil a medio				4
	medium	moyenne	mittel	medio	Sonar			5
	medium to strong	moyenne à forte	mittel bis stark	medio a fuerte				6
	strong	forte	stark	fuerte	Doux italien			7
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte				8
	very strong	très forte	sehr stark	muy fuerte	Ocelot			9

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44. (*)	QN	VG	(d)				
	Fruit: depth of stalk cavity	Fruit : profondeur de la cavité pédonculaire	Frucht: Tiefe der Stielhöhle	Fruto: profundidad de la cavidad peduncular			
	absent or very shallow	absente ou très peu profonde	fehlend oder sehr flach	ausente o muy poco profunda	Sweet banana	1	
	very shallow to shallow	très peu profonde à peu profonde	sehr flach bis flach	muy poco profunda a poco profunda		2	
	shallow	peu profonde	flach	poco profunda	Doux italien	3	
	shallow to medium	peu profonde à moyenne	flach bis mittel	poco profunda a media		4	
	medium	moyenne	mittel	media	Lamuyo, Maduro	5	
	medium to deep	moyenne à profonde	mittel bis tief	media a profunda		6	
	deep	profonde	tief	profunda	Baquero	7	
	deep to very deep	profonde à très profonde	tief bis sehr tief	profunda a muy profunda		8	
	very deep	très profonde	sehr tief	muy profunda	Dumbo34	9	
45.	QN	VG	(+)	(d)			
	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	absente ou très peu profonde	fehlend oder sehr flach	ausente o muy poco profunda	De Cayenne	1	
	very shallow to shallow	très peu profonde à peu profonde	sehr flach bis flach	muy poco profunda a poco profunda		2	
	shallow	peu profonde	flach	poco profunda	Kappone	3	
	shallow to medium	peu profonde à moyenne	flach bis mittel	poco profunda a media		4	
	medium	moyenne	mittel	media	Lamuyo, Marconi	5	
	medium to deep	moyenne à profonde	mittel bis tief	media a profunda		6	
	deep	profonde	tief	profunda	Round of Hungary	7	
	deep to very deep	profonde à très profonde	tief bis sehr tief	profunda a muy profunda		8	
	very deep	très profonde	sehr tief	muy profunda		9	
46. (*)	QN	MG/VG	(d)				
	Fruit: number of locules	Fruit : nombre de loges	Frucht: Anzahl Kammern	Fruto: número de lóculos			
	predominantly two	le plus souvent deux	vorwiegend zwei	predominantemente 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	predominantemente tres	Century	3	
	equally three and four	également trois et quatre	gleichermaßen drei und vier	igualmente tres y cuatro	Lamuyo, Sonar	4	
	predominantly four	le plus souvent quatre	vorwiegend vier	predominantemente cuatro	PAZ szentesi	5	

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
47. (*)	QN	VG	(d)				
	Fruit: thickness of flesh	Fruit : épaisseur de la chair	Frucht: Dicke des Fleisches	Fruto: grosor de la pulpa			
	very thin	très mince	sehr dünn	muy delgado	De Cayenne, Macska sárga	1	
	very thin to thin	très mince à mince	sehr dünn bis dünn	muy delgado a delgado		2	
	thin	mince	dünn	delgado	Banán, Doux très long des Landes	3	
	thin to medium	mince à moyenne	dünn bis mittel	delgado a medio		4	
	medium	moyenne	mittel	medio	Lamuyo	5	
	medium to thick	moyenne à épaisse	mittel bis dick	medio a grueso		6	
	thick	épaisse	dick	grueso	Deimos	7	
	thick to very thick	épaisse à très épaisse	dick bis sehr dick	grueso a muy grueso		8	
	very thick	très épaisse	sehr dick	muy grueso	Solario	9	
48. (*)	QL	VG	(+)	(d)			
	Fruit: capsaicin in placenta	Fruit : capsaïcine dans le placenta	Frucht: Capsaicin in der Plazenta	Fruto: capsaicina en la placenta			
	absent	absente	fehlend	ausente	Sonar, Sweet banana	1	
	present	présente	vorhanden	presente	De Cayenne	9	
49.	QL	VG	(+)	(d)			
	Fruit: seeds	Fruit : graines	Frucht: Samen	Fruto: semillas			
	absent	absentes	fehlend	ausentes	Angelito	1	
	present	présentes	vorhanden	presentes	Lamuyo	9	
50.	QN	MS/VG	(d)				
	Stalk: length	Pédoncule : longueur	Fruchtstiel: Länge	Pedúnculo: longitud			
	very short	très courte	sehr kurz	muy corta	Jablina	1	
	very short to short	très courte à courte	sehr kurz bis kurz	muy corta a corta		2	
	short	courte	kurz	corta	Corvinus, Yolo Wonder	3	
	short to medium	courte à moyenne	kurz bis mittel	corta a media		4	
	medium	moyenne	mittel	media	Sonar	5	
	medium to long	moyenne à longue	mittel bis lang	media a larga		6	
	long	longue	lang	larga	De Cayenne	7	
	long to very long	longue à très longue	lang bis sehr lang	larga a muy larga		8	
	very long	très longue	sehr lang	muy larga	Farnese, Lipari	9	

