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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

TOMATO *

UPOV Code(s): SOLAN_LYC; SOLAN_LCH; SOLAN_LPI

Solanum lycopersicum L.; *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg; *Solanum lycopersicum* L. x *Solanum pimpinellifolium* L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from the Netherlands (Kingdom of the)
to be considered by the
Technical Committee at its sixty-first session,
to be held Geneva from 2025-10-20 to 2025-10-21

Disclaimer: this document does not represent UPOV policies or guidance

This document contains the following changes proposed by the Technical Working Party for Vegetables (TWV), at its fifty-ninth session[1], presented in grey highlight:

(a) Revision of methods of observations of characteristics 47 to 49 (based on change (c) below);
(b) Addition of a new characteristic 58 "Resistance to *Passalora fulva* (Pf) - Race H";
(c) Revision of explanation Ad. 47 to 49 to add an alternative molecular marker method (using makers on I2) for characteristic 48 "Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) - Race 1EU/2US" next to the bioassay;
(d) Revision of explanation Ad. 51 "Resistance to *Passalora fulva* (Pf)" (based on change (b) above);
(e) Addition of new characteristic 58 "Resistance to *Passalora fulva* (Pf) - Race H" to the Technical Questionnaire, Section 5., with option "not tested".

[1] held by electronic means, from May 5 to 8, 2025.

* 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.]

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Solanum lycopersicum L.	Cherry tomato, Tomato	Tomate, Tomate cerise	Kirschtomate, Tomate	Tomate, Tomatera, Tomatillo
Solanum lycopersicum L. x *Solanum cheesmaniae* (L. Ridley) Fosberg				
Solanum lycopersicum L. x *Solanum pimpinellifolium* L., *Lycopersicon esculentum* Mill. x *Lycopersicon pimpinellifolium* L.				

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.

Other associated UPOV documents: TG/294

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

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Solanum lycopersicum* L., *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosber and *Solanum lycopersicum* L. x *Solanum pimpinellifolium* L. (including rootstocks of these species).

For tomato rootstock varieties belonging to other species TG/294 applies.

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 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 For the assessment of uniformity of self-pollinated varieties, single cross 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: growth type (characteristic 2)
(b) Leaf: type (characteristic 10)
(c) Pedicel: abscission layer (characteristic 18)
(d) Immature fruit: green shoulder (characteristic 20)
(e) Immature fruit: green stripes (characteristic 24)
(f) Immature fruit: anthocyanin coloration (characteristic 25)
(g) Fruit: size (characteristic 26)
(h) Fruit: shape in longitudinal section (characteristic 28)
(i) Fruit: number of locules (characteristic 36)
(j) Fruit: gel in locules (characteristic 37)

(k) Fruit: color (characteristic 38)
(l) Resistance to *Meloidogyne incognita* (Mi) (characteristic 45)
(m) Resistance to *Verticillium* sp. (Va and Vd) - Race 0 (characteristic 46)
(n) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 0EU/1US (Fol: 0EU/1US) (characteristic 47)
(o) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 1EU/2US (Fol: 1EU/2US) (characteristic 48)
(p) Resistance to *Tomato mosaic virus* - Strain 0 (ToMV: 0) (characteristic 60)
(q) Resistance to *Tomato spotted wilt virus* - Pathotype 0 (TSWV: 0) (characteristic 69)

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)-(c) See Explanations on the Table of Characteristics in Chapter 8.1

7 Not applicable

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (*) QN VS		**(+)**				
	Seed-propagated varieties only: Seedling: anthocyanin coloration of hypocotyl	**Variétés reproduites par voie sexuée seulement : Plantule : pigmentation anthocyanique de l'hypocotyle**	**Nur samenvermehrte Sorten: Sämling: Anthocyanfärbung des Hypokotyls**	**Sólo variedades propagadas mediante semillas: Plántula: pigmentación antociánica del hipocótilo**		
	absent	absente	fehlend	ausente	Colt, VTM215	1
	partially present	partiellement présente	teilweise vorhanden	parcialmente presente		2
	totally present	complètement présente	vollständig vorhanden	totalmente presente	Daniela, Marmande VR	3
2. (*) QL VG		**(+)**				
	Plant: growth type	**Plante : type de croissance**	**Pflanze: Wuchstyp**	**Planta: tipo de crecimiento**		
	determinate	déterminé	begrenzt wachsend	determinado	Rio Grande, Siluet	1
	indeterminate	indéterminé	unbegrenzt wachsend	indeterminado	Daniela, Florenteen, Marmande VR, Saint-Pierre	2
3. (*) QN MS/VG		**(+)**				
	Only varieties with plant growth type determinate: Plant: number of inflorescences on main stem	**Seulement les variétés à type de croissance déterminé : Plante : nombre d'inflorescences sur la tige principale**	**Nur Sorten mit Wuchstyp begrenzt wachsend: Pflanze: Anzahl Blütenstände am Haupttrieb**	**Solo variedades con tipo de crecimiento determinado: Planta: número de inflorescencias en el tallo principal**		
	very few	très petit	sehr gering	muy bajo	Cherry Falls	1
	very few to few	très petit à petit	sehr gering bis gering	muy bajo a bajo	Monty	2
	few	petit	gering	bajo	Simplex	3
	few to medium	petit à moyen	gering bis mittel	bajo a medio		4
	medium	moyen	mittel	media	Miceno	5
	medium to many	moyen à élevé	mittel bis hoch	medio a alto		6
	many	élevé	hoch	alto	Malkonet	7
	many to very many	élevé à très élevé	hoch bis sehr hoch	alto a muy alto	Grownet	8
	very many	très élevé	sehr hoch	muy alto		9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
4.	**QN VG**	**(+)**				
	Stem: anthocyanin coloration	**Tige : pigmentation anthocyanique**	**Stängel: Anthocyanfärbung**	**Tallo: pigmentación antociánica**		
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Rebelski	1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
	weak	faible	gering	débil	Montfavet 63-5	3
	weak to medium	faible à moyenne	gering bis mittel	débil a media		4
	medium	moyenne	mittel	media	Miniprio, Philovita	5
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte		6
	strong	forte	stark	fuerte	Grinta	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	Villax	9
5.	**QN MS/VG**	**(+)**				
	Only varieties with plant growth type indeterminate: Stem: length of internode	**Seulement les variétés à type de croissance indéterminé : Tige : longueur de l'entre-nœud**	**Nur Sorten mit Wuchstyp unbegrenzt wachsend: Stängel: Internodienlänge**	**Solo variedades con tipo de crecimiento indeterminado: Tallo: longitud del entrenudo**		
	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	Primioso	3
	short to medium	courte à moyenne	kurz bis mittel	corta a media		4
	medium	moyenne	mittel	media	Campari, Montfavet 63-5	5
	medium to long	moyenne à longue	mittel bis lang	media a larga		6
	long	longue	lang	larga	Rebelski, Tomawak	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 Beispielssorten Variedades ejemplo	Note/ Nota
6.	**(*)** **QN** **MS/VG**	**(+)**					
		Only varieties with plant growth type indeterminate: Plant: height	**Seulement les variétés à type de croissance indéterminé : Plante : hauteur**	**Nur Sorten mit Wuchstyp unbegrenzt wachsend: Pflanze: Höhe**	**Solo variedades con tipo de crecimiento indeterminado: Planta: altura**		
		very short	très courte	sehr niedrig	muy baja	Garderner's Delight, Maresme, Zadenna	1
		very short to short	très courte à courte	sehr niedrig bis niedrig	muy baja a baja		2
		short	courte	niedrig	baja	Delfine, Despina	3
		short to medium	courte à moyenne	niedrig bis mittel	baja a media		4
		medium	moyenne	mittel	media	Brooklyn, Campari	5
		medium to tall	moyenne à haute	mittel bis hoch	media a alta		6
		tall	haute	hoch	alta	Climberley, Pitenza	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	Goldwin, Romindo	9
7.	**(*)** **QN** **VG**	**(+)** **(a)**					
		Leaf: attitude	**Feuille : port**	**Blatt: Haltung**	**Hoja: porte**		
		erect	dressé	aufrecht	erecto		1
		erect to semi-erect	dressé à demi-dressé	aufrecht bis halbaufrecht	erecto a semierecto		2
		semi-erect	demi-dressé	halbaufrecht	semierecto	Zadenna	3
		semi-erect to horizontal	demi-dressé à horizontal	halbaufrecht bis waagerecht	semierecto a horizontal		4
		horizontal	horizontal	waagerecht	horizontal	Brioso, Geronimo	5
		horizontal to semi-drooping	horizontal à demi-retombant	waagerecht bis halbüberhängend	horizontal a semicolgante		6
		semi-drooping	demi-retombant	halbüberhängend	semicolgante	Leonce, Montfavet 63-5, Upper	7
		semi-drooping to drooping	demi-retombant à retombant	halbüberhängend bis überhängend	semicolgante a colgante		8
		drooping	retombant	überhängend	colgante	Caboverde	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8.		**QN MS/VG**	**(a)**				
		Leaf: length	**Feuille : longueur**	**Blatt: Länge**	**Hoja: 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	Red Robin	3
		short to medium	courte à moyenne	kurz bis mittel	corta a media		4
		medium	moyenne	mittel	media	Mezcal, Rio Grande	5
		medium to long	moyenne à longue	mittel bis lang	media a larga		6
		long	longue	lang	larga	Geronimo, Montfavet 63-5	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
9.		**QN MS/VG**	**(a)**				
		Leaf: width	**Feuille : largeur**	**Blatt: Breite**	**Hoja: anchura**		
		very narrow	très étroite	sehr schmal	muy estrecha		1
		very narrow to narrow	très étroite à étroite	sehr schmal bis schmal	muy estrecha a estrecha		2
		narrow	étroite	schmal	estrecha	Red Robin	3
		narrow to medium	étroite à moyenne	schmal bis mittel	estrecha a media		4
		medium	moyenne	mittel	media	Rio Grande	5
		medium to broad	moyenne à large	mittel bis breit	media a ancha		6
		broad	large	breit	ancha	Brioso, Saint-Pierre	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		9
10.	**(*)**	**QL VG**	**(+) (a)**				
		Leaf: type	**Feuille : type**	**Blatt: Typ**	**Hoja: tipo**		
		pinnate	penné	gefiedert	pinnado	Matina	1
		bipinnate	bipenné	doppelt gefiedert	bipinnado	Daniela, Saint-Pierre	2

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.	**QN VG**	**(+) (a)**				
	Leaf: size of leaflets	**Feuille : taille des folioles**	**Blatt: Größe der Blattfiedern**	**Hoja: tamaño de los folíolos**		
	very small	très petite	sehr klein	muy pequeño	Microtom	1
	very small to small	très petite à petite	sehr klein bis klein	muy pequeño a pequeño		2
	small	petite	klein	pequeño	Tiny Tim	3
	small to medium	petite à moyenne	klein bis mittel	pequeño a medio		4
	medium	moyenne	mittel	medio	Geronimo, Marmande VR	5
	medium to large	moyenne à grande	mittel bis groß	medio a grande		6
	large	grande	groß	grande	Daniela	7
	large to very large	grande à très grande	groß bis sehr groß	grande a muy grande		8
	very large	très grande	sehr groß	muy grande		9
12. **(*)**	**QN VG**	**(a)**				
	Leaf: intensity of green color	**Feuille : intensité de la couleur verte**	**Blatt: Intensität der Grünfärbung**	**Hoja: intensidad del color verde**		
	very light	très claire	sehr hell	muy clara		1
	very light to light	très claire à claire	sehr hell bis hell	muy clara a clara		2
	light	claire	hell	clara	Rossol	3
	light to medium	claire à moyenne	hell bis mittel	clara a media		4
	medium	moyenne	mittel	media	Rebelski	5
	medium to dark	moyenne à foncée	mittel bis dunkel	media a oscura		6
	dark	foncée	dunkel	oscura	Daniela, Red Robin	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
13.	**QN VG**	**(+) (a)**				
	Leaf: glossiness	**Feuille : brillance**	**Blatt: Glanz**	**Hoja: brillo**		
	very weak	très faible	sehr gering	muy débil	Speedax	1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
	weak	faible	gering	débil	Daniela, Losna	3
	weak to medium	faible à moyenne	gering bis mittel	débil a media		4
	medium	moyenne	mittel	media	Marmande VR	5
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte		6
	strong	forte	stark	fuerte	Albis, Dulcemiel, Lutecia	7
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte	Wasino	8
	very strong	très forte	sehr stark	muy fuerte		9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	**QN VG**	**(+) (a)**				
	Leaf: blistering	**Feuille : cloqûre**	**Blatt: Blasigkeit**	**Hoja: abullonado**		
	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	Daniela	3
	weak to medium	faible à moyenne	gering bis mittel	débil a medio		4
	medium	moyenne	mittel	medio	Marmande VR, Octavio, Syrio	5
	medium to strong	moyenne à forte	mittel bis stark	medio a fuerte		6
	strong	forte	stark	fuerte	Albis, Delfine, Paronset, Red Robin	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
15.	**QN VG**	**(+) (a)**				
	Leaf: attitude of petiolule of leaflets in relation to petiole	**Feuille : port du pétiolule des folioles par rapport au pétiole**	**Blatt: Stellung des Blattfiederstiels zum Blattstiel**	**Hoja: porte del peciolulo de los foliolos en relación con el peciolo**		
	erect	dressé	aufrecht	erecto	Volantis	1
	erect to semi-erect	dressé à demi-dressé	aufrecht bis halbaufrecht	erecto a semierecto		2
	semi-erect	demi-dressé	halbaufrecht	semierecto	Geronimo, Marmande VR	3
	semi-erect to horizontal	demi-dressé à horizontal	halbaufrecht bis waagerecht	semierecto a horizontal		4
	horizontal	horizontal	waagerecht	horizontal	Delisher	5
16.	**PQ MS/VG**	**(+)**				
	Inflorescence: type	**Inflorescence : type**	**Blütenstand: Typ**	**Inflorescencia: tipo**		
	mainly uniparous	principalement unipare	überwiegend unverzweigt	principalmente uníparos	Geronimo, Red Robin	1
	equally uniparous and multiparous	autant unipare que multipare	gleichwertig verzweigt und unverzweigt	igualmente uníparas y multíparas	Harzfeuer	2
	mainly multiparous	principalement multipare	überwiegend verzweigt	principalmente multíparas	Karelya	3
	multiflora	multiflore	multiflora	multiflora	Mini Star, Sweedor	4
17. **(*)**	**QL VG**					
	Flower: color	**Fleur : couleur**	**Blüte: Farbe**	**Flor: color**		
	yellow	jaune	gelb	amarillo	Marmande VR, Santorange	1
	orange	orange	orange	naranja	Mountain Vineyard, Orama	2

