TG/44/11 Rev. 3
ORIGINAL: English
DATE: 2011-10-20 + 2013-03-20
+ 2018-10-30 + 2019-10-29

UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

TOMATO

UPOV Code: SOLAN_LYC

Solanum lycopersicum L.

[*]

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names:[*]

Botanical name	*English*	*French*	*German*	*Spanish*
Solanum lycopersicum L., *Lycopersicon esculentum* Mill., *Lycopersicon lycopersicum* (L.) Karsten ex Farw.	Tomato	Tomate	Tomate	Tomate

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

ASSOCIATED DOCUMENTS

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

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

TABLE OF CONTENTS PAGE

1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Solanum lycopersicum* L..

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed or plants.

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

a)	seed propagated varieties:	10g or 2,500 seeds
b)	vegetatively propagated varieties:	25 plants plus the number required for disease resistance tests

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. For disease resistance testing, additional plant material may be requested.

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

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

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”.

3.3 Conditions for Conducting the Examination

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. On non-staked plants, the time of flowering (characteristic 43) cannot be easily observed due to the branching of the plant.

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 two replicates.

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

3.4.3 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 / 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 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 second column of 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 For the assessment of uniformity, 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 of blade (characteristic 10)
(c) Peduncle: abscission layer (characteristic 19)
(d) Fruit: green shoulder (before maturity) (characteristic 21)
(e) Fruit: size (characteristic 26)
(f) Fruit: shape in longitudinal section (characteristic 28)
(g) Fruit: number of locules (characteristic 36)
(h) Fruit: color (at maturity) (characteristic 37)
(i) Resistance to *Meloidogyne incognita* (Mi) (characteristic 46)
(j) Resistance to *Verticillium* sp. (Va and Vd) – Race 0 (characteristic 47)
(k) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) – Race 0EU/1US (characteristic 48.1)
(l) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) – Race 1EU/2US (characteristic 48.2)
(m) Resistance to Tomato mosaic virus (ToMV) – Strain 0 (characteristic 51.1)
(n) Resistance to Tomato spotted wilt virus (TSWV) - Race 0 (characteristic 58)

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

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

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

State	Note
small	3
medium	5
large	7

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

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

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

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

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

6.5 Legend

(*) Asterisked characteristic – see Chapter 6.1.2

QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

MG, MS, VG, VS – see Chapter 4.1.5

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

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

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. **(+)**	**VG**	**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 Hypocotyls**	**Sólo variedades de reproducción sexuada: Plántula: pigmentación antociánica del hipocótilo**		