	English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
51.	QN	MS/VG	(+)	(d)				
	Stalk: thickness	Pédoncule : épaisseur	Fruchtsiel: Dicke	Pedúnculo: grosor				
	very thin	très mince	sehr dünn	muy delgado	De Cayenne, Doux très long des Landes, Macska sárga		1	
	very thin to thin	très mince à mince	sehr dünn bis dünn	muy delgado a delgado			2	
	thin	mince	dünn	delgado	Sweet banana		3	
	thin to medium	mince à moyenne	dünn bis mittel	delgado a medio			4	
	medium	moyenne	mittel	medio	Doux italien		5	
	medium to thick	moyenne à épaisse	mittel bis dick	medio a grueso			6	
	thick	épaisse	dick	grueso	Lamuyo		7	
	thick to very thick	épaisse à très épaisse	dick bis sehr dick	grueso a muy grueso			8	
	very thick	très épaisse	sehr dick	muy grueso			9	
52.	QN	VG	(+)	(d)				
	Calyx: aspect	Calice : aspect	Kelch: Aussehen	Cáliz: aspecto				
	non enveloping	non enrobant	nicht umhüllend	no envolvente	Lamuyo, Sonar		1	
	semi enveloping	semi-enrobant	halb umhüllend	semienvolvente			2	
	enveloping	enrobant	umhüllend	envolvente	De Cayenne, Sweet banana		3	
53. (*)	QN	MG/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	
	early to medium	précoce à moyenne	früh bis mittel	temprana a media			4	
	medium	moyenne	mittel	media	Lamuyo, Sonar		5	
	medium to late	moyenne à tardive	mittel bis spät	media a tardía			6	
	late	tardive	spät	tardía	Doux d'Espagne		7	
	late to very late	tardive à très tardive	spät bis sehr spät	tardía a muy tardía			8	
	very late	très tardive	sehr spät	muy tardía	Teseo		9	
54.	QL	VG	(+)					
	Resistance to Tobamovirus - Tobacco mosaic virus - Group 0 (TMV: 0)	Résistance au tobamovirus - Tobacco mosaic virus - Groupe 0 (TMV: 0)	Resistenz gegen Tobamovirus - Tobacco mosaic virus - Gruppe 0 (TMV: 0)	Resistencia al tobamovirus - Tobacco mosaic virus - Grupo 0 (TMV: 0)				
	absent	absente	fehlend	ausente	Lamu, Pepita, Piquillo		1	
	present	présente	vorhanden	presente	Fehérozön, Ultron, Yolo Wonder		9	

	English		français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
55.	QL	VG	(+)				
	Resistance to Tobamovirus - Pepper mild mottle virus - Group 2 (PMMoV: 1.2)		Résistance au tobamovirus - Pepper mild mottle virus - Groupe 2 (PMMoV: 1.2)	Resistenz gegen Tobamovirus - Pepper mild mottle virus - Gruppe 2 (PMMoV: 1.2)	Resistencia al tobamovirus - Pepper mild mottle virus - Grupo 2 (PMMoV: 1.2)		
	absent		absente	fehlend	ausente	Fehérozön, Lamu, Yolo Wonder	1
	present		présente	vorhanden	presente	Achille, Candela, Ferrari, Fudji, Novi 3	9
56.	QL	VG	(+)				
	Resistance to Tobamovirus - Pepper mild mottle virus - Group 3 (PMMoV: 1.2.3)		Résistance au tobamovirus - Pepper mild mottle virus - Groupe 3 (PMMoV: 1.2.3)	Resistenz gegen Tobamovirus - Pepper mild mottle virus - Gruppe 3 (PMMoV: 1.2.3)	Resistencia al tobamovirus - Pepper mild mottle virus - Grupo 3 (PMMoV: 1.2.3)		
	absent		absente	fehlend	ausente	Candela, Ferrari, Oida, Yolo Wonder	1
	present		présente	vorhanden	presente	Ettore, Friendly, Tom4	9
57.	QL	VG	(+)				
	Resistance to Potato Y virus (PVY) - Pathotype 0 (PVY: 0)		Résistance au Potato Y virus (PVY) - Pathotype 0 (PVY: 0)	Resistenz gegen Potato Y virus (PVY) - Pathotyp 0 (PVY: 0)	Resistencia a Potato Y virus (PVY) - Patotipo 0 (PVY: 0)		
	absent		absente	fehlend	ausente	Ferrari, Murillo, Piquillo, Yolo Wonder	1
	present		présente	vorhanden	presente	Andalus, Goleador, Vidi, Yolo Y	9
58.	QL	VG	(+)				
	Resistance to Potato Y virus (PVY) - Pathotype 1 (PVY: 1)		Résistance au Potato Y virus (PVY) - Pathotype 1 (PVY: 1)	Resistenz gegen Potato Y virus (PVY) - Pathotyp 1 (PVY: 1)	Resistencia a Potato Y virus (PVY) - Patotipo 1 (PVY: 1)		
	absent		absente	fehlend	ausente	Yolo Wonder, Yolo Y	1
	present		présente	vorhanden	presente	Florida VR2, Ribatejo	9
59.	QL	VG	(+)				
	Resistance to Potato Y virus (PVY) - Pathotype 1.2 (PVY: 1.2)		Résistance au Potato Y virus (PVY) - Pathotype 1.2 (PVY: 1.2)	Resistenz gegen Potato Y virus (PVY) - Pathotyp 1.2 (PVY: 1.2)	Resistencia a Potato Y virus (PVY) - Patotipo 1.2 (PVY: 1.2)		
	absent		absente	fehlend	ausente	Florida VR2, Yolo Wonder, Yolo Y	1
	present		présente	vorhanden	presente	Chouca, Serrano Criollo de Morelos 334	9

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
60.	QL	VG	(+)				
	Resistance to <i>Phytophthora capsici</i> (Pc)		Résistance à <i>Phytophthora capsici</i> (Pc)	Resistenz gegen <i>Phytophthora capsici</i> (Pc)	Resistencia a <i>Phytophthora capsici</i> (Pc)		
	absent		absente	fehlend	ausente	Yolo Wonder	1
	present		présente	vorhanden	presente	Chistera, Favolor, Phyo 636, Solario	9
61.	QL	VG	(+)				
	Resistance to <i>Cucumber mosaic virus</i> (CMV)		Résistance au <i>Cucumber mosaic virus</i> (CMV)	Resistenz gegen <i>Cucumber mosaic virus</i> (CMV)	Resistencia a <i>Cucumber mosaic virus</i> (CMV)		
	absent		absente	fehlend	ausente	Yolo Wonder	1
	present		présente	vorhanden	presente	Alby, Ducato, Favolor	9
62.	QL	VG	(+)				
	Resistance to <i>Tomato spotted wilt virus</i> Pathotype 0 (TSWV: 0)		Résistance au <i>Tomato spotted wilt virus</i> Pathotype 0 (TSWV: 0)	Resistenz gegen <i>Tomato spotted wilt virus</i> Pathotyp 0 (TSWV: 0)	Resistencia a <i>Tomato spotted wilt virus</i> Patotipo 0 (TSWV: 0)		
	absent		absente	fehlend	ausente	Yolo Wonder	1
	present		présente	vorhanden	presente	Galileo, Jackal, Jackpot, Piamonte	9
63.	QL	VG	(+)				
	Resistance to <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 1		Résistance à <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 1	Resistenz gegen <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotyp 1	Resistencia a <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Patotipo 1		
	absent		absente	fehlend	ausente	Yolo Wonder	1
	present		présente	vorhanden	presente	Filidor, San Marco	9
64.	QL	VG					
	Resistance to <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 2		Résistance à <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 2	Resistenz gegen <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotyp 2	Resistencia a <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Patotipo 2		
	absent		absente	fehlend	ausente	Yolo Wonder	1
	present		présente	vorhanden	presente	Filidor, San Marco	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
65.	QL	VG				
	Resistance to <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 3	Résistance à <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 3	Resistenz gegen <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotyp 3	Resistencia a <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Patotipo 3		
	absent	absente	fehlend	ausente	Yolo Wonder	1
	present	présente	vorhanden	presente	Filidor, San Marco	9
66.	QL	MS/VG	(+)			
	Resistance to <i>Meloidogyne incognita</i> (Mi)	Résistance à <i>Meloidogyne incognita</i> (Mi)	Resistenz gegen <i>Meloidogyne incognita</i> (Mi)	Resistencia a <i>Meloidogyne incognita</i> (Mi)		
	absent	absente	fehlend	ausente	Tom4, Yolo Wonder	1
	present	présente	vorhanden	presente	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 should be made on plants without pruning or training.