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18. (*)	**QL VG**	**(+)**				
	Pedicel: abscission layer	**Pédicelle : assise d'abscission**	**Blütenstiel: Bruchstelle**	**Pedicelo: capa de abscisión**		
	absent	absente	fehlend	ausente	Merlice, Rio Grande	1
	present	présente	vorhanden	presente	Daniela, Grownet, Montfavet 63-5	9
19. (*)	**QN MS/VG**	**(+)**				
	Only varieties with pedicel abscission layer present: Pedicel: length	**Seulement les variétés avec assise d'abscission du pédicelle présente : Pédicelle : longueur**	**Nur Sorten mit Blütenstiel: Bruchstellen vorhanden: Blütenstiel: Länge**	**Solo variedades con capa de abscisión del pedicelo presente: Pedicelo: 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	Cerise, Ferline	3
	short to medium	courte à moyenne	kurz bis mittel	corta a media		4
	medium	moyenne	mittel	media	Caboverde, Grownet	5
	medium to long	moyenne à longue	mittel bis lang	media a larga		6
	long	longue	lang	larga	Sir Elyan	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
20. (*)	**QL VG**	**(+)**	**(b)**			
	Immature fruit: green shoulder	**Fruit immature : collet vert**	**Unreife Frucht: grüne Schulter**	**Fruto no maduro: hombro verde**		
	absent	absent	fehlend	ausente	Geronimo	1
	present	présent	vorhanden	presente	Daniela, Montfavet 63-5	9
21.	**QN VG**	**(+)**	**(b)**			
	Immature fruit: extent of green shoulder	**Fruit immature : étendue du collet vert**	**Unreife Frucht: Ausdehnung der grünen Schulter**	**Fruto no maduro: extensión del hombro verde**		
	very small	très petite	sehr gering	muy pequeña	Daniela	1
	very small to small	très petite à petite	sehr gering bis gering	muy pequeña a pequeña		2
	small	petite	gering	pequeña	Shiren, Siluet	3
	small to medium	petite à moyenne	gering bis mittel	pequeña a medio		4
	medium	moyenne	mittel	medio	Marmalindo, Montfavet 63-5, Red Robin	5
	medium to large	moyenne à grande	mittel bis groß	medio a grande		6
	large	grande	groß	grande	Cobra, Dulcemiel	7
	large to very large	grande à très grande	groß bis sehr groß	grande a muy grande		8
	very large	très grande	sehr groß	muy grande		9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.		**QN VG**	**(+) (b)**				
		Immature fruit: intensity of green color of shoulder	**Fruit immature : intensité de la couleur verte du collet**	**Unreife Frucht: Intensität der Grünfärbung der Schulter**	**Fruto no maduro: intensidad del color verde del hombro**		
		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	Daniela, Soltyno	3
		light to medium	claire à moyenne	hell bis mittel	clara a media		4
		medium	moyenne	mittel	media	Montfavet 63-5, Santonio, Sunita	5
		medium to dark	moyenne à foncée	mittel bis dunkel	media a oscura		6
		dark	foncée	dunkel	oscura	Brito, Nugget	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
23.	**(*)**	**QN VG**	**(+) (b)**				
		Immature fruit: intensity of green color excluding shoulder	**Fruit immature : intensité de la couleur verte à l'exclusion du collet**	**Unreife Frucht: Intensität der Grünfärbung ohne Schulter**	**Fruto no maduro: intensidad del color verde excepto el hombro**		
		very light	très claire	sehr hell	muy clara	Claree	1
		very light to light	très claire à claire	sehr hell bis hell	muy clara a clara		2
		light	claire	hell	clara	Daniela, Durinta, Trust	3
		light to medium	claire à moyenne	hell bis mittel	clara a media		4
		medium	moyenne	mittel	media	Sunita, Tropical	5
		medium to dark	moyenne à foncée	mittel bis dunkel	media a oscura		6
		dark	foncée	dunkel	oscura	Centella, Chocomate, Uragano	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	Momi, Verdi	9
24.	**(*)**	**QL VG**	**(b)**				
		Immature fruit: green stripes	**Fruit immature : stries vertes**	**Unreife Frucht: grüne Streifen**	**Fruto no maduro: rayas verdes**		
		absent	absentes	fehlend	ausente	Daniela, Guanche, Jasminia	1
		present	présentes	vorhanden	presente	Green Zebra, Tigerella	9
25.	**(*)**	**QL VG**	**(b)**				
		Immature fruit: anthocyanin coloration	**Fruit immature : pigmentation anthocyanique**	**Unreife Frucht: Anthocyanfärbung**	**Fruto no maduro: pigmentación antociánica**		
		absent	absente	fehlend	ausente	Durinta	1
		present	présente	vorhanden	presente	HN5003	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26. (*)	**QN MS/VG**	**(c)**				
	Fruit: size	**Fruit : taille**	**Frucht: Größe**	**Fruto: tamaño**		
	very small	très petite	sehr klein	muy pequeño	Cerise, Sweet 100	1
	very small to small	très petite à petite	sehr klein bis klein	muy pequeño a pequeño	Dolcetini, Genio	2
	small	petite	klein	pequeño	Brioso, Tankini	3
	small to medium	petite à moyenne	klein bis mittel	pequeño a medio	Larimar, Progress	4
	medium	moyenne	mittel	medio	Mezcal, Oceano	5
	medium to large	moyenne à grande	mittel bis groß	medio a grande	Luminance, Rio Grande	6
	large	grande	groß	grande	Carmello, Floradade	7
	large to very large	grande à très grande	groß bis sehr groß	grande a muy grande	Florenteen, Grownet	8
	very large	très grande	sehr groß	muy grande	Cupidissimo, Marsilia	9
27. (*)	**QN MS/VG**	**(c)**				
	Fruit: ratio length/diameter	**Fruit : rapport longueur/diamètre**	**Frucht: Verhältnis Länge/Durchmesser**	**Fruto: relación longitud/diámetro**		
	very low	très bas	sehr klein	muy baja	Margold, Marmande VR	1
	very low to low	très bas à bas	sehr klein bis klein	muy baja a baja	Lutecia, Shourouq	2
	low	bas	klein	baja	Cupidissimo, Motto	3
	low to medium	bas à moyen	klein bis mittel	baja a media	Kaponet, Laureen, Merlice	4
	medium	moyen	mittel	media	Chocostar, Mezcal, Red Robin	5
	medium to high	moyen à élevé	mittel bis groß	media a alta	Dulcini, Ibix	6
	high	élevé	groß	alta	Oceano, Oribustar, Rio Grande	7
	high to very high	élevé à très élevé	groß bis sehr groß	alta a muy alta	Ibrax, Sir Elyan	8
	very high	très élevé	sehr groß	muy alta	Bellandine, Capriccio, Elko	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28. (*) PQ VG		**(+) (c)**				
	Fruit: shape in longitudinal section	**Fruit: forme en section longitudinale**	**Frucht: Form im Längsschnitt**	**Fruto: forma en sección longitudinal**		
	flattened	aplatie	abgeflacht	aplanada	Margold, Marmande VR	1
	oblate	arrondie-aplatie	breitrund	achatada	Cartesio, Gloriette, Merlice, Montfavet 63-5	2
	circular	circulaire	kreisförmig	circular	Cerise, Soussia	3
	oblong	oblongue	rechteckig	oblonga	Landolino, Red Sky	4
	cylindric	cylindrique	zylindrisch	cilíndrica	Hypeel 244, Sir Elyan	5
	elliptic	elliptique	eingekerbt	elíptica	Obock	6
	cordate	cordiforme	herzförmig	cordada	Cuor di Bue, Cupidissimo, Laureen, Valenciano	7
	ovate	ovale	eiförmig	oval	Dualrow, Soto	8
	obovate	obovale	verkehrt eiförmig	oboval	Duquesa, Estelle, Mezcal	9
	pyriform	piriforme	birnenförmig	piriforme	Oceano, Olivenza, Operino	10
	obcordate	obcordiforme	verkehrt herzförmig	obcordada	Cuore del Ponente, Ingrid	11
29. (*) QN VG		**(+) (c)**				
	Fruit: ribbing	**Fruit : côtes**	**Frucht: Rippung**	**Fruto: acostillado**		
	absent or very weak	absentes ou très faibles	fehlend oder sehr gering	ausente o muy débil	Cerise, Conchita	1
	very weak to weak	très faibles à faibles	sehr gering bis gering	muy débil a débil		2
	weak	faibles	gering	débil	Baikonur, Guanche	3
	weak to medium	faibles à moyennes	gering bis mittel	débil a medio		4
	medium	moyennes	mittel	medio	Montfavet 63-5, Shourouq	5
	medium to strong	moyennes à fortes	mittel bis stark	medio a fuerte		6
	strong	fortes	stark	fuerte	Marmalindo, Marmande VR, Marsilia	7
	strong to very strong	fortes à très fortes	stark bis sehr stark	fuerte a muy fuerte		8
	very strong	très fortes	sehr stark	muy fuerte	Ingrid, Marsalato	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30.	**QN VG**	**(+) (c)**				
	Fruit: depression at pedicel end	**Fruit : dépression à l'attache du pédicelle**	**Frucht: Einsenkung am Blütenstielende**	**Fruto: depresión en el extremo del pedicelo**		
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Mirante, Sweet Baby	1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
	weak	faible	gering	débil	Bodega, Lebron, Melody	3
	weak to medium	faible à moyenne	gering bis mittel	débil a media		4
	medium	moyenne	mittel	media	Fandango, Hibisco, Jasminia, Saint-Pierre	5
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte		6
	strong	forte	stark	fuerte	Igido, Losna, Marmande VR	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
31.	**QN MS/VG**	**(+) (c)**				
	Fruit: size of pedicel scar	**Fruit : taille de la cicatrice du pédicelle**	**Frucht: Größe des Blütenstielansatzes**	**Fruto: tamaño de la cicatriz del pedicelo**		
	very small	très petite	sehr klein	muy pequeño	Cerise, Sweet Baby	1
	very small to small	très petite à petite	sehr klein bis klein	muy pequeño a pequeño		2
	small	petite	klein	pequeño	Cherrubino, Tukami	3
	small to medium	petite à moyenne	klein bis mittel	pequeño a medio		4
	medium	moyenne	mittel	medio	Bodega, Hibisco, Montfavet 63-5	5
	medium to large	moyenne à grande	mittel bis groß	medio a grande		6
	large	grande	groß	grande	Fandango, Gloriette, Jasminia	7
	large to very large	grande à très grande	groß bis sehr groß	grande a muy grande		8
	very large	très grande	sehr groß	muy grande	Baikonur, Ensemble, Marmande VR	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32.	**QN MS/VG**	**(c)**				
	Fruit: size of blossom scar	**Fruit : taille de la cicatrice pistillaire**	**Frucht: Größe des Blütenansatzes**	**Fruto tamaño de la cicatriz pistilar**		
	very small	très petite	sehr klein	muy pequeño	Cerise, Conchita, Mirante	1
	very small to small	très petite à petite	sehr klein bis klein	muy pequeño a pequeño		2
	small	petite	klein	pequeño	Ensemble, Lilos, Montfavet 63-5	3
	small to medium	petite à moyenne	klein bis mittel	pequeño a medio		4
	medium	moyenne	mittel	medio	Pink Bisou	5
	medium to large	moyenne à grande	mittel bis groß	medio a grande		6
	large	grande	groß	grande	Esmira, Marinda, Marmande VR, Saint-Pierre	7
	large to very large	grande à très grande	groß bis sehr groß	grande a muy grande		8
	very large	très grande	sehr groß	muy grande	Marsalato, Marsilia	9
33.	**QN VG**	**(+)**	**(c)**			
	Fruit: shape at blossom end	**Fruit : forme au sommet**	**Frucht: Form am Blütenende**	**Fruto: forma del extremo distal**		
	indented	déprimée	eingesenkt	hundida	Marmande VR	1
	indented to flat	déprimée à aplatie	eingesenkt bis flach	hundida a plana	Framboo, Linnea	2
	flat	aplatie	flach	plana	Montfavet 63-5, Realeza, Viniccio	3
	flat to pointed	aplatie à pointue	flach bis zugespitzt	plana a puntiaguda	Batistuta	4
	pointed	pointue	zugespitzt	puntiaguda	Roma VF, Talentum	5
34.	**QN MS/VG**	**(+)**	**(c)**			
	Fruit: diameter of core in cross section in relation to total diameter	**Fruit : diamètre du cœur en coupe transversale par rapport au diamètre total**	**Frucht: Herzdurchmesser im Querschnitt im Verhältnis zum Gesamtdurchmesser**	**Fruto: diámetro del corazón en corte transversal en relación con el diámetro total**		
	very small	très petit	sehr klein	muy pequeño	Cerise	1
	very small to small	très petit à petit	sehr klein bis klein	muy pequeño a pequeño		2
	small	petit	klein	pequeño	Dolcevita, Takumi	3
	small to medium	petit à moyen	klein bis mittel	pequeño a medio		4
	medium	moyen	mittel	medio	Losna, Montfavet 63-5, Tastery	5
	medium to large	moyen à grand	mittel bis groß	medio a grande		6
	large	grand	groß	grande	Commodo, Paradigma	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	Baikonur, Marmande VR, Valenciano	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
35.		**QN VG**	**(+) (c)**				
		Fruit: thickness of pericarp	**Fruit : épaisseur du péricarpe**	**Frucht: Dicke des Perikarps**	**Fruto: grosor del pericarpio**		
		very thin	très mince	sehr dünn	muy delgado	Cerise	1
		very thin to thin	très mince à mince	sehr dünn bis dünn	muy delgado a delgado		2
		thin	mince	dünn	delgado	Astuto, Conchita, Marmande VR	3
		thin to medium	mince à moyenne	dünn bis mittel	delgado a medio		4
		medium	moyenne	mittel	medio	Jayran, Montfavet 63-5, Refosco	5
		medium to thick	moyenne à épaisse	mittel bis dick	medio a grueso		6
		thick	épaisse	dick	grueso	Losna, Reconquista	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	Delibes, Floyd, Myriade, Orinade	9
36.	**(*)**	**QN MS/VG**	**(+) (c)**				
		Fruit: number of locules	**Fruit : nombre de loges**	**Frucht: Anzahl Kammern**	**Fruto: número de lóculos**		
		only two	seulement deux	nur zwei	sólo dos	Creativo, San Marzano 2, Tropical	1
		two and three	deux et trois	zwei und drei	dos y tres	Bomfado, Orinade	2
		three and four	trois et quatre	drei und vier	tres y cuatro	Durinta, Montfavet 63-5	3
		four, five or six	quatre, cinq ou six	vier, fünf oder sechs	cuatro, cinco o seis	Rovente, Tosmar, Tradiro	4
		more than six	plus de six	mehr als sechs	más de seis	Bronson, Chocostar, Marmande VR	5
37.	**(*)**	**QL VG**	**(+) (c)**				
		Fruit: gel in locules	**Fruit: gel dans les loges**	**Frucht: Gallerte in Kammern**	**Fruto: gel en los lóculos**		
		absent	absent	fehlend	ausente	Allflesh 1120, Nun 03560	1
		present	présent	vorhanden	presente	Daniela, Rio Grande	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
38. (*)	**PQ VG**	**(+) (c)**				
	Fruit: color	**Fruit : couleur**	**Frucht: Farbe**	**Fruto: color**		
	yellowish white	blanc jaunâtre	gelblichweiß	blanco amarillento	Cream Sausage	1
	yellow	jaune	gelb	amarillo	Babylor, Mimosa	2
	orange	orange	orange	naranja	Operino, Oranjestar	3
	pink	rose	rosa	rosa	Framboo, Pink Wand, Tomimaru Muchoo	4
	red	rouge	rot	rojo	Daniela, Ferline, Montfavet 63-5, Saint-Pierre, Umaca	5
	brown	marron	braun	marrón	Chocostar, Marbruni	6
	green	vert	grün	verde	Green Grape, Green Zebra	7
39.	**PQ VG**	**(+) (c)**				
	Fruit: color of flesh	**Fruit : couleur de la chair**	**Frucht: Fleischfarbe**	**Fruto: color de la pulpa**		
	yellowish white	blanc jaunâtre	gelblichweiß	blanco amarillento	Cream Sausage	1
	yellow	jaune	gelb	amarillo	Babylor, Mimosa	2
	orange	orange	orange	naranja	Operino, Oranjestar	3
	pink	rose	rosa	rosa	Framboo, Pink Wand	4
	red	rouge	rot	rojo	Daniela, Ferline, Montfavet 63-5, Saint-Pierre, Tomimaru Muchoo, Umaca	5
	brown	marron	braun	marrón	Chocostar, Marbruni	6
	green	vert	grün	verde	Green Grape, Green Zebra	7
40.	**QN VG**	**(+) (c)**				
	Fruit: glossiness of skin	**Fruit : brillance de la peau**	**Frucht: Glanz der Schale**	**Fruto: brillo de la epidermis**		
	weak	faible	gering	débil	Focale, Josefina, Sylvana	1
	medium	moyenne	mittel	medio	Ventero	2
	strong	forte	stark	fuerte	Daltoma, Mecano	3
41. (*)	**QL VG**	**(+) (c)**				
	Fruit: color of epidermis	**Fruit : couleur de l'épiderme**	**Frucht: Farbe der Epidermis**	**Fruto: color de la epidermis**		
	colorless	incolore	farblos	incoloro	Black Opal, Fruits, House Momotaro, Marvori	1
	yellow	jaune	gelb	amarillo	Brown Berry, Daniela	2