QL		absent	absente	fehlend	ausente	Colt, Heinz 8104, Mogeor, Momorvert, VTM215	1
		present	présente	vorhanden	presente	DG-039, Montfavet H 63.4	9
2. **(*)** **(+)**	**VG**	**Plant: growth type**	**Plante : type de croissance**	**Pflanze: Wuchstyp**	**Planta: hábito de crecimiento**		
QL		determinate	déterminée	begrenzt wachsend	determinado	Campbell 1327, Prisca	1
		indeterminate	indéterminée	unbegrenzt wachsend	indeterminado	Marmande VR, Saint-Pierre, San Marzano 2	2
3.	**VG/ MS**	**Only varieties with plant growth type determinate: Plant: number of inflorescences on main stem (side shoots to be removed)**	**Seulement variétés à type de croissance déterminée : Plante : nombre d'inflorescences sur la tige principale (bourgeons axillaires à éliminer)**	**Nur begrenzt wachsende Sorten: Pflanze: Anzahl Blütenstände am Haupttrieb (Seitentriebe sind zu entfernen)**	**Sólo variedades con tipo de crecimiento determinado: Planta: número de inflorescencias en el tallo principal (eliminar ramas axilares)**		
QN		few	petit	gering	bajo	Campbell 1327	3
		medium	moyen	mittel	medio	Montfavet H 63.4	5
		many	grand	groß	alto	Prisca	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
4. **(+)**	**VG**	**Stem: anthocyanin coloration**	**Tige : pigmentation anthocyanique**	**Stengel: Anthocyanfärbung**	**Tallo: pigmentación antociánica**		
QN	**(a)**	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Mogeor, Momorvert,	1
		weak	faible	gering	débil	Montfavet H 63.5	3
		medium	moyenne	mittel	media	Rondello	5
		strong	forte	stark	fuerte	Grinta, Nemato	7
		very strong	très forte	sehr stark	muy fuerte		9
5. **(+)**	**VG/ MS**	**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 unbegrenzt wachsende Sorten: Stengel: Internodienlänge**	**Sólo variedades con tipo de crecimiento indeterminado: Tallo: longitud del entrenudo**		
QN	**(a)**	short	court	kurz	corta	Dombito, Manific, Paso, Trend	3
		medium	moyen	mittel	media	Montfavet H 63.5	5
		long	long	lang	larga	Berdy, Calimero	7
6. **(+)**	**VG/ MS**	**Only varieties with plant growth type indeterminate: Plant: height**	**Seulement les variétés à type de croissance indéterminée : Plante : hauteur**	**Nur unbegrenzt wachsende Sorten: Pflanze: Höhe**	**Sólo variedades con tipo de crecimiento indeterminado: Planta: altura**		
QN		very short	très basse	sehr niedrig	muy corta	Cherry Belle	1
		short	basse	niedrig	corta	Carson, Despina	3
		medium	moyenne	mittel	media	Brooklyn, Buffalo, Vision	5
		long	haute	hoch	larga	Classy, Clarence, Climberly, Massada	7
		very long	très haute	sehr hoch	muy larga	Daydream, Minired	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
7. **(*)** **(+)**	**VG**	**Leaf: attitude**	**Feuille : port**	**Blatt: Haltung**	**Hoja: porte**		
QN	**(a)**	erect	dressé	aufgerichtet	erecto		1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Allround, Drakar, Vitador	3
		horizontal	horizontal	waagerecht	horizontal	Aromata, Triton	5
		semi-drooping	demi-retombant	halbüberhängend	semicolgante	Montfavet H 63.5	7
		drooping	retombant	überhängend	colgante	Multolino, Naram, Tibet	9
8.	**VG/ MS**	**Leaf: length**	**Feuille : longueur**	**Blatt: Länge**	**Hoja: longitud**		
QN	**(a)**	short	courte	kurz	corta	Nelson, Red Robin, Tiny Tim	3
		medium	moyenne	mittel	media	Lorena	5
		long	longue	lang	larga	Montfavet H 63.5	7
9.	**VG/ MS**	**Leaf: width**	**Feuille : largeur**	**Blatt: Breite**	**Hoja: anchura**		
QN	**(a)**	narrow	étroite	schmal	estrecha	Marmande VR, Red Robin, Tiny Tim	3
		medium	moyenne	mittel	media		5
		broad	large	breit	ancha	Saint-Pierre	7
10. **(*)** **(+)**	**VG**	**Leaf: type of blade**	**Feuille : type de limbe**	**Blatt: Typ der Blattspreite**	**Hoja: división del limbo**		
QL	**(a)**	pinnate	penné	gefiedert	pinnada	Mikado, Pilot, Red Jacket	1
		bipinnate	bipenné	doppelt gefiedert	bipinnada	Lukullus, Saint-Pierre	2