Ad. 3: Plant: height

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

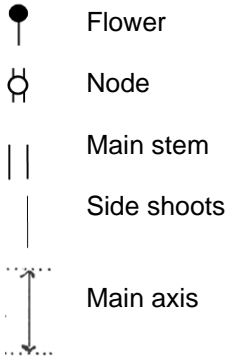
Ad. 4: Plant: shortened internodes

Observations should be made in the upper part of 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.

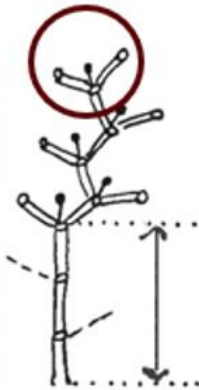
Absent: The main stems grow indeterminately; one or two flowers develop per node and shortened internodes never develop.

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.

Explanation of plant parts



1
absent

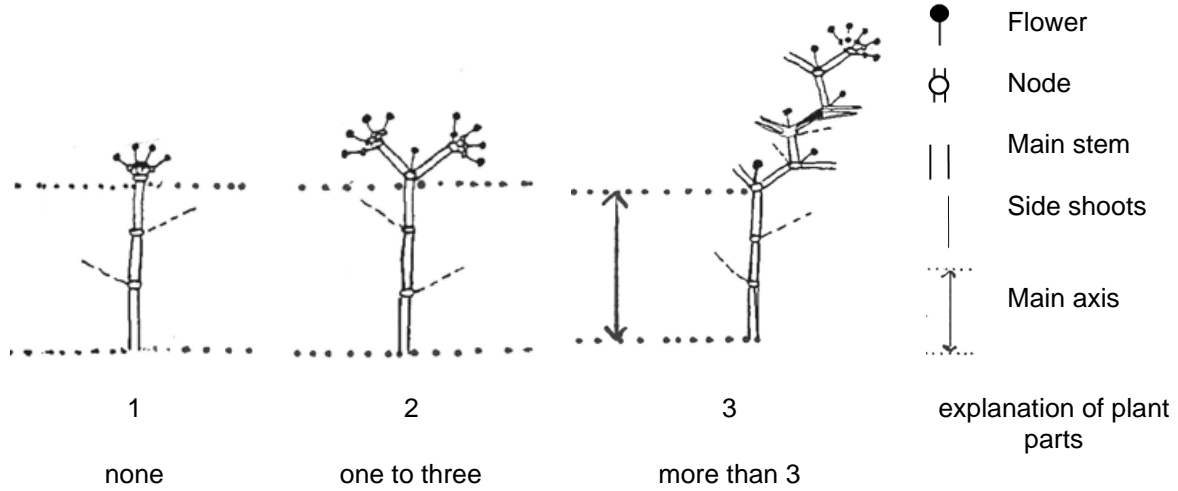


9
present



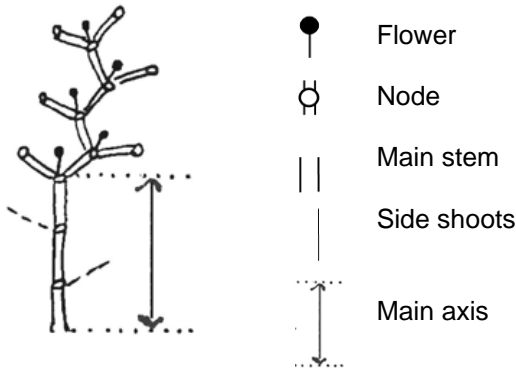
Ad. 5: Only varieties with plant: shortened internodes: present: number of internodes between the first flower and shortened internodes

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.