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42. **(*)**	**QN** **VG**	**(+)** **(c)**				
	Fruit: firmness	**Fruit : fermeté**	**Frucht: Festigkeit**	**Fruto: firmeza**		
	very soft	très molle	sehr weich	muy blanda	Marmande VR	1
	very soft to soft	très molle à molle	sehr weich bis weich	muy blanda a blanda		2
	soft	molle	weich	blanda	Marinda, Marsalato	3
	soft to medium	molle à moyenne	weich bis mittel	blanda a media		4
	medium	moyenne	mittel	media	Rosannita, Sunita	5
	medium to firm	moyenne à ferme	mittel bis fest	media a firme		6
	firm	ferme	fest	firme	Losna, Octavio, Tradiro	7
	firm to very firm	ferme à très ferme	fim bis sehr fest	firme a muy firme		8
	very firm	très ferme	sehr fest	muy firme	Brito, Daniela, Larimar, Lolek	9
43.	**QN** **MG/MS**	**(+)**				
	Time of flowering	**Époque de floraison**	**Zeitpunkt der Blüte**	**Época de floración**		
	very early	très précoce	sehr früh	muy temprana	Pyremello, Trambellino	1
	very early to early	très précoce à précoce	sehr früh bis früh	muy temprana a temprana	Creativo, Tropical	2
	early	précoce	früh	temprana	Delizia, Lemonade, Zorayda	3
	early to medium	précoce à moyenne	früh bis mittel	temprana a media	Cindel, Goldwin, Organza	4
	medium	moyenne	mittel	media	Delisher, Losna, Montfavet 63-5, Sonico	5
	medium to late	moyenne à tardive	mittel bis spät	media a tardía	Orama, Soltyno	6
	late	tardive	spät	tardía	Octydia, Raymos, Saint-Pierre, Sylvana	7
	late to very late	tardive à très tardive	spät bis sehr spät	tardía a muy tardía	Nissos, Paronset	8
	very late	très tardive	sehr spät	muy tardía	Atago, Brito, Wafira	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44. (*) QN MG		**(+)**				
	Time of maturity	**Époque de maturité**	**Zeitpunkt der Reife**	**Época de madurez**		
	very early	très précoce	sehr früh	muy temprana	Goldwin, Pyremello, Sweet Baby, Trambellino	1
	very early to early	très précoce à précoce	sehr früh bis früh	muy temprana a temprana	Delisher	2
	early	précoce	früh	temprana	Lemonade, Shiren, Zorayda	3
	early to medium	précoce à moyenne	früh bis mittel	temprana a media		4
	medium	moyenne	mittel	media	Delizia, Losna, Sonico	5
	medium to late	moyenne à tardive	mittel bis spät	media a tardía		6
	late	tardive	spät	tardía	Mariana, Saneh	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	Atago, Brito, Daniela, Raymos, Wafira	9
45. QN MS/VG		**(+)**				
	Resistance to *Meloidogyne incognita* (Mi)	**Résistance à *Meloidogyne incognita* (Mi)**	**Resistenz gegen *Meloidogyne incognita* (Mi)**	**Resistencia a *Meloidogyne incognita* (Mi)**		
	absent or low	absente ou faible	fehlend oder gering	ausente o baja	Casaque Rouge	1
	medium	moyenne	mittel	media	Campeon, Tyonic	2
	high	élevée	hoch	alta	Anahu, Anahu x Casaque Rouge	3
46. QL VG		**(+)**				
	Resistance to *Verticillium* sp. (Va and Vd) - Race 0	**Résistance à *Verticillium* sp. (Va et Vd) - Race 0**	**Resistenz gegen *Verticillium* sp. (Va und Vd) - Pathotyp 0**	**Resistencia a *Verticillium* sp. (Va y Vd) - Raza 0**		
	absent	absente	fehlend	ausente	Marmande verte, Moneymaker	1
	present	présente	vorhanden	presente	Marmande VR, Monalbo	9
47. QL VG/VS		**(+)**				
	Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 0EU/1US (Fol: 0EU/1US)	**Résistance à *Fusarium oxysporum* f. sp. *lycopersici* - Race 0EU/1US (Fol: 0EU/1US)**	**Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* - Pathotyp 0EU/1US (Fol: 0EU/1US)**	**Resistencia a *Fusarium oxysporum* f. sp. *lycopersici* – Raza 0EU/1US (Fol: 0EU/1US)**		
	absent	absente	fehlend	ausente	Marmande verte, Moneymaker	1
	present	présente	vorhanden	presente	Anabel, Marporum, Marsol	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48.	**QL** **MS/VG/VS**	**(+)**				
	Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 1EU/2US (Fol: 1EU/2US)	**Résistance à *Fusarium oxysporum* f. sp. *lycopersici* - Race 1EU/2US (Fol: 1EU/2US)**	**Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* - Pathotyp 1EU/2US (Fol: 1EU/2US)**	**Resistencia a *Fusarium oxysporum* f. sp. *lycopersici* - Raza 1EU/2US (Fol: 1EU/2US)**		
	absent	absente	fehlend	ausente	Marmande verte, Moneymaker	1
	present	présente	vorhanden	presente	Motelle	9
49.	**QL** **VG/VS**	**(+)**				
	Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 2EU/3US (Fol: 2EU/3US)	**Résistance à *Fusarium oxysporum* f. sp. *lycopersici* - Race 2EU/3US (Fol: 2EU/3US)**	**Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* - Pathotyp 2EU/3US (Fol: 2EU/3US)**	**Resistencia a *Fusarium oxysporum* f. sp. *lycopersici* - Raza 2EU/3US (Fol: 2EU/3US)**		
	absent	absente	fehlend	ausente	Marmande verte, Motelle	1
	present	présente	vorhanden	presente	Alliance, Ivanhoé	9
50.	**QL** **VG**	**(+)**				
	Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)	**Résistance à *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)**	**Resistenz gegen *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)**	**Resistencia a *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)**		
	absent	absente	fehlend	ausente	Moneymaker, Motelle	1
	present	présente	vorhanden	presente	Momor	9
51.	**QL** **VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race 0	**Résistance à *Passalora fulva* (Pf) - Race 0**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp 0**	**Resistencia a *Passalora fulva* (Pf) - Raza 0**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
	present	présente	vorhanden	presente	Antique, Pink Treat, Retinto, Sprigel, Triatlon	9
52.	**QL** **VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race A	**Résistance à *Passalora fulva* (Pf) - Race A**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp A**	**Resistencia a *Passalora fulva* (Pf) - Raza A**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker, Retinto	1
	present	présente	vorhanden	presente	Antique, Pink Treat, Sprigel, Triatlon	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
53.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race B	**Résistance à *Passalora fulva* (Pf) - Race B**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp B**	**Resistencia a *Passalora fulva* (Pf) - Raza B**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker, Pink Treat	1
	present	présente	vorhanden	presente	Antique, Retinto, Sprigel, Triatlon	9
54.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race C	**Résistance à *Passalora fulva* (Pf) - Race C**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp C**	**Resistencia a *Passalora fulva* (Pf) - Raza C**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker, Pink Treat, Retinto	1
	present	présente	vorhanden	presente	Antique, Sprigel, Triatlon	9
55.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race D	**Résistance à *Passalora fulva* (Pf) - Race D**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp D**	**Resistencia a *Passalora fulva* (Pf) - Raza D**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker, Triatlon	1
	present	présente	vorhanden	presente	Antique, Pink Treat, Retinto, Sprigel	9
56.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race E	**Résistance à *Passalora fulva* (Pf) - Race E**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp E**	**Resistencia a *Passalora fulva* (Pf) - Raza E**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
	present	présente	vorhanden	presente	Antique, Sprigel	9
57.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race F	**Résistance à *Passalora fulva* (Pf) - Race F**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp F**	**Resistencia a *Passalora fulva* (Pf) - Raza F**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
	present	présente	vorhanden	presente	Chelino, Completo	9
58.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race H	**Résistance à *Passalora fulva* (Pf) - Race H**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp H**	**Resistencia a *Passalora fulva* (Pf) - Raza H**		
	absent	absente	fehlend	ausente	Sprigel	1
	present	présente	vorhanden	presente	Chelino, Completo	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
59.	**QL VG**	**(+)**				
	Resistance to *Passalora fulva* (Pf) - Race J	**Résistance à *Passalora fulva* (Pf) - Race J**	**Resistenz gegen *Passalora fulva* (Pf) - Pathotyp J**	**Resistencia a *Passalora fulva* (Pf) - Raza J**		
	absent	absente	fehlend	ausente	Chelino, Completo	1
	present	présente	vorhanden	presente	Mogami	9
60.	**QL VG**	**(+)**				
	Resistance to *Tomato mosaic virus* - Strain 0 (ToMV: 0)	**Résistance au virus de la mosaïque de la tomate - Souche 0 (ToMV: 0)**	**Resistenz gegen das Tomatenmosaikvirus - Pathotyp 0 (ToMV: 0)**	**Resistencia al virus del mosaico del tomate - Cepa 0 (ToMV: 0)**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
	present	présente	vorhanden	presente	Mobaci, Mocimor, Momor, Moperou	9
61.	**QL VG**	**(+)**				
	Resistance to *Tomato mosaic virus* - Strain 1 (ToMV: 1)	**Résistance au virus de la mosaïque de la tomate - Souche 1 (ToMV: 1)**	**Resistenz gegen das Tomatenmosaikvirus - Pathotyp 1 (ToMV: 1)**	**Resistencia al virus del mosaico del tomate - Cepa 1 (ToMV: 1)**		
	absent	absente	fehlend	ausente	Mobaci, Monalbo, Moneymaker	1
	present	présente	vorhanden	presente	Mocimor, Momor, Moperou	9
62.	**QL VG**	**(+)**				
	Resistance to *Tomato mosaic virus* - Strain 2 (ToMV: 2)	**Résistance au virus de la mosaïque de la tomate - Souche 2 (ToMV: 2)**	**Resistenz gegen das Tomatenmosaikvirus - Pathotyp 2 (ToMV: 2)**	**Resistencia al virus del mosaico del tomate - Cepa 2 (ToMV: 2)**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker, Moperou	1
	present	présente	vorhanden	presente	Mobaci, Mocimor, Momor	9
63.	**QL VG**	**(+)**				
	Resistance to *Phytophthora infestans* (Pi)	**Résistance à *Phytophthora infestans* (Pi)**	**Resistenz gegen *Phytophthora infestans* (Pi)**	**Resistencia a *Phytophthora infestans* (Pi)**		
	absent	absente	fehlend	ausente	Moneymaker, Saint-Pierre	1
	present	présente	vorhanden	presente	Phantasia, Sixtina	9
64.	**QL VG**	**(+)**				
	Resistance to *Pseudopyrenochaeta lycopersici)* (ex *Pyrenochaeta lycopersici* (Pl)	**Résistance à *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici*) (Pl)**	**Resistenz gegen *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici*) (Pl)**	**Resistencia a *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici*) (Pl)**		
	absent	absente	fehlend	ausente	Marmande verte	1
	present	présente	vorhanden	presente	Garance	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
65.	**QL VG**	**(+)**				
	Resistance to *Stemphylium* spp. (Ss)	**Résistance à *Stemphylium* spp. (Ss)**	**Resistenz gegen *Stemphylium* spp. (Ss)**	**Resistencia a *Stemphylium* spp. (Ss)**		
	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Motelle	9
66.	**QL VG**	**(+)**				
	Resistance to *Pseudomonas syringae* pv. *tomato* (Pst)	**Résistance à *Pseudomonas syringae* pv. *tomato* (Pst)**	**Resistenz gegen *Pseudomonas syringae* pv. *tomato* (Pst)**	**Resistencia a *Pseudomonas syringae* pv. *tomato* (Pst)**		
	absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
	present	présente	vorhanden	presente	Fuzzer	9
67.	**QL VG**	**(+)**				
	Resistance to *Ralstonia solanacearum* – Race 1 (Rs: 1)	**Résistance à *Ralstonia solanacearum* - Race 1 (Rs: 1)**	**Resistenz gegen *Ralstonia solanacearum* – Pathotyp 1 (Rs: 1)**	**Resistencia a *Ralstonia solanacearum* – Raza 1 (Rs: 1)**		
	absent	absente	fehlend	ausente	Floradel	1
	present	présente	vorhanden	presente	Caraïbo	9
68.	**QL VG**	**(+)**				
	Resistance to *Tomato yellow leaf curl virus* (TYLCV)	**Résistance au virus des feuilles jaunes en cuillère de la tomate (TYLCV)**	**Resistenz gegen gelbes Tomatenblattrollvirus (TYLCV)**	**Resistencia al virus del rizado amarillo de la hoja del tomate (TYLCV)**		
	absent	absente	fehlend	ausente	Marmande, Moneymaker	1
	present	présente	vorhanden	presente	Delyca, Montenegro	9
69.	**QL VG**	**(+)**				
	Resistance to *Tomato spotted wilt virus* - Pathotype 0 (TSWV: 0)	**Résistance au virus de la tache bronzée de la tomate - Pathotype 0 (TSWV: 0)**	**Resistenz gegen das Tomatenbronzen-fleckenvirus - Pathotyp 0 (TSWV: 0)**	**Resistencia al virus del bronceado del tomate - Raza 0 (TSWV: 0)**		
	absent	absente	fehlend	ausente	Moneymaker, Montfavet 63-5, Mountain Magic	1
	present	présente	vorhanden	presente	Bodar, Mospomor	9
70.	**QL VG**	**(+)**				
	Resistance to *Leveillula taurica* (Lt)	**Résistance à *Leveillula taurica* (Lt)**	**Resistenz gegen *Leveillula taurica* (Lt)**	**Resistencia a *Leveillula taurica* (Lt)**		
	absent	absente	fehlend	ausente	Montfavet 63-5	1
	present	présente	vorhanden	presente	Radiance	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
71.	**QL VG**	**(+)**				
	Resistance to *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)* (Pn) (ex On)	**Résistance à *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)* (Pn) (ex On)**	**Resistenz gegen *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)* (Pn) (ex On)**	**Resistencia a *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)* (Pn) (ex On)**		
	absent	absente	fehlend	ausente	Montfavet 63-5	1
	present	présente	vorhanden	presente	Romiro	9
72.	**QL VG**	**(+)**				
	Resistance to *Tomato torrado virus* (ToTV)	**Résistance au virus torrado de la tomate (ToTV)**	**Resistenz gegen *Tomato torrado virus* (ToTV)**	**Resistencia al virus del torrado del tomate (ToTV)**		
	absent	absente	fehlend	ausente	Daniela	1
	present	présente	vorhanden	presente	Matias	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) In the case of indeterminate varieties, observations should be made after a fruit set on at least five trusses and before ripening of the second truss. In the case of determinate varieties, all observations should be made after a fruit set on the second truss. Observations should be made in the middle third of the plant, before leaves senesce.

(b) Observations should be made on fully developed immature fruits.

(c) Observations should be made on mature fruits from the second or higher truss, avoiding first and last mature fruit on the truss.

8.2 Explanations for individual characteristics

Ad. 1: Seed-propagated varieties only: Seedling: anthocyanin coloration of hypocotyl

Observations should be made on the hypocotyl, before development of the first leaves.

In heterozygous genotypes, anthocyanin coloration of hypocotyl may segregate. If the segregation occurs in the predicted manner, the variety should be classified as partly present. Presence of anthocyanin is caused by one dominant allele.

Ad. 2: Plant: growth type

Determinate (1):

The number of trusses is limited and differs between varieties. The number of leaves or internodes between inflorescences is irregular within a plant and varies from one to three. The stem ends with an inflorescence and no lateral shoots are produced.

Indeterminate (2):

As a rule, the number of leaves or internodes between inflorescences is three. After every group of three leaves, three buds are developed: the terminal bud is transformed into an inflorescence and stem elongation continues from one of the lateral buds. There is continuous growing with repetition of this growth pattern.

Sometimes only two leaves or internodes might be observed between inflorescences in some parts of plants (e.g. varieties originating from ‘Daniela’).

Ad. 3: Only varieties with plant growth type determinate: Plant: number of inflorescences on main stem

Observations can only be made if side shoots have been removed in the growing trial.

Ad. 4: Stem: anthocyanin coloration

Indeterminate growth type varieties: observations should be made around flowering of the third or fourth truss, on the upper third of the plant.

Determinated growth type varieties: observation should be made before the main stem stops growing, showing then truss/leaf division, on the upper third of the plant.

Ad. 5: Only varieties with plant growth type indeterminate: Stem: length of internode

Observation should be made at one time for the whole trial, e.g after a fruit set on approximately 5 nodes.

The total length of the stem should be observed/measured between the first and fourth truss. When this observation/measure is divided by the number of internodes in between, an indication of the length of the internode is given.

Ad. 6: Only varieties with plant growth type indeterminate: Plant: height

Observations should be made at one time for the whole trial: 60 days after planting, or after a fruit set on approximately 5 nodes, or when the first variety in the trial has reached the wire in the green house or the top of the stake.

Ad. 7: Leaf: attitude

The attitude of the middle third part of the leaves with respect to the main stem should be observed. The line in the picture indicates the angle between the stem and leaf (middle third of leaf).

3
semi-erect

5
horizontal

7
semi-drooping

9
drooping

Ad. 10: Leaf: type

Pinnate leaf: primary leaflets do not bear secondary leaflets.
Bipinnate leaf: primary leaflets are pinnate and bear secondary leaflets.

1
pinnate

2
bipinnate

Ad. 11: Leaf: size of leaflets

Observations should be made in the middle of the leaf.

Ad. 13: Leaf: glossiness

Observations should be made on leaves from the middle of the plant.

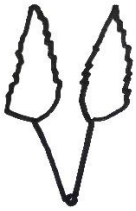
Ad. 14: Leaf: blistering

Observations should be made on leaves from the middle of the plant.
Caution is advised regarding the confusion between blistering and creasing.
Blistering is the difference in height of the surface of the leaf between the veins.
Creasing is independent from the veins.

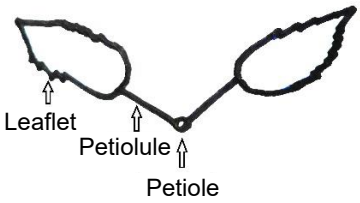
blistering

creasing

Ad. 15: Leaf: attitude of petiolule of leaflet in relation to petiole



1
erect



3
semi-erect

5
horizontal

Ad. 16: Inflorescence: type

Observations should be made after fruit setting on the second and third trusses. If there is no predominant type, the variety should be described with state 2.

uniparous

multiparous (biparous)

multiparous (triparous)

multiflora

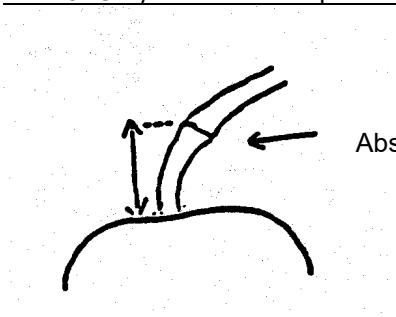
Ad. 18: Pedicel: abscission layer

Varieties without an abscission layer have only a collar on the pedicel.

1
absent

9
present

Ad. 19: Only varieties with pedicel abscission layer present: Pedicel: length



Observations should be made from the base until the abscission layer on harvested fruits.

Ad. 20: Immature fruit: green shoulder

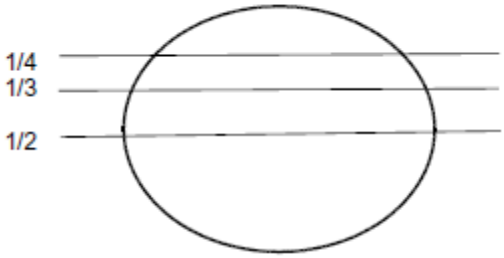
Due to potential environmental effects, example varieties should be included in the trial.

1
absent

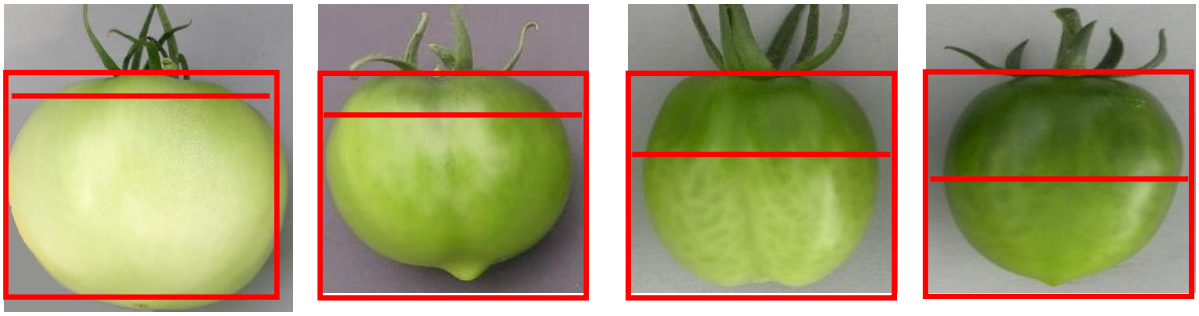
9
present

Ad. 21: Immature fruit: extent of green shoulder

Due to potential environmental effects, example varieties should be included in the trial.



3: small (1/4)
5: medium (1/3)
7: large (1/2)



1
very small

3
small

5
medium

7
large

Ad. 22: Immature fruit: intensity of green color of shoulder

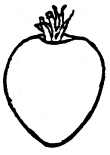
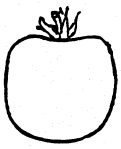
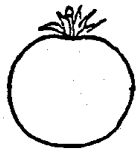
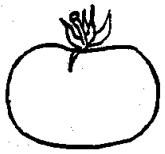
Intensity of green color of shoulder and intensity of green color excluding shoulder have to be observed on the same scale. This means that the note for intensity of green color of shoulder should be higher than the note for intensity of green color excluding shoulder, or in exceptional cases the same if the difference in intensity is very small. Due to potential environmental effects, example varieties should be included in the trial.

Ad. 23: Immature fruit: intensity of green color excluding shoulder

See Ad. 22

Ad. 28: Fruit: shape in longitudinal section

	← broadest part →		
	below middle	at middle	above middle

width (ratio length/width)						
narrow (elongated)	 10 pyriform	 8 ovate	 (parallel) 5 cylindric	 (rounded) 6 elliptic	 9 obovate	 7 cordate
	 11 obcordate		 (parallel) 4 oblong	 (rounded) 3 circular		
		 2 oblate				
broad (compressed)		 1 flattened				

Ad. 29: Fruit: ribbing

Observations should be made at the pedicel end after removing the pedicel and calyx.

1
absent or very weak

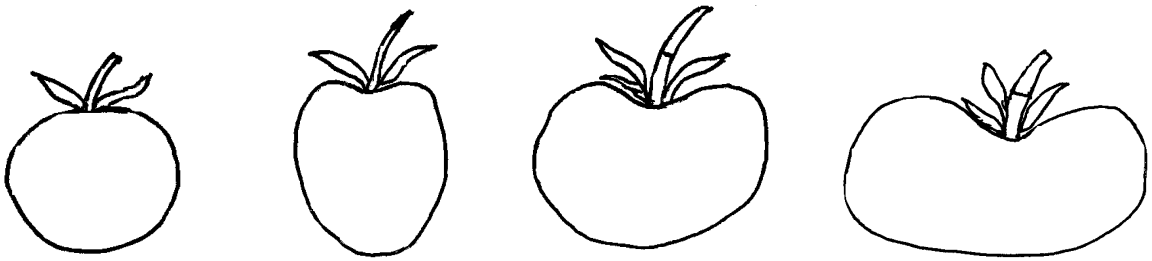
3
weak

5
medium

7
strong

9
very strong

Ad. 30: Fruit: depression at pedicel end



1
absent or very weak

3
weak

5
medium

7
strong

Ad. 31: Fruit: size of pedicel scar

Observations should be made on the green ring (not the full scar) after removal of the pedicel.

Ad. 33: Fruit: shape at blossom end

1
indented

2
indented to flat

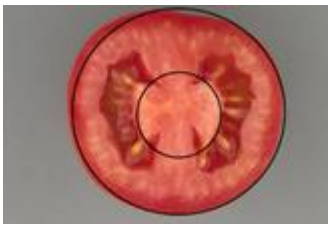
3
flat

4
flat to pointed

5
pointed

Ad. 34: Fruit: diameter of core in cross section in relation to total diameter

1
very small



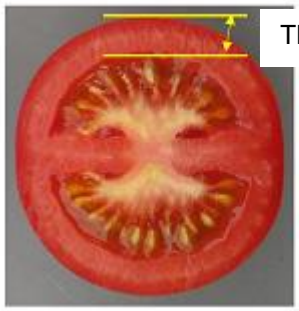
3
small

5
medium

7
large

9
very large

Ad. 35: Fruit: thickness of pericarp



Thickness of pericarp

Ad. 36: Fruit: number of locules

Observations should be made on cross sections of typical fruits, excluding the first and last fruits of the truss.

1
only two

2
two and three

3
three and four

4
four, five or six

5
more than six

Ad. 37: Fruit: gel in locules

1
absent

9
present

Ad. 38: Fruit: color

Observations should be made when the color has fully changed and the placenta is visible in the cross section. Parent lines which do not ripen at all should be excluded.

Ad. 39: Fruit: color of flesh

Parent lines which do not ripen at all should be excluded.

Ad. 40: Fruit: glossiness of skin

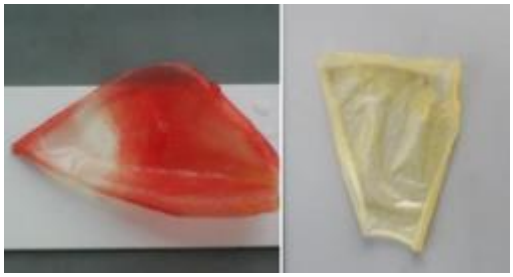
1
weak

2
medium

3
strong

Ad. 41: Fruit: color of epidermis

The epidermis should be peeled off the fruit with a sharp knife. The fruit flesh may stick to the epidermis. Fruit flesh should be removed by scratching it delicately.



1
colorless

2
yellow

Ad. 42: Fruit: firmness

Observations should be made on completely colored fruits. Firmness should be determined by hand on relation to example varieties.

Ad. 43: Time of flowering

The date of flowering is reached when 50% of plants have the third flower on the second truss open.

Ad. 44: Time of maturity

Time of maturity is reached when the first fruit on the second truss is fully ripe on 50 % of plants.

Ad. 45: Resistance to *Meloidogyne incognita* (Mi)

1.	Pathogen	*Meloidogyne incognita*
2.	Quarantine status	-
3.	Host species	Tomato - *Solanum lycopersicum*
4.	Source of inoculum	GEVES[2] (FR) or INIA - CSIC[3] (ES) or Naktuinbouw[4] (NL)
5.	Isolate	non-resistance breaking
6.	Establishment isolate identity	use tomato standards
7.	Establishment pathogenicity	use susceptible rootstock or tomato standard
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant
8.2	Multiplication variety	susceptible variety, preferably resistant to powdery mildew
8.3	Plant stage at inoculation	2nd leaf stage
8.5	Inoculation method	deposit of piece of contaminated roots in soil (around 5-10g near each plant, to adapt depending of the population aggressivity)
8.6	Harvest of inoculum	6 to 10 weeks after inoculation, root systems are cut with scissors into pieces of about 1 cm length
8.7	Check of harvested inoculum	visual check for presence of root knots and ripe egg masses
8.8	Shelflife/viability inoculum	1 day
9.	Format of the test	
9.1	Number of plants per genotype	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 replicates
9.3	Control varieties	ISF definitions: [5]
	Susceptible	Casaque Rouge
	Intermediate resistant (IR)	Campeon and Tyonic
	Highly resistant (HR)	Arletta, Anahu, Anahu x Casaque Rouge
9.4	Test design	3 replicates of 10 plants in different trays by variety, non-inoculated plants in a separate tray
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. Higher temperatures will cause breakdown of resistance.
9.7	Light	at least 12 h per day
10.	Inoculation	
10.1	Preparation inoculum	small pieces of diseased roots mixed with soil
10.2	Quantification inoculum	the ratio is depending of aggressiveness of test and lab's conditions (e.g. between 30 g to 60 g of infested roots, for 100 plants in a tray of 45*30 cm containing approximately 5.5 kg of substrate), galls should be homogeneously mixed with soil.
10.3	Plant stage at inoculation	seed
10.4	Inoculation method	seeds sown in soil contaminated with galls
10.7	Final observations	28 to 45 days after inoculation depending on test conditions (temperature, season)
11.	Observations	
11.1	Method	root inspection

[2] GEVES, matref@geves.fr
[3] INIA – CSIC, resistencias@inia.es
[4] Naktuinbouw, resistentie@naktuinbouw.nl
[5] ISF, https://www.worldseed.org

11.2	Observation scale	

Class 0: healthy plant, no galls	Class 1: few and little galls which are difficult to find (for example less than 5)	Class 2: few galls, easy to observe but on few roots, still a lot of roots without galls	Class 3: many individual galls on most but not all roots	Class 4: many galls on all roots, sometimes in chains, can lead to dead plants and /or may suppress emergence
				

The germination percentage of non-inoculated plants of the same seed lot in the same experiment should be used to calculate the number of seeds that did not produce a plant due to the presence of nematodes, and add these to plants in class 4.

11.3	Validation of test	Validation on controls. Expected reactions of controls: Susceptible control: - most plants at classes 3 and 4, - at most 2 plants can be observed at class 2 Intermediate resistant control: - clearly different from other controls, - with majority of plants around class 2. Highly resistant control: - most plants at classes 0 and 1, - at most 2 plants can be observed at class 2
11.4	Off-types	Highly resistant varieties may have a few plants with a few galls
12.	Interpretation of data in terms of UPOV characteristic states	Resistance to *Meloidogyne incognita* (Mi): [1] absent or low: distribution of plants in the classes comparable with the susceptible controls. [2] medium: distribution of plants in the classes comparable with the intermediate resistant controls. [3] high: distribution of plants in the classes comparable with the highly resistant controls.
13.	Critical control points	Avoid overwatering. This may result in rotting of roots. In case of aggressive test, put seeds in a layer of non-contaminated soil or decrease the quantity of inoculum.

Ad. 46: Resistance to *Verticillium* sp. (Va and Vd) - Race 0

1.	Pathogen	*Verticillium* sp. (see note below)
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw[6] (NL) and GEVES[7] (FR)
5.	Isolate	Race 0 (e.g. isolate Toreilles 4-1-4-1)
6.	Establishment isolate identity	use differential varieties, see ISF website: https://www.worldseed.org
8.	Multiplication inoculum	
8.1	Multiplication medium	Potato Dextrose Agar, Agar Medium “S” of Messiaen
8.4	Inoculation medium	water (for scraping agar plates) or Czapek Dox broth (3-7 d-old aerated culture at 20-25°C, in darkness)
8.6	Harvest of inoculum	filter through double muslin cloth
8.7	Check of harvested inoculum	spore count; adjust to 10^6 per ml
8.8	Shelf life/viability inoculum	1 day at 4°C
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants, and at least 2 non-inoculated plants
9.3	Control varieties	
	Susceptible	Flix, Marmande verte, Moneymaker, Santonio
	Resistant	Monalbo, Marmande VR, “Monalbo x Marmande verte”, Daniela, Elias
9.5	Test facility	greenhouse or climate room
9.6	Temperature	optimal 20-25°C, 20-22°C after inoculation
9.7	Light	12 h or longer
10.	Inoculation	
10.1	Preparation inoculum	aerated, liquid culture (8.4)
10.2	Quantification inoculum	count spores, adjust to 10^6 per ml
10.3	Plant stage at inoculation	cotyledon to 3rd leaf
10.4	Inoculation method	roots are immersed for 4 to 15 min in spore suspension
10.5	First observation	14 days after inoculation
10.7	Final observations	21 to 33 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	growth retardation, wilting, chlorosis, and vessel browning
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] severe symptoms present [9] no or mild symptoms
13.	Critical control points	All symptoms may be present in resistant varieties, but the severity will be distinctly less than in susceptible varieties. Usually resistant varieties will show significantly less growth retardation than susceptible varieties. Observation of vessel browning is important for diagnosis. Usually, vessel browning will not extend to the 1st leaf in resistant varieties. Many hybrid varieties are heterozygous and appear to have mild symptoms in the biotest. Note: Resistance to *V. dahliae* based in the Ve gene is also effective to *V. albo-atrum*. Isolates of both fungal species may be used to evaluate the UPOV characteristic “Resistance to *V. dahliae*” or *V. albo-atrum* as long as the isolate belongs to the non-Ve breaking race 0. Resistance-breaking isolates have been described in both species.