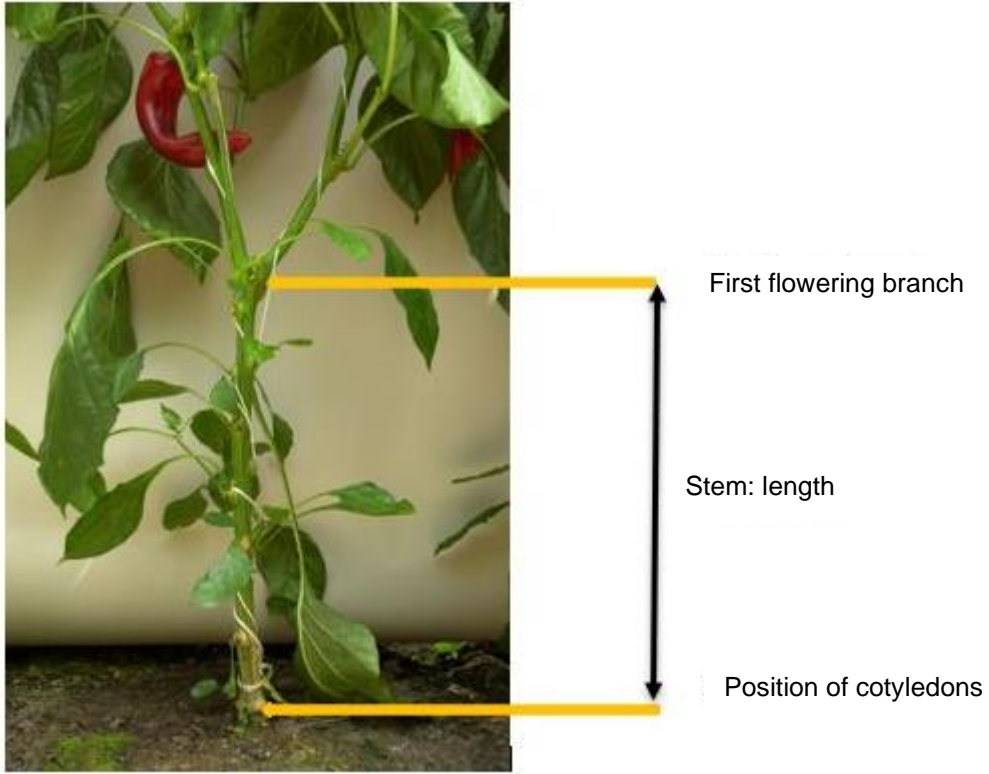
Ad. 6: Only varieties with plant: shortened internodes: absent: length of internodes

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.

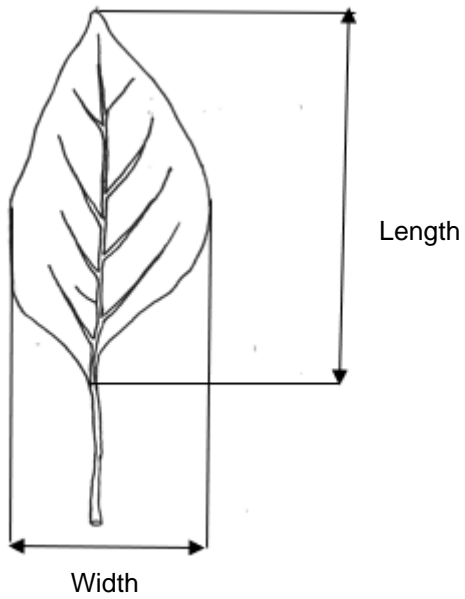


Ad. 7: Stem: length

Observations should be made from the cotyledons to the node of the first flowering 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 recently fully developed leaves.

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



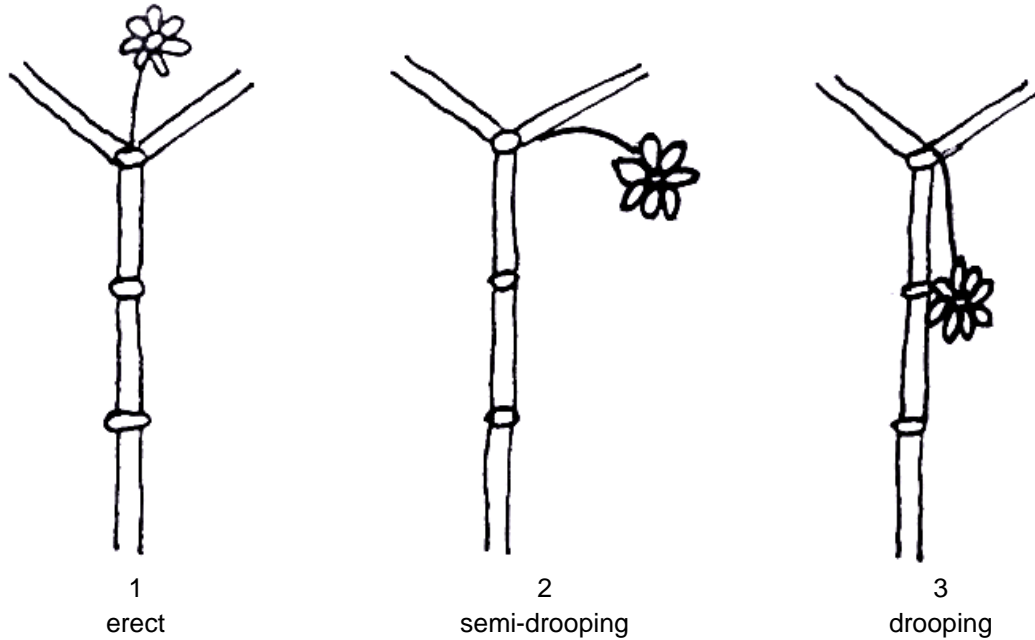
9
present

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.

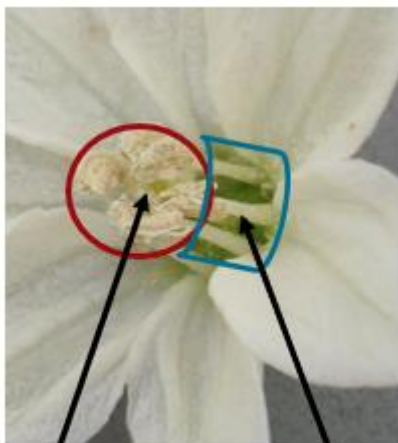
Ad. 21: Flower: attitude of pedicel

The predominant state of expression should be observed.



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.



Anthers

Filaments

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.

In heterozygous genotypes, male sterility may segregate. If the segregation occurs in the predicted manner, the variety should be classified as partly present.