[6] Naktuinbouw, resistentie@naktuinbouw.nl
[7] GEVES, matref@geves.fr

Ad. 47, 48 and 49: Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 0EU/1US (Fol: 0EU/1US), Race 1EU/2US (Fol: 1EU/2US) and Race 2EU/3US (Fol: 2EU/3US)

Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) - Race 0EU/1US to be tested in a bio-assay (method i).

Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) - Race 1EU/2US to be tested in a bio-assay (method i) and/or in a DNA marker test on gene *I-2* (method ii).

Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) - Race 2EU/3US - to be tested in a bio-assay (method i).

In case of a bio-assay, type of observation is VS/VG. In case of a DNA marker test, type of observation is MS.

(i) Bio-assay

1.	Pathogen	*Fusarium oxysporum* f. sp. *lycopersici*
3.	Host species	*Solanum lycopersicum* L.
4.	Source of inoculum	GEVES[8] (FR), INIA - CSIC[9] (ES) or Naktuinbouw[10] (NL)
5.	Isolate	e.g. Reference strain validated in an interlaboratory test[11]. Race 0EU/1US (e.g. isolate Orange 71 or PRI 20698 or Fol 071), race 1EU/2US (e.g. isolate 4152, PRI40698 or RAF 70) and race 2EU/3US
6.	Establishment isolate identity	use differential varieties, see ISF website: https://www.worldseed.org
7.	Establishment pathogenicity	on susceptible tomato varieties
8.	Multiplication inoculum	
8.1	Multiplication medium	Potato Dextrose Agar or Medium “S” of Messiaen or Czapek-Dox
8.4	Inoculation medium	water for scraping agar plates or Czapek-Dox culture medium (7 d-old aerated culture)
8.6	Harvest of inoculum	filter through double muslin cloth
8.7	Check of harvested inoculum	see 10.2
8.8	Shelflife/viability inoculum	4-8 h, keep cool to prevent spore germination
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants plus at least 5 non-inoculated plants
9.2	Number of replicates	plants have to be divided into at least 2 replicates
9.3	Control varieties	
9.3.1	Control varieties for the test with race 0EU/1US	Susceptible: Marmande, Marmande verte, Resal, Moneymaker Resistant: Marporum, Larissa, “Marporum x Marmande verte”, Motelle, Gourmet; and Riesling as additional resistant control for medium level
9.3.2	Control varieties for the test with race 1EU/2US	Susceptible: Marmande verte, Cherry Belle, Roma, Marporum, Ranco, Moneymaker Resistant: Tradiro, Motelle, “Motelle x Marmande verte”; and Agostino as additional resistant control for medium level
9.3.3	Control varieties for the test with race 2EU/3US	Susceptible: Marmande verte, Motelle, Marporum Resistant: Alliance, Florida, Murdoch, “Marmande verte x Florida”
9.5	Test facility	glasshouse or climate room
9.6	Temperature	24-28°C (severe test, with mild isolate), 20-24°C (mild test, with severe isolate)
9.7	Light	12 hours per day or longer
9.8	Season	all seasons

[8] GEVES, matref@geves.fr
[9] INIA – CSIC, resistencias@inia.es
[10] Naktuinbouw, resistentie@naktuinbouw.nl
[11] Harmores 3 CPVO project: https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf

10.	Inoculation	
10.1	Preparation inoculum	3-5 days in aerated liquid cultures like PDB, Czapek Dox or S of Messiaen or scraping of plates of 10 days cultures on agar medium.
10.2	Quantification inoculum	spore count, adjust to 10^6 spores per ml, in case of very aggressive isolate inoculum concentration can be decreased
10.3	Plant stage at inoculation	10-18 d, cotyledon to first leaf
10.4	Inoculation method	plants at the inoculation stage are harvested carefully, roots and hypocotyls are immersed in spore suspension for 5-15 min; trimming of roots is an option, and transplanted in trays
10.7	Final observations	14-21 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	

Class 0	Class 1	Class 2	Class 3
Healthy compared to the non-inoculated control.	Healthy compared to the non-inoculated control with brown vessel above the cotyledon (observed when plants are cut in case of variety with different levels of symptoms)	Higher than 50% of growth reduction and/or yellowing and/or wilting on cotyledons and/or leaves.	Nearly dead: strong reduction with plants look dwarf (there can be necrosis but not always) or dead
			
If all plants in class 0 or if all plants in classes 2 and 3, it is not necessary to cut the plants.			
In case of variety or control with different levels of symptoms, cut the plants to check presence or not of strong brown vessel above cotyledons. In case of no brown vessels or below cotyledons, the plant is note 0. In case of brown vessels above cotyledons, the plant is note 1.			

11.3	Validation of test	Validation on controls. Expected response of controls: Susceptible control: most plants in class 2 and 3, max.10% of plants class 0 and 1 Resistant control: most plants in class 0 and 1, max. 10% of plants class 2 and 3. Controls with medium level of resistance can show a higher number of plants in class 2 and 3.
12.	Interpretation of data in terms of UPOV characteristic states	[1] absent: Average symptom level higher than in the medium-resistant control [9] present: Average symptom level not different from the medium-resistant control or the high-resistant control

(ii) DNA marker test

The resistance gene I-2 confers resistance to both *Fusarium oxysporum* f. sp. *lycopersici* Fol:1(EU)/2(US) and Fol:0(EU)/1(US). The presence of the resistant allele and/or the susceptible allele can be detected by the co-dominant TaqMan marker based on the dominant marker described in Arens et al., (2010) and El Mohtar, et al., (2007).

Specific aspects: *Fusarium oxysporum* f.sp. *lycopersici* Fol: 1(EU)/2(US)

1.	Characteristic	*Fusarium oxysporum* f.sp. l*ycopersici* Fol: 1(EU)/2(US)
2.	Genes and alleles	*I-2*
2.1	Targeted gene(s)	Resistance Gene *I-2* Accession no. AF118127 Susceptible gene/ homologs *i-2* I-2C1 (accession no. AF004878), I-2C2 accession no. AF004879), I-2C3 (accession no. AF004880)
		Arens et al., (2009).
		Susceptible gene/ homologs i-2 I-2C1 (accession no. AF004878), I-2C2 accession no. AF004879), I-2C3 (accession no. AF004880)
2.3	Allele corresponding to expression state 9	Resistance Gene I-2 Accession no. AF118127
		Arens et al., (2009)
3.	Primers (and probes)	
3.1	Primers to detect both alleles	Forward Primer: 5’-AATGATGAGAGRGTGAAGAAWCA-3’ Reverse Primer: 5’-TCTTTCCCTTCAAACTTTCCTTCA-3’
3.2	Probes to detect both alleles	Recommended probes are MGB probes (Applied biosystems) or XS probes (Biolegio) the Tm of the XS probes must be ordered at 68°C. Susceptible i2 probe: 5’-6FAM*-TTGACAGCTTGGTTTTGT-BHQ1-3’ Resistance I2 probe: 5’-TEXASRED*-TTTGAAAGCGTGGTATTGC-BHQ2-3‘ *Fluorophores and quenchers can be modified according to compatibility with the filters on the real-time PCR machine.
4.	Format of the test	
4.1	Number of plants per genotype	20 plants (individual DNA extraction and PCR for each plant)
4.2	Control varieties	
4.3	Process controls	Negative control (H2O), positive controle (sample containing the expected alleles)
5.	Preparations	
5.1	Preparation DNA	Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol (for example commercial kit for plant DNA extraction, or lab prepared reagents)

5.2	Preparation PCR	Pipette each DNA sample and a commercial real-time PCR mastermix into individual wells. Analyze the samples in a real-time PCR machine capable of reading the fluorophores of all the probes, with reaction conditions suitable for the mastermix used. For this test the Quanta PerfeCta Multiplex qPCR Toughmix is commonly used.
5.3	Example PCR mastermix	

	Initial concentration	**Volume/ reaction (µL)**	**Final concentration**
PerfeCta Multiplex qPCR Toughmix	5x	4	1X
Forward Primer	10µm	0.75	375nM
Reverse Primer	10µm	0.75	375nM
Probe-Fus-i2-sus	10µm	0.3	150nM
Probe-Fus-I2-res	10µm	1.3	650nM
H_2O	-	9.9	-
subtotal		*17*	-
DNA		3	-
Total		**20**	-

6.	Technique of the method	
6.1	Particular conditions	PCR conditions: 1. Initial denaturation step at 94°C for 2-10 minutes (mastermix dependent) 2. 40 cycles at 94°C for 15 sec, 60°C 1 min. Every cycle ends with plate reading 3. Analysis of Ct values for each probe is done to identify positive (+) reactions at Ct<35, or negative reactions (no Ct value). Reactions with Ct values 35-40 should be repeated. Analysis can also be done with a genotyping end point fluorescence reading.
7.	Observations	
7.1	Validity of the results	•Check for typical exponential amplification curves for each sample, as expected for normal specific amplification. •Non-specific amplification is possible in a PCR reaction. Check the results for the presence of non-exponential curves and/or curves just above the threshold. These curves should be assessed as negative. •Check if the control samples are as expected (negative control: no signal; positive controls: shows expected signals for the fluorophores).

8.	Interpretation of the test results	•In case the DNA marker test result does not confirm the declaration in the Technical Questionnaire, a field trial or bio-assay should be performed • Ct values are determined using a set threshold (single threshold) of 200 RFU for each of the fluorescence labels,. this value may need to be adapted to each machine. •For low or high Ct values the DNA concentration should be checked. If the DNA concentration is low, high Ct values are expected. For samples with a high DNA concentration, low Ct values are expected. If two fluorophores are present, both fluorophores will show the high or the low Ct value.
8.1	Decision Matrix:	

Signal specific Fluorophore*				
Fam Susceptible i-2**	Texas Red Resistance I-2 **	**Molecular Interpretation**	**Conclusion regarding resistance to FoI: 1(EU)/2(US)**	**Control variety**
+	-	i-2/i-2	Absent***	Marmande Verte
+	+****	I-2/i-2	Present	Motelle x Marmande Verte
-	+	I-2/I-2	Present	Tradiro
-	-	Invalid result. Repeat assay or bio-assay should be performed.		

* + signal is above the threshold and curves are as expected; - signal is not above the threshold or curves are non-exponential.
**Fluorophores can be modified according to compatibility with the filters on the real-time PCR machine.
*** Susceptible, or possibly resistant on another mechanism like gene I3
****Ct value should not be more than +3Ct after the Ct value of the susceptible i-2 fluorophore otherwise the marker is considered as absent.

9.	Validation of the method	A conclusion of presence/absence of resistance should be made for each variety based on the results of the 20 individual plant genotypes. A tolerance of 1 individual out of type plant can be made, otherwise the variety should be identified as heterogenous if contradictory results are obtained for a variety. This protocol was validated by a ring-test with three different laboratories (Interlaboratory Comparative Test Report, INVITE 2023). If a different protocol is used, the laboratory must validate its method in comparison to the reference method to show that the alternative protocol gives the same results.
	Contact Examination Office	Naktuinbouw

Ad. 50: Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)

1.	Pathogen	*Fusarium oxysporum* f. sp. *radicis-lycopersici*
2.	Quarantine status	
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw[12] (NL) and GEVES[13] (FR)
5.	Isolate	-
7.	Establishment pathogenicity	symptoms on susceptible tomato
8.	Multiplication inoculum	
8.1	Multiplication medium	Potato Dextrose Agar, or Medium agar “S” of Messiaen
8.4	Inoculation medium	Water for scraping agar plates or Czapek-Dox (7 d-old aerated culture)
8.6	Harvest of inoculum	filter through double muslin cloth
8.7	Check of harvested inoculum	spore count; adjust to 10^6 per ml
8.8	Shelflife/viability inoculum	4-8 h, keep cool to prevent spore germination
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	Not applicable
9.3	Control varieties	
	Susceptible	Motelle, Moneymaker
	Resistant	Momor, “Momor x Motelle”
	Remark	“Momor x Motelle” has slightly weaker resistance than Momor
9.4	Test design	>20 plants; e.g. 35 seeds for 24 plants, including 2 non-inoculated controls
9.5	Test facility	glasshouse or climate room
9.6	Temperature	24-28°C (severe test, with mild isolate) 17-24°C (mild test, with severe isolate)
9.7	Light	at least 12 hours per day
9.8	Season	all seasons
9.9	Special measures	slightly acidic peat soil is optimal; keep soil humid but avoid water stress
10.	Inoculation	
10.1	Preparation inoculum	aerated culture or scraping of plates
10.2	Quantification inoculum	spore count, adjust to 10^6 spores per ml
10.3	Plant stage at inoculation	12-18 d, cotyledon to third leaf
10.4	Inoculation method	roots and hypocotyls are immersed in spore suspension for 5-15 min
10.7	Final observations	10-21 days after inoculation
11.	Observations	
11.1	Method	visual; a few plants are lifted at the end of the test
11.2	Observation scale	Symptoms: Plant death Growth retardation caused by root degradation Root degradation Necrotic pinpoints and necrotic lesions on stems
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] symptoms present [9] no symptoms
13.	Critical control points	Temperature should never exceed 27°C during the test period. Isolates may lose pathogenicity after repeated subculturing. Isolates should not be subcultured more than two times.

[12] Naktuinbouw, resistentie@naktuinbouw.nl
[13] GEVES, matref@geves.fr

Ad. 51: Resistance to *Passalora fulva* (Pf) - Race 0

1.	Pathogen	*Passalora fulva*
2.	Quarantine status	-
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw[14] (NL) or GEVES[15] (FR)
5.	Isolate	Races 0, A, B, C, D, E, F, H and J
6.	Establishment isolate identity	with genetically defined differentials A breaks *Cf-2*, B *Cf-4*, C *Cf-2* and *Cf-4*, D *Cf-5*, E *Cf-2*, *Cf-4* and *Cf-5*, F *Cf-2* and *Cf-9*, H *Cf-4* and *Cf-9*, J *Cf-2, Cf-6* and *Cf-9* https://www.worldseed.org
7.	Establishment pathogenicity	symptoms on susceptible tomato
8.	Multiplication inoculum	
8.1	Multiplication medium	Potato Dextrose Agar or Malt Agar or a synthetic medium
8.8	Shelflife/viability inoculum	4 hours, keep cool
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Monalbo, Moneymaker
	Resistant for Race A:	Purdue 135, IVT1154, IVT1149, Antique, Pink Treat, Sprigel, Triatlon
	Resistant for Race B:	Vétomold, IVT1154, IVT1149, Antique, Retinto, Sprigel, Triatlon
	Resistant for Race C:	IVT1154, IVT1149, Antique, Sprigel, Triatlon
	Resistant for Race D:	Vétomold, IVT1154, Antique, Pink Treat, Retinto, Sprigel
	Resistant for Race E:	IVT 1154, Antique, Sprigel
	Resistant for Race F:	Purdue 135, IVT1149, Ontario 7818, Chelino, Completo
	Resistant for Race H:	Vétomold, IVT1149, Ontario 7818, Chelino, Completo
	Resistant for Race J:	Purdue 135, IVT1149
9.5	Test facility	glasshouse or climate room
9.6	Temperature	day: 22° C, night: 20°or day: 25°C, night 20°C
9.7	Light	12 hours or longer
9.8	Season	
9.9	Special measures	depending on facility and weather, there may be a need to raise the humidity, e.g. humidity tent fully closed 3-4 days after inoculation and after that partly closed (66% to 80%, 24 h per day), until end
10.	Inoculation	
10.1	Preparation inoculum	prepare evenly colonized plates, e.g. 1 for 36 plants; remove spores from plate by scraping with water with Tween20; filter through double muslin cloth
10.2	Quantification inoculum	count spores; adjust to 10^5 spores per ml or more
10.3	Plant stage at inoculation	19-20 d (incl. 12 d at 24°), 2-3 leaves
10.4	Inoculation method	spray on dry leaves
10.7	Final observations	14 days after inoculation; when susceptible control does not show clear symptoms the test may be prolonged until for example 18 days after inoculation
11.	Observations	
11.1	Method	visual inspection of abaxial side of inoculated leaves
11.2	Observation scale	Symptom: velvety, white spots
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] symptoms present [9] no symptoms
13.	Critical control points	Pf spores have a variable size and morphology. Small spores are also viable. Fungal plates will gradually become sterile after 6-10 weeks and repeated subculturing. Do not subculture more often than strictly necessary for multiplication. Excessively high humidity may cause rugged brown spots on all leaves.