In hybrid production, this population is used as a motherline.



fertile



sterile

Ad. 26: Immature fruit: color

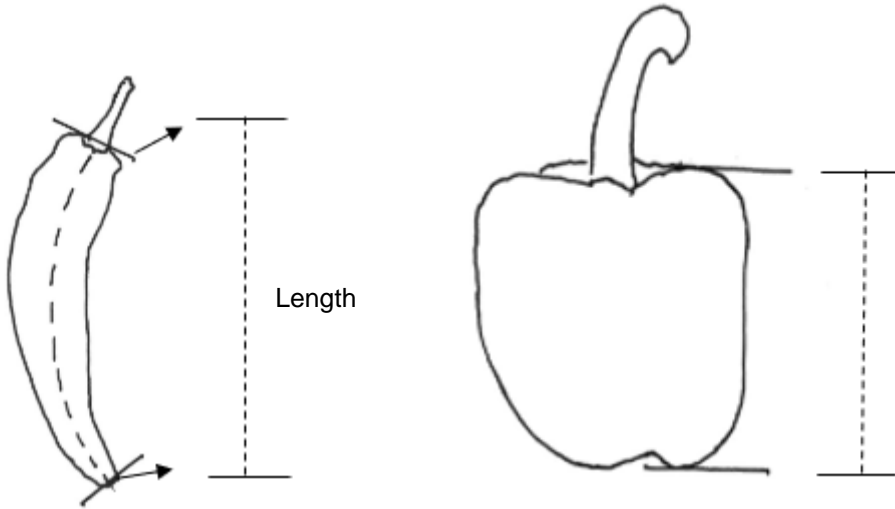
For varieties with greenish white and greenish yellow immature fruits, particular attention is needed to make observations before the start of the color change.

Ad. 29: Fruit: attitude

The predominant state of expression should be scored.

Ad. 30: Fruit: length
























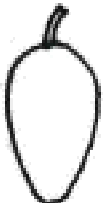












Observations of fruit length should not include the stalk.
The length of the fruit for curved or s-shaped fruits should be observed following the C- shape or S-shape.
The length of the fruit with stalk cavity or/and depressed apex should be observed without taking into account the cavity and depressed apex.





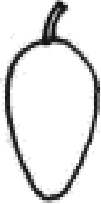







Ad. 31: Fruit: diameter

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

Ad. 32: Fruit: ratio length/diameter

ratio length/diameter	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					

Ad. 33: Fruit: shape in longitudinal section

	broadest part				
	at middle		above middle		
elongated	 3 elliptic	 6 rectangular	 8 ovate	 9 triangular	 10 trapezoid
medium ratio	 2 circular	 5 square	 7 cordiform		
compressed	 1 oblate	 4 transverse rectangular			

Ad. 34: Fruit: curvature

Observations should be made excluding the extreme point of the tip. The predominant 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: situation of pericarp at basal part



1
absent or very weak

3
weak

5
medium

7
strong

9
very strong

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



1
absent or weak



2
medium



3
strong

Ad. 40: Fruit: texture of surface



1
smooth or weakly wrinkled



2
moderately wrinkled



3
strongly wrinkled

Ad. 41: Fruit: color

Fruit: intensity of color (Char. 42)	Fruit: color (Char. 41)				
	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, Lamuyo	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

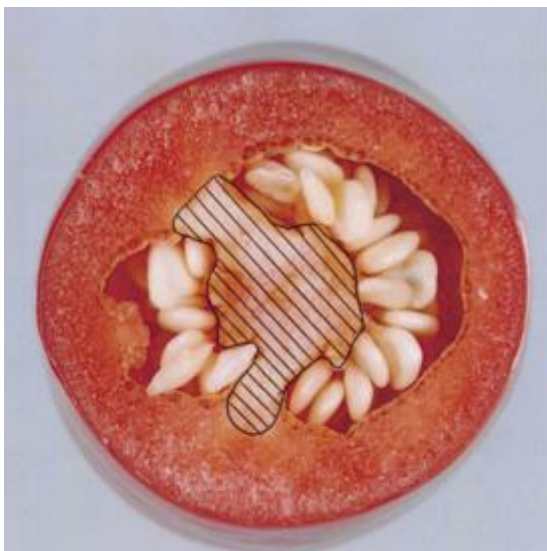
See Ad. 41 for example varieties.

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: Stalk: thickness

Observations should be made at the middle of the stalk.

Ad. 52: Calyx: aspect

Observations should be made on whether the calyx is not enveloping (1) the fruit or enveloping the fruit including its shoulder (3), 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 <i>Tobacco mosaic virus</i> (TMV), and <i>Pepper mild mottle virus</i> (PMMoV))
2.	Quarantine status	No
3.	Host species	Sweet pepper, hot pepper, paprika and chili – <i>Capsicum annuum</i> L.
4.	Source of inoculum	GEVES ¹ (FR), Naktuinbouw ² (NL) or INIA - CSIC ³ (SP)
5.	Isolate	<ul style="list-style-type: none"> - <i>Tobacco mosaic virus</i> group 0 (TMV: 0) strain Vi-6 - <i>Pepper mild mottle virus</i> group 2 (PMMoV: 1.2) strain nt203 - <i>Pepper mild mottle virus</i> group 3 (PMMoV: 1.2.3) strain Eve <p>The test protocols have been validated in a CPVO co-funded project⁴ with these 3 isolates/races</p>
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 <i>Nicotiana tabacum</i> 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 <i>Nicotiana tabacum</i> "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	<p><u>TMV: 0:</u></p> <ul style="list-style-type: none"> - Susceptible controls: Lamu, Pepita, Piquillo - Resistant controls: Fehérözön, Yolo Wonder <p><u>PMMoV: 1.2:</u></p> <ul style="list-style-type: none"> - Susceptible controls: Fehérözön, Lamu, Yolo Wonder - Resistant controls: Ferrari, Novi 3 <p><u>PMMoV: 1.2.3:</u></p> <ul style="list-style-type: none"> - Susceptible controls: Ferrari, Yolo Wonder - Resistant controls: Friendly, Tom 4 <p>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.</p>
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	<u>TMV: 0</u> , cotyledons to first leaf stage <u>PMMoV: 1.2 and PMMoV: 1.2.3</u> , cotyledon stage
10.4	Inoculation method	rubbing with the virus suspension
10.5	First observation	<p><u>TMV:0:</u> 4-7 days post-inoculation for observation of local necrosis.</p> <p><u>PMMoV: 1.2 and PMMoV: 1.2.3:</u> 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</p>
10.6	Second observation	<p><u>TMV: 0:</u> two weeks post-inoculation for observation of symptoms of susceptibility.</p> <p><u>PMMoV: 1.2 and PMMoV: 1.2.3:</u> two weeks post-inoculation for observation of symptoms of susceptibility.</p>
10.7	Final observations	<p><u>TMV: 0:</u> three weeks post-inoculation.</p> <p><u>PMMoV: 1.2 and PMMoV: 1.2.3:</u> three weeks post-inoculation.</p> <p>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)</p>

11.	Observations	
11.1	Method	Visual
11.2	Observation scale	<p><u>TMV: 0:</u></p> <ul style="list-style-type: none"> - 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. <p><u>PMMoV: 1.2 and PMMoV: 1.2.3:</u></p> <ul style="list-style-type: none"> - 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	<p>absent [1] susceptible, see 11.2</p> <p>present [9] resistant, see 11.2</p>
13.	Critical control points	<ul style="list-style-type: none"> - 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	<i>Potato Y virus</i> (PVY)
2.	Quarantine status	No
3.	Host species	Sweet pepper, hot pepper, paprika and chili – <i>Capsicum annuum</i> 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	<i>pvr 0</i>	S	S	S
PI152225	<i>pvr 1</i>	HR	HR	-
Yolo Y	<i>pvr1</i> ¹ (<i>pvr 2</i> ¹)	HR	S	S
Florida VR2	<i>pvr1</i> ² (<i>pvr 2</i> ²)	HR	HR	S
Florida VR4, Del Rey Bell, Agronomico 10	<i>pvr3</i>	HR	HR	HR
Serrano Criollo de Morelos 334	<i>pvr4</i>	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 <i>Nicotiana tabacum</i> cv. <i>Xanthi-nc</i> 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 <i>Nicotiana tabacum</i> cv. <i>Xanthi-nc</i> , 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

⁷resistencias@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	<p><u>PVY: 0:</u></p> <ul style="list-style-type: none"> - Susceptible controls: Ferrari, Piquillo, Yolo Wonder - Resistant controls: Andalus, Vidi, Yolo Y <p><u>PVV: 1:</u></p> <ul style="list-style-type: none"> - Susceptible controls: Yolo Wonder, Yolo Y - Resistant controls: Florida VR2 <p><u>PVY: 1.2:</u></p> <ul style="list-style-type: none"> - 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	<u>Susceptibility:</u> mosaic (can be very light/faint), growth reduction, vein banding and vein necrosis. <u>Resistance:</u> 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	<i>Phytophthora capsici</i> (Pc)
2.	Quarantine status	no
3.	Host species	<i>Capsicum annuum</i>
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), Favorol (moderately resistant), Solario, Phyto 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 plants (2 untreated plants)
9.2	Number of replicates	e.g. 1
9.3	Control varieties	Jupiter, Yolo Wonder (susceptible), Favorol (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 $\geq 0.5 \text{ cm} \leq 0.8 \text{ cm/week}$
	- 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 highly 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	<i>Cucumber mosaic virus</i> (CMV)
2.	Quarantine status	no
3.	Host species	<i>Capsicum annuum</i>
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. <i>Vinca rosea</i>
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	at least 50 plants
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	<i>Tomato spotted wilt virus</i> , Pathotype 0 (TSWV: 0)
2.	Quarantine status	yes
3.	Host species	<i>Capsicum annuum</i>
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 <i>Nicotiana benthamiana</i> , <i>N. rustica</i>
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant
8.2	Multiplication variety	Yolo Wonder or <i>N. benthamiana</i> , <i>N. rustica</i>
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 plants
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 to 10 - 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	
		<u>Susceptibility</u> : mosaic on young leaf, some leaf malformation <u>Resistance</u> : 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 (<i>Thrips tabaci</i> and <i>Frankliniella occidentalis</i>). 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	<i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. I) (X spp (ex Xcv))
2.	Quarantine status	-
3.	Host species	<i>Capsicum annuum</i>
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 plants
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	
		<u>Susceptibility:</u> Water soaking near infiltration site
		<u>Resistance:</u> 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	<i>Meloidogyne incognita</i> (Mi)
2.	Quarantine status	-
3.	Host species	Sweet pepper, hot pepper, paprika and chili – <i>Capsicum annuum</i> 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 on 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	at least 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
10.2	Quantification inoculum	The ratio is depending on 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

⁹ GEVES; matref@geves.fr

11.2	Observation scale	<p>Class 0: healthy plant, no galls</p> <p>Class 1: few and little galls which are difficult to find (for example less than 5)</p> <p>Class 2: few galls, easy to observe but on few roots, still a lot of roots without galls, no chains</p> <p>Class 3: many individual galls on most but not all roots, presence of chains</p> <p>Class 4: many galls on all roots, can lead to dead plants and may suppress emergence.</p>
11.3	Validation of test	<p>Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls.</p>
11.4	Off-types	<p>resistant varieties may have a few plants with a few galls</p>
12.	Interpretation of data in terms of UPOV characteristic states	<p>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.</p> <p><i>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</i></p>
13.	Critical control points	<p>Avoid rotting of roots; high temperature causes breakdown of resistance.</p> <p>In case of an aggressive test, put seeds in a layer of non-contaminated soil or decrease the quantity of inoculum.</p> <p>In class 4 heavy gall development is seldom observed, normally it can occur as loss of seedlings.</p> <p>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.</p>

9. Literature

GENERAL INFORMATION

[Florabase—the Western Australian Flora \(dpaw.wa.gov.au\)](http://dpaw.wa.gov.au)

Palloix, A., Phaly, T., 1996: [Histoire du piment: de la plante sauvage aux variétés modernes](#), PHM Revue Horticole, FR, no. 365; pp. 41-43

Pochard, E., 1987: [Histoire du piment et recherche](#), INRA Mensuel, FR, no. 29; pp. 5-8

Pochard, E., Palloix, A., Daubeze, A.M., 1992: [Le piment](#), Gallais, A. (ed.), Bannerot, H. (ed.), Amelioration des especes vegetales cultivees. Objectifs et critères de selection pp. 420-434, INRA; Paris, FR

do Rêgo, E. R., do Rêgo, M. M., 2016: Genetics and Breeding of Chili Pepper Capsicum spp. In: do Rego, E.R. et al. 2016: Production and Breeding of Chilli Peppers (Capsicum spp.) Chapter 4, Springer International Publishing Switzerland.