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Ad. 52: Resistance to *Passalora fulva* (Pf) - Race A

See Ad. 51

Ad. 53: Resistance to *Passalora fulva* (Pf) - Race B

See Ad. 51

Ad. 54: Resistance to *Passalora fulva* (Pf) - Race C

See Ad. 51

Ad. 55: Resistance to *Passalora fulva* (Pf) - Race D

See Ad. 51

Ad. 56: Resistance to *Passalora fulva* (Pf) - Race E

See Ad. 51

Ad. 57: Resistance to *Passalora fulva* (Pf) - Race F

See Ad. 51

Ad. 58: Resistance to *Passalora fulva* (Pf) - Race H

See Ad. 51

Ad. 59: Resistance to *Passalora fulva* (Pf) - Race J

See Ad. 51

Ad. 60: Resistance to *Tomato mosaic virus* - Strain 0 (ToMV: 0)

Resistance to strain 0, 1 and 2 to be tested in a bio-assay (method i) or in a DNA marker test (method ii), if appropriate.

(i) bio-assay

1.	Pathogen	*Tomato mosaic virus*
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw[16] (NL) or GEVES[17] (FR) or INIA - CSIC[18] (ES, strain 0)
5.	Isolate	Strain 0, (e.g. isolate INRA Avignon 6-5-1-1), strain 1 and strain 2
6.	Establishment isolate identity	genetically defined tomato standards Mobaci (Tm1), Moperou (Tm2), Momor (Tm2^2) Use diffential varieties, see ISF website : https:// www.woldseed.org
7.	Establishment pathogenicity	on susceptible plant
8.	Multiplication inoculum	
8.1	Multiplication medium	living plant
8.2	Multiplication variety	e.g. Moneymaker, Marmande
8.7	Check of harvested inoculum	option: on *Nicotiana tabacum* “Xanthi”, check lesions after 2 days
8.8	Shelf life/viability inoculum	fresh>1 day, desiccated>1year
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Marmande, Monalbo, Moneymaker
	Resistant to ToMV: 0 and 2	Mobaci
	Resistant to ToMV: 0 and 1	Moperou
	Resistant to ToMV: 0, 1 and 2	“Monalbo x Momor” (with necrosis), Gourmet, Mocimor, Momor
9.4	Test design	blank treatment with PBS and carborundum or similar buffer
9.5	Test facility	glasshouse or climate room
9.6	Temperature	24 to 26°C
9.7	Light	12 hours or longer
9.8	Season	symptoms are more pronounced in summer
10.	Inoculation	
10.1	Preparation inoculum	1 g leaf with symptoms with 10 ml PBS or similar buffer Homogenize, add carborundum to buffer (1 g/30 ml)
10.4	Inoculation method	gentle rubbing
10.6	Second observation	cotyledons or 2 leaves
10.7	Final observations	11-21 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	symptoms of susceptibility: mosaic in top, leaf malformation symptoms of resistance (based on hypersensitivity): local necrosis, top necrosis, systemic necrosis
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls Remark: in some heterozygous varieties a variable proportion of plants may have severe systemic necrosis or some necrotic spots while the other plants have no symptoms. This proportion may vary between experiments.
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] symptoms of susceptibility present [9] no symptoms, or symptoms of hypersensitive resistance

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13.	Critical control points	Temperature and light may influence the development of necrosis. More light means more necrosis. At temperatures above 26°C the resistance may break down. Resistant heterozygous varieties may have symptomless plants and plants with severe necrosis; in spite of apparent segregation the sample may be evaluated as uniform for resistance. Remark: Strain INRA Avignon 6-5-1-1 is recommended for ToMV: 0. This strain causes a striking yellow Aucuba mosaic.

(ii) DNA marker test

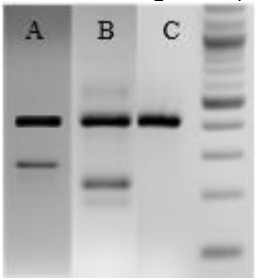
Resistance to ToMV is often based on resistance gene Tm2 (allele Tm2 or Tm2^2). The presence of the allele for resistance Tm2 and Tm2^2 and/or susceptible allele tm2 can be detected by the co-dominant markers as described in Arens *et al* (2010). Two methods are available, conventional PCR and Taqman PCR. Specific aspects:

(a) Conventional PCR

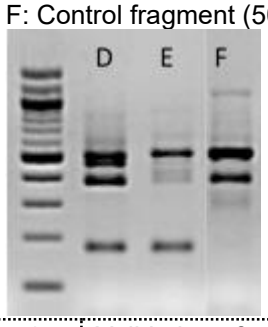
1.	Pathogen	*Tomato mosaic virus*
2.	Functional gene	Tm2/2^2 (with two alleles for resistance Tm2 and Tm2^2 and one allele for susceptibility tm2)
3.	Primers	
3.1	Assay 1 to check resistant allele Tm2 or Tm2^2	Outer primer TMV-2286F: 5'GGGTATACTGGGAGTGTCCAATTC3' Outer primer TMV-2658R: 5'CCGTGCACGTTACTTCAGACAA3' Tm2^2 SNP2494F: 5'CTCATCAAGCTTACTCTAGCCTACTTTAGT3' Tm2 SNP2493R: 5'CTGCCAGTATATAACGGTCTACCG3'
3.2	Assay 2 to check susceptible or resistant allele	Outer primer TM2-748F:5'CGGTCTGGGGAAAACAACTCT3' Outer primer TM2-1256R:5'CTAGCGGTATACCTCCACATCTCC3' TM2-SNP901misR: 5'GCAGGTTGTCCTCCAAATTTTCCATC3' TM2-SNP901misF: 5'CAAATTGGACTGACGGAACAGAAAGTT3'
4.	Format of the test	
4.1	Number of plants per genotype	at least 20 plants
4.2	Control varieties	homozygous susceptible allele tm2 present: Mobaci, Monalbo, Moneymaker Homozygous resistant allele Tm2 present: Moperou Homozygous resistant allele Tm2^2 present: Mocimor, Momor
5.	Preparation of DNA	Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol. Pipette each DNA sample and the PCR mix (primers, dNTP's and Taq polymerase) into individual wells for assay 1 and assay 2.
6.	PCR conditions	1. Initial denaturation step at 94°C for 3 minutes 2. 35 cycles at 94°C for 1 minute, 56°C for 1 minute, 72°C for 2 minutes 3. Final extension step of 72°C for 10 minutes Visualize PCR product on 1-2% agarose gel.

7.	Observations	
7.1	Observation scale	

Assay 1
A: Control fragment (416bp) and Tm2 fragment (255bp)
B: Control fragment (416bp) and $Tm2^2$ fragment (214bp)
C: Control fragment (416bp)



Assay 2
D: Control fragment (509bp), tm2 fragment (S-allele; 381bp) and Tm2 or $Tm2^2$ fragment (R-allele; 185bp)
E: Control fragment (509bp) and Tm2 or $Tm2^2$ fragment (R-allele; 185bp)
F: Control fragment (509bp) and tm2 fragment (S-allele; 381bp)



7.2	Validation of test	Control varieties should give the expected results.
8.	Interpretation of data in terms of UPOV characteristic states	the presence of the alleles tm2, Tm2, $Tm2^2$ lead to different interpretation for characteristics 56, 57 and 58, see table. In case the DNA marker test result does not confirm the declaration in the TQ, a bio-assay should be performed to observe whether the resistance is absent or present for the variety (possibly based on another resistance gene, e.g. gene Tm1).

Test result DNA marker test	tm2/tm2	Tm2/tm2 or Tm2/Tm2	$Tm2^2$/tm2 or $Tm2^2$/$Tm2^2$ or $Tm2^2$/Tm2
		(less frequent)	(more frequent)
56 Strain 0	[1] absent	[9] resistant	[9] resistant
57 Strain 1	[1] absent	[9] resistant	[9] resistant
58 Strain 2	[1] absent	[1] absent	[9] resistant

(b) Taqman PCR

1.	Pathogen	*Tomato mosaic virus*
2.	Functional gene	Tm2/2^2 (with two alleles for resistance Tm2 and $Tm2^2$ and one allele for susceptibility tm2)
3.	Primers	TOMV RES Forward: 5'-CTCAATCATTTCCTCCAAATCTC-' TOMV RES Reverse: 5'-GGGAAATGTCTTAAGTACTGCCA-3' TOMV SUS Forward: 5'-GAAGCATTCCCTCCAAATATT-3' TOMV SUS Reverse: 5'-GGTAATGTCTTAAGCACTGCCAG-3' TOMV Probe Res $TM2^2$: 5'-Texas Red-CTACTTTAGTGTAGACCGT-BHQ2-3' TOMV Probe Res TM2: 5'-Atto 532-CAACTTTACGGTAGACC-BHQ1-3' TOMV Probe SUS: 5'-6FAM-TGCTTTATGGTAGACAGT-BHQ1-3' The probes are MGB probes or XS probes, designed with a temperature of 65°C.
4.	Format of the test	
4.1	Number of plants per genotype	at least 20 plants
4.2	Control varieties	homozygous susceptible allele tm2 present: Mobaci, Monalbo, Moneymaker Homozygous resistant allele Tm2 present: Moperou Homozygous resistant allele $Tm2^2$ present: Mocimor, Momor
5.	Preparation of DNA	Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol. Pipette each DNA sample and a commercial real-time PCR mastermix (primers, probes) into individual wells. Analyse the samples in a real-time PCR machine capable of reading the fluorophores of all the probes, with reaction conditions suitable for the mastermix used.
6.	PCR conditions	1. Initial denaturation step at 94°C for 2-10 minutes (mastermix dependent) 2. 40 cycles at 94°C for 15 sec, 60°C 1 min. Every cycle ends with plate reading
7.	Observations	
7.1	Observation scale	
7.2	Validation of test	Control varieties should give the expected results. In case of Ct/Cq 35-40: repeat the test.
8.	Interpretation of data in terms of UPOV characteristic states	the presence of the alleles tm2, Tm2, $Tm2^2$ lead to different interpretation for characteristics 56, 57 and 58, see table. In case the DNA marker test result does not confirm the declaration in the TQ, a bio-assay should be performed to observe whether the resistance is absent or present for the variety (possibly based on another resistance gene, e.g. gene Tm1).

Probe	Ct/Cq	Interpretation
TOMV Probe Res $TM2^2$	<35	resistance allele $Tm2^2$ present
	N/A	resistance allele $Tm2^2$ absent
TOMV Probe Res TM2	<35	resistance allele Tm2 present
	N/A	resistance allele Tm2 absent
TOMV Probe SUS	<35	Susceptible allele tm2 present
	N/A	Susceptible allele tm2 absent

Test result DNA marker test	tm2/tm2	Tm2/tm2 or Tm2/Tm2	$Tm2^2$/tm2 or $Tm2^2$/$Tm2^2$ or $Tm2^2$/Tm2
		(less frequent)	(more frequent)
56 Strain 0	[1] absent	[9] resistant	[9] resistant
57 Strain 1	[1] absent	[9] resistant	[9] resistant
58 Strain 2	[1] absent	[1] absent	[9] resistant

Ad. 61: Resistance to *Tomato mosaic virus* - Strain 1 (ToMV: 1)

See Ad. 60

Ad. 62: Resistance to *Tomato mosaic virus* - Strain 2 (ToMV: 2)

See Ad. 60

Ad. 63: Resistance to *Phytophthora infestans* (Pi)

1.	Pathogen	*Phytophthora infestans*
3.	Host species	*Solanum lycopersicum*
5.	Isolate	highly pathogenic on tomato
6.	Establishment isolate identity	biotest
7.	Establishment pathogenicity	biotest
8.	Multiplication inoculum	
8.1	Multiplication medium	V8 Agar or PDA or Malt Agar medium
8.2	Multiplication variety	susceptible tomato variety
8.3	Plant stage at inoculation	4 weeks
8.4	Inoculation medium	water
8.5	Inoculation method	spraying
8.6	Harvest of inoculum	wash spores from wetted plates
8.7	Check of harvested inoculum	count spores
8.8	Shelflife/viability inoculum	4 h after chilling at 8-10°C
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Moneymaker, Saint-Pierre
	Resistant	Phantasia, Sixtina
9.5	Test facility	glasshouse
9.6	Temperature	18°C
9.7	Light	after inoculation darkness during 24 h, thereafter 10 h darkness per 24 h
9.9	Special measures	humidity tent during four days after inoculation
10.	Inoculation	
10.1	Preparation inoculum	wash spores from sporulating leaves, chill at 8-10°C chilling will induce zoospore release remark: Use fresh spores from repeated infection cycles on tomato plants during 3 weeks before inoculation
10.2	Quantification inoculum	count sporangiospores; adjust to 10^4 spores per ml
10.3	Plant stage at inoculation	10 leaves developed (6 to 7 weeks)
10.4	Inoculation method	spraying
10.7	Final observations	5-7 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	Symptoms: water-soaked lesions, yellowing, and death
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls heterozygous varieties may have a slightly lower level of expression of resistance
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] severe symptoms present [9] no or mild symptoms
13.	Critical control points	resistance is only well-expressed in the adult plant

Ad. 64: Resistance to *Pseudopyrenochaeta lycopersici (ex Pyrenochaeta lycopersici* (Pl)

1.	Pathogen	*Pyrenochaeta lycopersici*
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	GEVES[19] (FR)
5.	Isolate	e.g. strain Pl 21
7.	Establishment pathogenicity	On susceptible plant
8.	Multiplication inoculum	
8.1	Multiplication medium	Messiaen agar or synthetic medium
8.4	Inoculation medium	Autoclaved grains (e.g. barley)
8.5	Inoculation method	Mix grains (e.g. 1 kg) with inoculum (e.g. medium from 2 Petri dishes with mycelium)
8.6	Harvest of inoculum	After 3 weeks
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Marmande verte, Montfavet H 63.5
	Resistant	Garance and (*S. lycopersicum* x S. *habrochaites*) Emperador
9.4	Test design	Add non-inoculated plants
9.5	Test facility	Greenhouse or climatic chamber
9.6	Temperature	20°C
9.7	Light	At least 12h
10.	Inoculation	
10.1	Preparation inoculum	Homogenize the contaminated grains and mix with soil (volume ratio of grains to soil ca. 1:5)
10.3	Plant stage at inoculation	3-4 leaf stage
10.4	Inoculation method	Transplanting of plantlets in the mixture of soil and contaminated grains
10.7	Final observations	40 days post inoculation
11.	Observations	
11.1	Method	Visual
11.2	Observation scale	Class 0: no necrotic lesions on roots Class 1: few small and uncoloured necrotic lesions Class 2: some brown necrotic lesions clearly visible (less than half the surface of the main root) Class 3: several brown necrotic lesions clearly visible (more than half the surface of the main root) Class 4: complete necrosis or destruction of the main root
11.3	Validation of test	Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	Any variety judged to be of the same resistance level or higher than Garance is judged as resistant. Classes 0, 1 and 2 are commonly judged as resistant – Note 9 Classes 3 and 4 are commonly judged as susceptible – Note 1
13.	Critical control points	Pathogenicity maybe lost after 3 weeks growing on an agar medium.

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Ad. 65: Resistance to *Stemphylium* spp. (Ss)

1.	Pathogen	*Stemphylium* spp. e.g. *Stemphylium solani* (see note below)
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	GEVES[20] (FR)
7.	Establishment pathogenicity	biotest
8.1	Multiplication medium	PDA (12 hours per day under near-ultraviolet light to induce sporulation) or V8-Agar
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Monalbo
	Resistant	Motelle, “Motelle x Monalbo” (border)
9.5	Test facility	greenhouse or climate cell
9.6	Temperature	24°C
9.7	Light	12 hours minimum
9.9	Special measures	incubation in tunnel with 100% relative humidity or humidity tent closed 5 days after inoculation, after this, 80% RH until end.
10.	Inoculation	
10.1	Preparation inoculum	sporulating plates (8.1) are scraped and air-dried overnight. The next day plates are soaked and stirred for 30 min in a beaker with demineralized water, or sporulating plates are scraped with water with Tween20. The resulting suspension is sieved through a double layer of muslin.
10.2	Quantification inoculum	$5x10^3$ to $5x10^5$ spores per ml
10.3	Plant stage at inoculation	20-22 days (three expanded leaves)
10.4	Inoculation method	spraying
10.7	Final observations	4-10 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	0. no symptoms 1. some very rare lesions plus yellowing onleaves, and no symptoms on cotyledons 2. some lesions on leaves and cotyledons 3. many lesions on leaves, and cotyledons attached 4. coalescence of lesions, and cotyledons falling 5. total drying of the first two or the first three leaves, and cotyledons fallen
11.3	Validation of test	Symptoms on Motelle x Monalbo should be a little bit stronger than on Motelle. Symptoms on Monalbo should be much stronger than on Motelle.
12.	Interpretation of data in terms of UPOV characteristic states	Resistance absent [1] strong symptoms Resistance present [9] weak symptoms or no symptoms When the resistance level is just below the lower border of resistance, the test should be repeated one or two times before a final decision is taken
13.	Critical control points	Individuel isolates may differ stightly in pathogenicity. Some isolates of *Stemphylium* cannot be classified easily as either *Stemphylium solani* or a related species. These *Stemphylium* isolates may still be useful for identifying resistance to *Stemphylium solani*.

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Ad. 66: Resistance to *Pseudomonas syringae* pv. *tomato* (Pst)

1.	Pathogen	*Pseudomonas syringae* pv. *tomato*
2.	Quarantine status	-
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	GEVES[21] (FR)
5.	Isolate	-
7.	Establishment pathogenicity	biotest
8.	Multiplication inoculum	
8.1	Multiplication medium	e.g. King's B agar medium, darkness
8.2	Multiplication variety	susceptible variety
8.4	Inoculation medium	water
8.8	Shelflife/viability inoculum	plates become old after 10 days
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	Not applicable
9.3	Control varieties	
	Susceptible	Monalbo, Moneymaker
	Resistant	Ontario 7710, "Monalbo x Ontario 7710", Fuzzer
9.5	Test facility	greenhouse or growth chamber
9.6	Temperature	day: 22° C, night: 16° C or 20°C
9.7	Light	12 hours
9.9	Special measures	humidity tent needed for 3 days or longer
10.	Inoculation	
10.1	Preparation inoculum	wash off spores from plate and addv a drop of surfactant to the bacterial suspension. Plate should be less than 2-4 days old.
10.2	Quantification inoculum	OD 0.1 or less, supported by dilution plating. Density 10^6 colony forming units per ml
10.3	Plant stage at inoculation	three leaves expanded (20-22 days)
10.4	Inoculation method	spraying a bacterial suspension on leaves
10.7	Final observations	8 days after inoculation or longer
11.	Observations	
11.1	Method	visual
11.2	Observation scale	bacterial speck, greasy in appearance with marginal chlorosis pinpoint lesions can be observed on resistant plants < 1.0 mm
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] bacterial speck present [9] no symptoms or pinpoint lesions
13.	Critical control points	Strains may lose virulence in storage

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Ad. 67: Resistance to *Ralstonia solanacearum* – Race 1 (Rs: 1)

1.	Pathogen	*Ralstonia solanacearum* – Race 1
2.	Regulatory status	See EPPO Global database: https://gd.eppo.int
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	-
5.	Isolate	Race 1 (Race 1 has a wide host range, including tomato. Race 3 has a narrow host range, also including tomato.)
8.	Multiplication inoculum	
8.1	Multiplication medium	Yeast Peptone Glucose (YPG) Agar or PYDAC Special conditions: 25-30°C (Race 3 usually needs 20-23°C)
8.5	Inoculation method	2 ml of inoculum placed at the foot of each plantlet prior to transplanting
8.8	Shelf life/viability inoculum	suspension in sterile distilled water at 15°C (<1 year)
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Floradel
	Resistant	Caraïbo
9.5	Test facility	climate room
9.6	Temperature	day: 26-30°C; night: 25°C
9.7	Light	10 - 12 hours
9.9	Special measures	high humidity
10.	Inoculation	
10.2	Quantification inoculum	10^7 colony forming units per ml
10.3	Plant stage at inoculation	3 to 4 well-developed leaves (3 weeks)
10.7	Final observations	3 weeks after inoculation
11.	Observations	in intermediate resistant varieties, bacteria could be present in the lower part of the plant
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] symptoms present [9] no symptoms, or less than resistant standard

Ad. 68: Resistance to *Tomato yellow leaf curl virus* (TYLCV)

(i) agroinoculation method

1.	Pathogen	*Tomato yellow leaf curl virus* (TYLCV)
2.	Regulatory status	See EPPO Global Database: https://gd.eppo.int
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Dr. Eduardo R. Bejarano, Plant Genetics Laboratory, HMS UMA-CSIC[22]
5.	Isolate	Alm:Pep:99, strain IL
8.	Multiplication inoculum	
8.1	Multiplication medium	YEP/Kanamycin.
8.3	Plant stage at inoculation	3-4 leaf
8.4	Inoculation medium	YEP
8.5	Inoculation method	Stem puncture agroinfiltration. Plant agroinoculation is carried out using *Agrobacterium tumefaciens* transformed with plasmids containing the infectious clones (Morilla, et al. 2005. Phytopathology 95: 1089-1097)
8.8	Shelf life/viability inoculum	*A. tumefaciens* stocks are maintained frozen at -80ºC in 15-20% glycerol for long term storage. Cultures to be stored are typically started from a single colony and grown in 5 ml YEP +2.5 µl kanamycin (100mg/ml) during 48 h at 28ºC.
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	2
9.3	Control varieties	
	Susceptible	Moneymaker, Marmande
	Resistant	Delyca, Montenegro
9.5	Test facility	Glasshouse or climatic chamber with permission to confined use of LMO/GMO
9.6	Temperature	23-25°C
9.7	Light	16 h
9.9	Special measures	The transformed *Agrobacterium tumefaciens* is a living modified organism (LMO; or genetically modified organism (GMO)) for which further regulations may apply.
10.	Inoculation	
10.1	Preparation inoculum	Streak the surface of the frozen A. tumefaciens stock tube and submerge in 5ml YEP+2.5 µl kanamycin (100mg/ml) during 48 h at 28°C. Shaking is needed. Take 100 µl and place them into 100 ml YEP and 50 µl kanamycin (100mg/ml). Shake 48 h at 28ºC. Centrifuge the saturated culture for 20 min at 3500 rpm and discard supernatant
10.2	Quantification inoculum	Dissolve in sterile deionize water to a final OD_{600} of 1.
10.3	Plant stage at inoculation	3-4th leaf
10.4	Inoculation method	Take up into a 1 ml syringe with a 27-gauge needle and few drops (about 20 µl of the culture) were deposited on 10-15 puncture wounds made with the needle into the stem of test tomato plants. Maintain on ice while inoculating plants.
10.5	First observation	20 days post inoculation (dpi)
10.6	Second observation	30 dpi
10.7	Final observations	45 dpi
11.	Observations	
11.1	Method	visual
11.2	Observation scale	Symptoms: leaf yellowing and curling
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] severe symptoms present [9] no symptoms

[22] Source of inoculum: HMS UMA (CSIC) edu_rodri@uma.es, INIA resistencias@inia.es

13.	Critical control points	TYLCV is endemic in many tropical and subtropical areas and has a quarantine status in many countries with a temperate climate. TYLCV-IL is the strain most widely spread worldwide. With this strain, symptoms do not appear in varieties with Ty-1 and Ty-2. Some TYLCV resistant varieties may be susceptible to the closely related virus Tomato yellow leaf curl Sardinia virus (TYLCSV).

(ii) White fly inoculation method

1.	Pathogen	*Tomato yellow leaf curl virus* (TYLCV) IL strain
2.	Quarantine status	See EPPO Global Database: https://gd.eppo.int
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Spain[23]
5.	Isolate	TYLCV-IL La Mayora
8.	Multiplication inoculum	White flies
8.1	Multiplication medium	
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	Two replicates
9.3	Control varieties	
	Susceptible	Moneymaker, Marmande
	Resistant	Delyca, Montenegro
9.5	Test facility	Greenhouse/plastic tunnel
9.9	Special measures	prevent spread of white-flies
10.	Inoculation	
10.3	Plant stage at inoculation	2-4 weeks
10.4	Inoculation method	vector (*Bemisia* white-flies carrying TYLCV-IL)
10.7	Final observations	1-2 months after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	Symptoms: leaf yellowing and curling
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] severe symptoms present [9] no or mild symptoms
13.	Critical control points	TYLCV is endemic in many tropical and subtropical areas and has a quarantine status in many countries with a temperate climate. TYLCV-IL is the strain most widely spread worldwide. With this strain, symptoms do not appear in varieties with Ty-1 and Ty-2. Some Some TYLCV resistant varieties may be susceptible to the closely related virus Tomato yellow leaf curl Sardinia virus (TYLCSV).

[23] Source of inoculum; IHSM, CSIC guillamon@eelm.csic.es, INIA resistencias@inia.es

Ad. 69: Resistance to *Tomato spotted wilt virus* - Pathotype 0 (TSWV: 0)

Resistance to strain 0 to be tested in a bio-assay (method i) or in a DNA marker test (method ii), if appropriate.

(i) bio-assay

1.	Pathogen	*Tomato spotted wilt virus*, Pathotype 0 (TSWV: 0)
2.	Regulatory status	See EPPO Global database: https://gd.eppo.int
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw[24] (NL), GEVES[25] (FR)
5.	Isolate	pathotype 0, preferably a thrips-transmission deficient variant
6.	Establishment isolate identity	symptomatic leaves may be stored below -70°C
7.	Establishment pathogenicity	Biotest
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	1 replicate
9.3	Control varieties	
	Susceptible	Monalbo, Momor, Montfavet 63-5, Moneymaker
	Resistant	Bodar, Mospomor
9.5	Test facility	glasshouse or climatic chamber
9.6	Temperature	20°C
9.7	Light	12 hours or longer
9.9	Special measures	prevent or combat thrips
10.	Inoculation	
10.1	Preparation inoculum	press symptomatic leaves in ice-cold buffer 0,01 M PBS, pH 7.4, with 0,01 M sodium sulfite or similar buffer Option: sieve the leaf sap through double muslin
10.3	Plant stage at inoculation	one or two expanded leaves
10.4	Inoculation method	mechanical, rubbing with a suitable abrasive on cotyledons, inoculum suspension < 10°C
10.7	Final observations	7 -21 days after inoculation
11.	Observations	
11.1	Method	Visual, comparative
11.2	Observation scale	Symptoms: top mosaic, bronzing, various malformations, strong necrosis can be a sign of hypersensitivity
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] symptoms present [9] no symptoms or symptoms of hypersensitivity
13.	Critical control points	TSWV is transmitted by *Thrips tabaci* and Western flower thrips (*Frankliniella occidentalis*). Pathotype 0 is defined by its inability to break resistance in tomato varieties carrying the resistance gene Sw-5.

[24] Naktuinbouw, resistentie@naktuinbouw.nl
[25] GEVES, matref@geves.fr

(ii) DNA marker test

Resistance to TSWV pathotype 0 is often based on resistance gene Sw-5. The presence of allele for resistance and/or susceptible allele(s) can be detected by the co-dominant markers as described in Dianese *et al* (2010). Specific aspects:

1.	Pathogen	*Tomato spotted wilt virus* – pathotype 0
2.	Functional gene	Sw-5b
3.	Primers	
3.1	Susceptible alleles	Sw5-Vat1-F: 5'-ACAACATCAAACAATGTTAGCC-3' Sw5-Vat2-F: 5'-CATCAAACAATGCAGTTAGCC-3'
3.2	Resistant allele	Sw5-Res-F: 5'-ATCAACCAATACAGCCTAACC-3
3.3	Universal reverse	Sw5-universal-R: 5'-TTTCTCCCTGCAAGTTCACC-3'
3.3	Allele specific probes	Sw5-Sus1: 5'-VIC-TACATTATGAAGGGTTAACAAG-MGB-NFQ-3' Sw5-Sus2: 5'-6FAM-ACAACAGAGGGTTAACAAGTTTAGG-BHQ1-3' Sw5-Res: 5'-TEXAS RED-TGGGCGAAAATCCCAACAAG-BHQ2-3'
4.	Format of the test	
4.1	Number of plants per genotype	at least 20 plants
4.2	Control varieties	homozygous susceptible allele 1 present: Moneymaker homozygous susceptible allele 2 present: Mountain Magic homozygous resistant allele present: Montealto Heterozygous 1 (allele for resistance and allele 1 for susceptibility present): Bodar Heterozygous 2 (allele for resistance and allele 2 for susceptibility present): Sharmita
5.	Preparation of DNA	Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol. Pipette each DNA sample and a commercial real-time PCR mastermix into individual wells. Analyse the samples in a real-time PCR machine capable of reading the fluorophores of all the probes, with reaction conditions suitable for the mastermix used.
6.	PCR conditions	1. Initial denaturation step 10 min 95 °C 2. 40 cycles 15 sec 95 °C and 1 min 60°C. Every cycle ends with a plate reading.
7.	Observations	
7.1	Observation scale	<table><tr><td>probe</td><td>Ct/Cq</td><td>interpretation</td></tr><tr><td rowspan="2">Sw5-Sus1</td><td><35</td><td>susceptible allele sw5b-1 present</td></tr><tr><td>N/A</td><td>susceptible allele sw5b-1 absent</td></tr><tr><td rowspan="2">Sw5-Sus2</td><td><35</td><td>susceptible allele sw5b-2 present</td></tr><tr><td>N/A</td><td>susceptible allele sw5b-2 absent</td></tr><tr><td rowspan="2">Sw5-Res</td><td><35</td><td>resistance allele Sw-5b present</td></tr><tr><td>N/A</td><td>resistance allele Sw-5b absent</td></tr></table>
7.2	Validation of the test	Control varieties should give the expected results. In case of Ct/Cq 35-40: repeat the test.
8.	Interpretation of data in terms of UPOV characteristic states	absent [1] susceptible allele(s) present and resistant allele absent present [9] resistant allele present (homozygous or heterozygous) In case the DNA marker test result does not confirm the declaration in the TQ, a bio-assay should be performed to observe whether the resistance is absent or present for the variety (on another mechanism).

Ad. 70: Resistance to *Leveillula taurica* (Lt)

1.	Pathogen	*Leveillula taurica*
2.	Quarantine status	-
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	no long term storage method is available
8.1	Multiplication medium	detached leaves of a susceptible host plant
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Monalbo, Montfavet 63-5
	Resistant	Radiance
10.	Inoculation	
10.3	Plant stage at inoculation	adult plants
10.4	Inoculation method	natural infection, mainly by wind dispersal of spores
10.7	Final observations	before maturity of fruits
11.	Observations	
11.1	Method	visual
11.2	Observation scale	Symptoms: Yellow chlorotic spots on upper side of leaves, mycelium on abaxial side of leaves
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] symptoms present [9] no symptoms, or same level as the resistant control.
13.	Critical control points	Check cleistothecia under microscope to confirm presence of *Leveillula* and not another powdery mildew. Plant stage dependent action of resistance can cause difficulties in the interpretation

Ad. 71: Resistance to *Pseudoidium neolycopersici (ex Oidium neolycopersici)* (Pn (ex On))

1.	Pathogen	*Oidium neolycopersici*
2.	Quarantine status	-
3.	Host species	*Solanum lycopersicum*
5.	Isolate	see remark under 13
7.	Establishment pathogenicity	biotest
8.	Multiplication inoculum	
8.1	Multiplication medium	plant
8.3	Plant stage at inoculation	24°C during the day; 18°C during the night
8.4	Inoculation medium	water
8.5	Inoculation method	see 10.4
8.6	Harvest of inoculum	by washing off
8.7	Check of harvested inoculum	check for contaminants under microscope
8.8	Shelf life/viability inoculum	1-2 hours
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.2	Number of replicates	Not applicable
9.3	Control varieties	
	Susceptible	Momor, Montfavet 63-5
	Resistant	Romiro, PI 247087
9.5	Test facility	glasshouse
9.6	Temperature	20°C or 18/24°C
9.7	Light	12 hours
10.	Inoculation	
10.1	Preparation inoculum	collect spores in water
10.2	Quantification inoculum	10^4 conidia/ml
10.3	Plant stage at inoculation	3 weeks
10.4	Inoculation method	by spraying on leaves or dredging of leaves
10.7	Final observations	7-18 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	0. no sporulation 1. necrotic points and sometimes locally restricted sporulation 2. moderate sporulation 3. abundant sporulation
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] Moderate or abundant sporulation present [9] No or restricted sporulation
13.	Critical control points	Resistance-breaking isolates should be avoided. Resistance to *O. neolycopersici* is usually race-specific. However, as long as a differential series of tomato genotypes with well-defined resistances is lacking, it will remain hard to conclude that different races of *O. neolycopersici* exist.