Smilde, W.D. and D. Peters (2007) Pathotyping TSWV in pepper and tomato. In: Niemorowicz-Szczytt, K. 2007: Progress in Research on Capsicum and Eggplant, Eucarpia conference proceedings, Warsaw, pp. 231-236 (<http://www.eucarpia.org/03publications/#Abstracts>)

Somos, A., 1984: The Paprika, Akadémiai Kiadó, Budapest, HU.

Genetic Resources

Daunay, M.C., Jullian, E., Dauphin, F., 2001: [Management of eggplant and pepper genetic resources in Europe: networks are emerging](#), EUCARPIA, European Association for Research on Plant Breeding, Paris, FR, Genetics and breeding of Capsicum and eggplant, 11th EUCARPIA Meeting, Antalya, TR, 2001 pp.1-5

Disease Resistance

Caranta, C., Palloix, A., Gébré-Sélassié, K., Marchoux, G., Lefebvre, V., Daubèze, A.M., 1996: [Genomic organization of multi-virus resistance factors in pepper \(Capsicum annuum\): Co-localization between QTLs and major genes. Poster](#)

Lefebvre, V., Caranta, C., Moury, B., Pflieger, S., Daubèze, A.M., Blattes, A., Phaly, T., Nemouchi, G., Palloix, A., 1997: [Status of the intraspecific molecular map of pepper: genome distribution of multiple disease resistance loci and defence genes](#), Sherago International Inc., New York, US, Plant and animal genome V, International Conference on the Status of Plant and Animal Genome Research, San Diego, US, 1997/01/12-16, pp. 115

Pflieger, S., Lefebvre, V., Blattes, A., Caranta, C., Palloix, A., 1998: [Candidate gene approach for identifying QTLs involved in pepper/pathogen interactions](#), EUCARPIA, European Association for Research on Plant Breeding, Avignon, FR, Genetics and breeding of Capsicum and eggplant, 10th Meeting EUCARPIA, Avignon, FR, 1998/09/07-11, pp. 245-248

Stacey, G. (ed.), Mullin, B. (ed.), Gresshoff, P.M. (ed.), Biology of plant-microbe interactions 8. International Symposium on molecular plant-microbe interactions, Knoxville (USA), 1996/07/12-19, 1 p., International Society for Molecular Plant-Microbe Interactions, Saint-Paul, US

Potyvirus

Parrella, G., Ruffel, S., Moretti, A., Morel, C., Palloix, A., Caranta, C., 2002: [Recessive resistance genes against potyviruses are localized in colinear genomic regions of the tomato \(Lycopersicon spp.\) and pepper \(Capsicum spp.\) genomes](#), Theoretical and Applied Genetics, DE, vol. 105; pp. 855-861

Ruffel, S., Dussault, M.H., Palloix, A., Moury, B., Bendahmane, A., Robaglia, C., Caranta, C., 2002: [A natural recessive resistance gene against potato virus Y in pepper corresponds to the eukariotic initiation factor 4E \(eIF4E\)](#), Plant Journal, UK, vol. 32 no. 6; pp. 1067-1075

CMV

Caranta, C., Daubèze, A.M., Pflieger, S., Lefebvre, V., Thabuis, A., Blattes, A., Nemouchi, G., Phaly, T., Signoret, P., Palloix, A., 2001: [Identification of quantitative trait loci involved in partial restriction of cucumber mosaic virus \(CMV\) long-distance movement in pepper](#), EUCARPIA, European Association for Research on Plant Breeding, Paris (FRA), Genetics and breeding of Capsicum and eggplant, 11th EUCARPIA Meeting, Antalya, TR, 2001 pp. 176-180

Caranta, C., Palloix, A., Lefebvre, V., Daubèze, A.M., 1997: [QTLs for a component of partial resistance to cucumber mosaic virus in pepper: restriction of virus installation in host-cells](#), Theoretical and Applied Genetics, DE, no. 94; pp. 431-438

Caranta, C., Pflieger, S., Lefebvre, V., Daubèze, A.M., Thabuis, A., Palloix, A., 2002: [QTLs involved in the restriction of cucumber mosaic virus \(CMV\) long-distance movement in pepper](#), Theoretical and Applied Genetics, DE, vol. 104; pp. 586-591

Phytophthora

Lefebvre, V., Palloix, A., 1995: [Mapping QTL's affecting the resistance to Phytophthora capsici in pepper \(Capsicum annuum\)](#), Scherago International Inc., New York, US, USDA, United States Department of Agriculture, Agricultural Research Service, Washington, US, International Conference on the Status of Plant Genome Research, Plant Genome 3, San Diego, US, 1995/01/15-19 58, USDA-ARS, Washington, US

Lefebvre, V., Palloix, A., 1996: [Both epistatic and additive effects of QTLs are involved in polygenic induced resistance to disease: a case study, the interaction pepper Phytophthora capsici Leonian](#), Theoretical and Applied Genetics, DE, no. 93; pp. 503-511

Thabuis, A., Palloix, A., Pflieger, S., Daubèze, A.M., Caranta, C., Lefebvre, V., 2003: [Comparative mapping of Phytophthora resistance loci in pepper germplasm: evidence for conserved resistance loci across Solanaceae and for a large genetic diversity](#), Theoretical and Applied Genetics, DE, vol. 106; pp. 1473-1485

Xanthomonas

Márkus, F., Kapitány, J., Csilléry, G. and Szarka, J., 2001 b: *Xanthomonas* resistance In Hungarian spice pepper varieties. Int. Jour. of Hort. Sci., Voil. 7. No. 3-4. pp. 69-72

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	<input type="text" value="Capsicum annuum L."/>
1.2	Common name	<input type="text" value="Sweet Pepper, Hot Pepper, Paprika, Chili"/>
2. Applicant		
	Name	<input type="text"/>
	Address	<input type="text"/>
	Telephone No.	<input type="text"/>
	Fax No.	<input type="text"/>
	E-mail address	<input type="text"/>
	Breeder (if different from applicant)	<input type="text"/>
3. Proposed denomination and breeder's reference		
	Proposed denomination (if available)	<input type="text"/>
	Breeder's reference	<input type="text"/>

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)

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

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

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

4.2.2 Vegetative propagation

- (a) Cuttings []
- (b) *In vitro* propagation []
- (c) Other (state method) []