Ad. 72: Resistance to *Tomato torrado virus* (ToTV)

1.	Pathogen	*Tomato torrado virus*
2.	Quarantine status	in regions with temperate climate
3.	Host species	*Solanum lycopersicum*
7.	Establishment pathogenicity	biotest
8.	Multiplication inoculum	
8.1	Multiplication medium	*Nicotiana tabacum* 'Xanthi'
8.3	Plant stage at inoculation	cotyledon to first leaf
8.5	Inoculation method	see 10.4
8.6	Harvest of inoculum	after 3 weeks
8.7	Check of harvested inoculum	plants yellow, systemic infection
8.8	Shelf life/viability inoculum	instable at room temperature
9.	Format of the test	
9.1	Number of plants per genotype	at least 20 plants
9.3	Control varieties	
	Susceptible	Daniela
	Resistant	Matias
9.5	Test facility	glasshouse
9.6	Temperature	23°C during the day; 21°C during the night
9.7	Light	16 hours
10.	Inoculation	
10.3	Plant stage at inoculation	14 days
10.4	Inoculation method	with ice-cold 0,01 M PBS pH 7 and carborundum
10.5	First observation	7 days after inoculation
10.6	Second observation	14 days after inoculation
10.7	Final observations	18 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	necrotic spots on the top leaves
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of data in terms of UPOV characteristic states	absent [1] necrotic spots present present [9] No symptoms
13.	Critical control points	ToTV is transmitted by white fly (*Bemisia tabaci*). Produce inoculum with ice-cold mortar and pestle. During inoculation the temperature should be below 25°C.

9. Literature

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10. Technical Questionnaire

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

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

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

1. Subject of the Technical Questionnaire

1.1.1	Botanical name	*Solanum lycopersicum* L.	[ ]
1.1.2	Common name	Cherry tomato, Tomato	
1.2.1	Botanical name	*Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg	[ ]
1.2.2	Common name		
1.3.1	Botanical name	*Solanum lycopersicum* L. x *Solanum pimpinellifolium* L.	[ ]
1.3.2	Common name		

2. Applicant

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

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

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

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

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(b) partially known cross [ ]

(c) unknown cross [ ]

4.1.2 Mutation [ ]
(please state parent variety)

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

4.1.4 Other [ ]
(Please provide details)

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

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

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) 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 (2)	**Plant: growth type**		
	determinate	Rio Grande, Siluet	1 [ ]
	indeterminate	Daniela, Florenteen, Marmande VR, Saint-Pierre	2 [ ]
5.2 (6)	**Only varieties with plant growth type indeterminate: Plant: height**		
	very short	Garderner's Delight, Maresme, Zadenna	1 [ ]
	very short to short		2 [ ]
	short	Delfine, Despina	3 [ ]
	short to medium		4 [ ]
	medium	Brooklyn, Campari	5 [ ]
	medium to tall		6 [ ]
	tall	Climberley, Pitenza	7 [ ]
	tall to very tall		8 [ ]
	very tall	Goldwin, Romindo	9 [ ]
5.3 (10)	**Leaf: type**		
	pinnate	Matina	1 [ ]
	bipinnate	Daniela, Saint-Pierre	2 [ ]
5.4 (12)	**Leaf: intensity of green color**		
	very light		1 [ ]
	very light to light		2 [ ]
	light	Rossol	3 [ ]
	light to medium		4 [ ]
	medium	Rebelski	5 [ ]
	medium to dark		6 [ ]
	dark	Daniela, Red Robin	7 [ ]
	dark to very dark		8 [ ]
	very dark		9 [ ]
5.5 (18)	**Pedicel: abscission layer**		
	absent	Merlice, Rio Grande	1 [ ]
	present	Daniela, Grownet, Montfavet 63-5	9 [ ]

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

	Characteristics	Example Varieties	Note
5.6 (20)	**Immature fruit: green shoulder**		
	absent	Geronimo	1 [ ]
	present	Daniela, Montfavet 63-5	9 [ ]
5.7 (24)	**Immature fruit: green stripes**		
	absent	Daniela, Guanche, Jasminia	1 [ ]
	present	Green Zebra, Tigerella	9 [ ]
5.8 (25)	**Immature fruit: anthocyanin coloration**		
	absent	Durinta	1 [ ]
	present	HN5003	9 [ ]
5.9 (26)	**Fruit: size**		
	very small	Cerise, Sweet 100	1 [ ]
	very small to small	Dolcetini, Genio	2 [ ]
	small	Brioso, Tankini	3 [ ]
	small to medium	Larimar, Progress	4 [ ]
	medium	Mezcal, Oceano	5 [ ]
	medium to large	Luminance, Rio Grande	6 [ ]
	large	Carmello, Floradade	7 [ ]
	large to very large	Florenteen, Grownet	8 [ ]
	very large	Cupidissimo, Marsilia	9 [ ]
5.10 (28)	**Fruit: shape in longitudinal section**		
	flattened	Margold, Marmande VR	1 [ ]
	oblate	Cartesio, Gloriette, Merlice, Montfavet 63-5	2 [ ]
	circular	Cerise, Soussia	3 [ ]
	oblong	Landolino, Red Sky	4 [ ]
	cylindric	Hypeel 244, Sir Elyan	5 [ ]
	elliptic	Obock	6 [ ]
	cordate	Cuor di Bue, Cupidissimo, Laureen, Valenciano	7 [ ]
	ovate	Dualrow, Soto	8 [ ]
	obovate	Duquesa, Estelle, Mezcal	9 [ ]
	pyriform	Oceano, Olivenza, Operino	10 [ ]
	obcordate	Cuore del Ponente, Ingrid	11 [ ]

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

	Characteristics	Example Varieties	Note
5.11 (29)	**Fruit: ribbing**		
	absent or very weak	Cerise, Conchita	1 [ ]
	very weak to weak		2 [ ]
	weak	Baikonur, Guanche	3 [ ]
	weak to medium		4 [ ]
	medium	Montfavet 63-5, Shourouq	5 [ ]
	medium to strong		6 [ ]
	strong	Marmalindo, Marmande VR, Marsilia	7 [ ]
	strong to very strong		8 [ ]
	very strong	Ingrid, Marsalato	9 [ ]
5.12 (36)	**Fruit: number of locules**		
	only two	Creativo, San Marzano 2, Tropical	1 [ ]
	two and three	Bomfado, Orinade	2 [ ]
	three and four	Durinta, Montfavet 63-5	3 [ ]
	four, five or six	Rovente, Tosmar, Tradiro	4 [ ]
	more than six	Bronson, Chocostar, Marmande VR	5 [ ]
5.13 (37)	**Fruit: gel in locules**		
	absent	Allflesh 1120, Nun 03560	1 [ ]
	present	Daniela, Rio Grande	9 [ ]
5.14 (38)	**Fruit: color**		
	yellowish white	Cream Sausage	1 [ ]
	yellow	Babylor, Mimosa	2 [ ]
	orange	Operino, Oranjestar	3 [ ]
	pink	Framboo, Pink Wand, Tomimaru Muchoo	4 [ ]
	red	Daniela, Ferline, Montfavet 63-5, Saint-Pierre, Umaca	5 [ ]
	brown	Chocostar, Marbruni	6 [ ]
	green	Green Grape, Green Zebra	7 [ ]

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

	Characteristics	Example Varieties	Note
5.15 (42)	**Fruit: firmness**		
	very soft	Marmande VR	1 [ ]
	very soft to soft		2 [ ]
	soft	Marinda, Marsalato	3 [ ]
	soft to medium		4 [ ]
	medium	Rosannita, Sunita	5 [ ]
	medium to firm		6 [ ]
	firm	Losna, Octavio, Tradiro	7 [ ]
	firm to very firm		8 [ ]
	very firm	Brito, Daniela, Larimar, Lolek	9 [ ]
5.16 (44)	**Time of maturity**		
	very early	Goldwin, Pyremello, Sweet Baby, Trambellino	1 [ ]
	very early to early	Delisher	2 [ ]
	early	Lemonade, Shiren, Zorayda	3 [ ]
	early to medium		4 [ ]
	medium	Delizia, Losna, Sonico	5 [ ]
	medium to late		6 [ ]
	late	Mariana, Saneh	7 [ ]
	late to very late		8 [ ]
	very late	Atago, Brito, Daniela, Raymos, Wafira	9 [ ]
5.17 (45)	**Resistance to *Meloidogyne incognita* (Mi)**		
	absent or low	Casaque Rouge	1 [ ]
	medium	Campeon, Tyonic	2 [ ]
	high	Anahu, Anahu x Casaque Rouge	3 [ ]
5.18 (46)	**Resistance to *Verticillium* sp. (Va and Vd) - Race 0**		
	absent	Marmande verte, Moneymaker	1 [ ]
	present	Marmande VR, Monalbo	9 [ ]
5.19 (47)	**Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 0EU/1US (Fol: 0EU/1US)**		
	absent	Marmande verte, Moneymaker	1 [ ]
	present	Anabel, Marporum, Marsol	9 [ ]

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

	Characteristics	Example Varieties	Note
5.20 (48)	**Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 1EU/2US (Fol: 1EU/2US)**		
	absent	Marmande verte, Moneymaker	1 [ ]
	present	Motelle	9 [ ]
5.21 (49)	**Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 2EU/3US (Fol: 2EU/3US)**		
	absent	Marmande verte, Motelle	1 [ ]
	present	Alliance, Ivanhoé	9 [ ]
	not tested		[ ]
5.22 (50)	**Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)**		
	absent	Moneymaker, Motelle	1 [ ]
	present	Momor	9 [ ]
	not tested		[ ]
5.23 (51)	**Resistance to *Passalora fulva* (Pf) - Race 0**		
	absent	Monalbo, Moneymaker	1 [ ]
	present	Antique, Pink Treat, Retinto, Sprigel, Triatlon	9 [ ]
	not tested		[ ]
5.24 (52)	**Resistance to *Passalora fulva* (Pf) - Race A**		
	absent	Monalbo, Moneymaker, Retinto	1 [ ]
	present	Antique, Pink Treat, Sprigel, Triatlon	9 [ ]
	not tested		[ ]
5.25 (53)	**Resistance to *Passalora fulva* (Pf) - Race B**		
	absent	Monalbo, Moneymaker, Pink Treat	1 [ ]
	present	Antique, Retinto, Sprigel, Triatlon	9 [ ]
	not tested		[ ]
5.26 (54)	**Resistance to *Passalora fulva* (Pf) - Race C**		
	absent	Monalbo, Moneymaker, Pink Treat, Retinto	1 [ ]
	present	Antique, Sprigel, Triatlon	9 [ ]
	not tested		[ ]

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	Characteristics	Example Varieties	Note
5.27 (55)	**Resistance to *Passalora fulva* (Pf) - Race D**		
	absent	Monalbo, Moneymaker, Triatlon	1 [ ]
	present	Antique, Pink Treat, Retinto, Sprigel	9 [ ]
	not tested		[ ]
5.28 (56)	**Resistance to *Passalora fulva* (Pf) - Race E**		
	absent	Monalbo, Moneymaker	1 [ ]
	present	Antique, Sprigel	9 [ ]
	not tested		[ ]
5.29 (57)	**Resistance to *Passalora fulva* (Pf) - Race F**		
	absent	Monalbo, Moneymaker	1 [ ]
	present	Chelino, Completo	9 [ ]
	not tested		[ ]
5.30 (58)	**Resistance to *Passalora fulva* (Pf) - Race H**		
	absent	Sprigel	1 [ ]
	present	Chelino, Completo	9 [ ]
	not tested		[ ]
5.31 (59)	**Resistance to *Passalora fulva* (Pf) - Race J**		
	absent	Chelino, Completo	1 [ ]
	present	Mogami	9 [ ]
	not tested		[ ]
5.32 (60)	**Resistance to *Tomato mosaic virus* - Strain 0 (ToMV: 0)**		
	absent	Monalbo, Moneymaker	1 [ ]
	present	Mobaci, Mocimor, Momor, Moperou	9 [ ]
5.33 (61)	**Resistance to *Tomato mosaic virus* - Strain 1 (ToMV: 1)**		
	absent	Mobaci, Monalbo, Moneymaker	1 [ ]
	present	Mocimor, Momor, Moperou	9 [ ]
	not tested		[ ]
5.34 (62)	**Resistance to *Tomato mosaic virus* - Strain 2 (ToMV: 2)**		
	absent	Monalbo, Moneymaker, Moperou	1 [ ]
	present	Mobaci, Mocimor, Momor	9 [ ]
	not tested		[ ]

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

	Characteristics	Example Varieties	Note
5.35 (63)	**Resistance to *Phytophthora infestans* (Pi)**		
	absent	Moneymaker, Saint-Pierre	1 [ ]
	present	Phantasia, Sixtina	9 [ ]
	not tested		[ ]
5.36 (64)	**Resistance to *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici)* (Pl)**		
	absent	Marmande verte	1 [ ]
	present	Garance	9 [ ]
	not tested		[ ]
5.37 (65)	**Resistance to *Stemphylium* spp. (Ss)**		
	absent	Monalbo	1 [ ]
	present	Motelle	9 [ ]
	not tested		[ ]
5.38 (66)	**Resistance to *Pseudomonas syringae* pv. *tomato* (Pst)**		
	absent	Monalbo, Moneymaker	1 [ ]
	present	Fuzzer	9 [ ]
	not tested		[ ]
5.39 (67)	**Resistance to *Ralstonia solanacearum* – Race 1 (Rs: 1)**		
	absent	Floradel	1 [ ]
	present	Caraïbo	9 [ ]
	not tested		[ ]
5.40 (68)	**Resistance to *Tomato yellow leaf curl virus* (TYLCV)**		
	absent	Marmande, Moneymaker	1 [ ]
	present	Delyca, Montenegro	9 [ ]
	not tested		[ ]
5.41 (69)	**Resistance to *Tomato spotted wilt virus* - Pathotype 0 (TSWV: 0)**		
	absent	Moneymaker, Montfavet 63-5, Mountain Magic	1 [ ]
	present	Bodar, Mospomor	9 [ ]

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

	Characteristics	Example Varieties	Note
5.42 (70)	**Resistance to *Leveillula taurica* (Lt)**		
	absent	Montfavet 63-5	1 [ ]
	present	Radiance	9 [ ]
	not tested		[ ]
5.43 (71)	**Resistance to *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)* (Pn (ex On))**		
	absent	Montfavet 63-5	1 [ ]
	present	Romiro	9 [ ]
	not tested		[ ]
5.44 (72)	**Resistance to *Tomato torrado virus* (ToTV)**		
	absent	Daniela	1 [ ]
	present	Matias	9 [ ]
	not tested		[ ]

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6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Example	*Immature fruit: green shoulder*	*present*	*absent*

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

7.3.1 Other characteristics

(a) Fruits of the variety reach maturity yes [ ] / no [ ]

(b) LSL gene present yes [ ] / no [ ]

(c) LSL genetics homozygous RIN [ ] / heterozygous RIN [ ]
homozygous NOR [ ] / heterozygous NOR [ ] /
not known [ ] / other (please specify) [ ]

7.3.2 Special conditions for the examination of the variety

(a) Type of culture:

- under glass [ ]
- in the open [ ]

(b) Main use:

-fresh market or garden [ ]

-industrial processing [ ]
- peel [ ]
- paste [ ]
- other [ ]

- pot plant [ ]

- rootstock [ ]

- other [ ]

It is strongly recommended to add a representative colour image of the fruits of the variety to the TQ.

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

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

8. Authorization for release

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

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

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

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

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

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

(a)	Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [ ]	No [ ]
(b)	Chemical treatment (e.g. growth retardant, pesticide)	Yes [ ]	No [ ]
(c)	Tissue culture	Yes [ ]	No [ ]
(d)	Other factors	Yes [ ]	No [ ]

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

.....

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

Applicant’s name

Signature Date

[End of document]