4.2.3 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	Plant: height		
(3)			
	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	Plant: shortened internodes		
(4)			
	absent	California wonder, De Cayenne	1 []
	present	Bucano	9 []
5.3	Leaf blade: intensity of anthocyanin coloration of upper side		
(14)			
	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	Leaf blade: variegation		
(16)			
	absent	Omiyamurasaki	1 []
	present	Calico, Purple Rain	9 []
5.5	Flower: anthocyanin coloration of anther		
(23)			
	absent	Bravia	1 []
	present	Brutus, Lamuyo	9 []
5.6	Male sterility		
(25)			
	absent	California wonder	1 []
	partially present		2 []
	totally present	Angelito	3 []

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

	Characteristics	Example Varieties	Note
5.7	Immature fruit: color		
(26)			
	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 []
5.8	<u>Only varieties with Immature fruit: color: green or purple:</u>		
(27)	Immature fruit: 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 []
5.9	Fruit: length		
(30)			
	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
5.10	Fruit: diameter		
(31)			
	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 []
5.11	Fruit: ratio length/diameter		
(32)			
	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 []
5.12	Fruit: shape in longitudinal section		
(33)			
	oblate	Koral	1 []
	circular	Capperino	2 []
	elliptic		3 []
	transverse rectangular	Liebesapfel, PAZ szentesi	4 []
	square	Maranello	5 []
	rectangular	Raggio	6 []
	cordiform	Morrón de conserva 3	7 []
	ovate	Jalapeño	8 []
	triangular	Bravia, Corno di toro rosso, De Cayenne	9 []
	trapezoid	Altea	10 []

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

Characteristics	Example Varieties	Note
5.13 Fruit: situation of pericarp at basal part (37)		
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 []
5.14 Fruit: situation of pericarp excluding basal part (38)		
absent or weak	Sonar, Yolo Wonder	1 []
medium	Rodri	2 []
strong	De Cayenne, Doux italien	3 []
5.15 Fruit: color (41)		
yellow	Allrounder	1 []
orange	Arancia	2 []
red	Lamuyo	3 []
brown	Bastan, Chocology	4 []
green	Raymond	5 []
5.16 Fruit: intensity of color (42)		
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
5.17	Fruit: depth of stalk cavity		
(44)			
	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 []
5.18	Fruit: number of locules		
(46)			
	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 []
5.19	Fruit: capsaicin in placenta		
(48)			
	absent	Sonar, Sweet banana	1 []
	present	De Cayenne	9 []
5.20	Fruit: seeds		
(49)			
	absent	Angelito	1 []
	present	Lamuyo	9 []
5.21	Time of maturity		
(53)			
	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
	5.22 Resistance to Tobamovirus - <i>Tobacco mosaic virus</i> - Group 0 (TMV: 0) (54)		
	absent	Lamu, Pepita, Piquillo	1 []
	present	Fehérözön, Ultron, Yolo Wonder	9 []
	5.23 Resistance to Tobamovirus - <i>Pepper mild mottle virus</i> - Group 2 (PMMoV: 1.2) (55)		
	absent	Fehérözön, Lamu, Yolo Wonder	1 []
	present	Achille, Candela, Ferrari, Fudji, Novi 3	9 []
	5.24 Resistance to Tobamovirus - <i>Pepper mild mottle virus</i> - Group 3 (PMMoV: 1.2.3) (56)		
	absent	Candela, Ferrari, Oida, Yolo Wonder	1 []
	present	Ettore, Friendly, Tom4	9 []
	5.25 Resistance to <i>Potato Y virus</i> (PVY) - Pathotype 0 (PVY: 0) (57)		
	absent	Ferrari, Murillo, Piquillo, Yolo Wonder	1 []
	present	Andalus, Goleador, Vidi, Yolo Y	9 []
	5.26 Resistance to <i>Potato Y virus</i> (PVY) - Pathotype 1 (PVY: 1) (58)		
	absent	Yolo Wonder, Yolo Y	1 []
	present	Florida VR2, Ribatejo	9 []
	not tested		[]
	5.27 Resistance to <i>Potato Y virus</i> (PVY) - Pathotype 1.2 (PVY: 1.2) (59)		
	absent	Florida VR2, Yolo Wonder, Yolo Y	1 []
	present	Chouca, Serrano Criollo de Morelos 334	9 []
	not tested		[]
	5.28 Resistance to <i>Phytophthora capsici</i> (Pc) (60)		
	absent	Yolo Wonder	1 []
	present	Chistera, Favolor, Phyo 636, Solario	9 []
	not tested		[]
	5.29 Resistance to <i>Cucumber mosaic virus</i> (CMV) (61)		
	absent	Yolo Wonder	1 []
	present	Alby, Ducato, Favolor	9 []
	not tested		[]
	5.30 Resistance to <i>Tomato spotted wilt virus</i> Pathotype 0 (TSWV: 0) (62)		
	absent	Yolo Wonder	1 []
	present	Galileo, Jackal, Jackpot, Piamonte	9 []

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

	Characteristics	Example Varieties	Note
	5.31 Resistance to <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 1 (63)		
	absent	Yolo Wonder	1 []
	present	Filidor, San Marco	9 []
	not tested		[]
	5.32 Resistance to <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 2 (64)		
	absent	Yolo Wonder	1 []
	present	Filidor, San Marco	9 []
	not tested		[]
	5.33 Resistance to <i>Xanthomonas</i> spp (ex <i>Xanthomonas campestris</i> pv. <i>vesicatoria</i>) (X spp (ex Xcv)) - Pathotype 3 (65)		
	absent	Yolo Wonder	1 []
	present	Filidor, San Marco	9 []
	not tested		[]
	5.34 Resistance to <i>Meloidogyne incognita</i> (Mi) (66)		
	absent	Tom4, Yolo Wonder	1 []
	present	Bastion, Capital, Kation, W4	9 []
	not tested		[]

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
<i>Example</i>	<i>Fruit: length</i>	<i>long</i>	<i>very long</i>

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

Type of culture:

- protected (greenhouse, tunnel, etc.)
- in the open

It is highly recommended that a representative color photograph of the variety accompanies the TQ.

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]