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11.	**VG**	**Leaf: size of leaflets**	**Feuille : taille des folioles**	**Blatt: Größe der Blattfiedern**	**Hoja: tamaño de los folíolos**		
(+)							
QN	**(a)**	very small	très petites	sehr klein	muy pequeños	Minitom	1
		small	petites	klein	pequeños	Tiny Tim	3
		medium	moyennes	mittel	medios	Marmande VR, Royesta	5
		large	grandes	groß	grandes	Daniela, Hynema	7
		very large	très grandes	sehr groß	muy grandes	Dombo	9
12.	**VG**	**Leaf: intensity of green color**	**Feuille : intensité de la couleur verte**	**Blatt: Intensität der Grünfärbung**	**Hoja: intensidad del color verde**		
QN	**(a)**	light	claire	hell	clara	Macero II, Poncette, Rossol	3
		medium	moyenne	mittel	media	Lucy	5
		dark	foncée	dunkel	oscura	Allround, Daniela, Lorena, Red Robin	7
13.	**VG**	**Leaf: glossiness**	**Feuille : brillance**	**Blatt: Glanz**	**Hoja: brillo**		
(+)							
QN	**(a)**	weak	faible	gering	débil	Daniela	3
		medium	moyenne	mittel	medio	Marmande VR	5
		strong	forte	stark	fuerte	Guindilla	7
14.	**VG**	**Leaf: blistering**	**Feuille : cloqûre**	**Blatt: Blasigkeit**	**Hoja: abullonado**		
(+)							
QN	**(a)**	weak	faible	gering	débil	Daniela	3
		medium	moyenne	mittel	medio	Marmande VR	5
		strong	forte	stark	fuerte	Delfine, Tiny Tim	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
15. **(+)**	**VG**	**Leaf: attitude of petiole of leaflet in relation to main axis**	**Feuille : port du pétiole par rapport à l'axe central**	**Blatt: Stellung des Blattstiels im Verhältnis zur Hauptachse**	**Hoja: porte del pecíolo de los folíolos en relación con el eje principal**		
QN	**(a)**	semi-erect	demi-dressé	halbaufrecht	semierecto	Blizzard, Marmande VR	3
		horizontal	horizontal	waagerecht	horizontal	Sonatine	5
		semi-drooping	demi-retombant	halbüberhängend	semicolgante	Montfavet H63.5	7
16. **(+)**	**VG/ MS**	**Inflorescence: type**	**Inflorescence : type**	**Blütenstand: Typ**	**Inflorescencia: tipo**		
QN		mainly uniparous	principalement unipare	überwiegend unverzweigt	principalmente unípara	Dynamo	1
		equally uniparous and multiparous	autant unipare que multipare	intermediär	intermedia	Harzfeuer	2
		mainly multiparous	principalement multipare	überwiegend verzweigt	principalmente multípara	Marmande VR	3
17. **(*)**	**VG**	**Flower: color**	**Fleur : couleur**	**Blüte: Farbe**	**Flor: color**		
QL		yellow	jaune	gelb	amarillo	Exota, MarmandeVR	1
		orange	orange	orange	anaranjado	Orama, Pericherry	2
18. **(+)**	**VG**	**Flower: pubescence of style**	**Fleur : pilosité du style**	**Blüte: Behaarung des Griffels**	**Flor: pubescencia del estilo**		
QL		absent	absente	fehlend	ausente	Campbell 1327	1
		present	présente	vorhanden	presente	Saint Pierre	9
19. **(*)** **(+)**	**VG**	**Peduncle: abscission layer**	**Pédoncule : assise d'abscission**	**Blütenstiel: Bruchstelle**	**Pedúnculo: capa de abscisión**		
QL		absent	absente	fehlend	ausente	Aledo, Bandera, Count, Lerica	1
		present	présente	vorhanden	presente	Montfavet H 63.5, Roma	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20. (*) (+)	**VG/ MS**	**Only varieties with peduncle abscission layer present: Pedicel: length**	**Seulement les variétés avec assise d'abscission : Pédicelle : longueur**	**Nur Sorten mit Blütenstiel: Bruchstellen vorhanden: Blütenstandstiel: Länge**	**Sólo para variedades con abscisión: Pedicelo: longitud**		
QN		short	court	kurz	corta	Cerise, Ferline, Montfavet H 63.18, Rossol	3
		medium	moyen	mittel	media	Dario, Primosol	5
		long	long	lang	larga	Erlidor, Ramy, Ranco	7
21. (*) (+)	**VG**	**Fruit: green shoulder (before maturity)**	**Fruit : collet vert (avant maturité)**	**Frucht: grüne Schulter (vor der Reife)**	**Fruto: hombro verde (antes de madurez)**		
QL	**(b)**	absent	absent	fehlend	ausente	Felicia, Rio Grande, Trust	1
		present	présent	vorhanden	presente	Daniela, Montfavet H 63.5	9
22. (+)	**VG**	**Fruit: extent of green shoulder (before maturity)**	**Fruit : extension du collet vert (avant maturité)**	**Frucht: Größe der grünen Schulter (vor der Reife)**	**Fruto: tamaño del hombro verde (antes de madurez)**		
QN	**(b)**	very small	très petit	sehr klein	muy pequeño	Daniela	1
		small	petit	klein	pequeño	Ballet, Cristy, Firestone, Siluet	3
		medium	moyen	mittel	medio	Erlidor, Foxy, Montfavet H 63.5	5
		large	grand	groß	grande	Cobra, Delisa, Epona, Manific	7
23. (+)	**VG**	**Fruit: intensity of green color of shoulder (before maturity)**	**Fruit : intensité de la couleur verte du collet (avant maturité)**	**Frucht: Intensität der Grünfärbung der Schulter (vor der Reife)**	**Fruto: intensidad del color verde del hombro (antes de madurez)**		
QN	**(b)**	light	claire	hell	clara	Ballet, Daniela, Juboline	3
		medium	moyenne	mittel	media	Montfavet H 63.5, Siluet	5
		dark	foncée	dunkel	oscura	Ayala, Erlidor, Xenon	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
24. (*) (+)	**VG**	**Fruit: intensity of green color excluding shoulder (before maturity)**	**Fruit : intensité de la couleur verte à l'exclusion du collet (avant maturité)**	**Frucht: Intensität der Grünfärbung ohne Schulter (vor der Reife)**	**Fruto: intensidad del color verde excepto el hombro (antes de madurez)**		
QN	**(b)**	very light	très claire	sehr hell	muy clara	Clarée	1
		light	claire	hell	clara	Capello, Daniela, Duranto, Durinta, Trust	3
		medium	moyenne	mittel	media	Marmande, Rody	5
		dark	foncée	dunkel	oscura	Ayala, Centella, Tatiana, Uragano	7
		very dark	très foncée	sehr dunkel	muy oscura	Verdi	9
25. (+)	**VG**	**Fruit: green stripes (before maturity)**	**Fruit : stries vertes (avant maturité)**	**Frucht: grüne Flammung (vor der Reife)**	**Fruto: rayas verdes (antes de madurez)**		
QL	**(b)**	absent	absentes	fehlend	ausente	Daniela	1
		present	présentes	vorhanden	presente	Green Zebra, Tigerella	9
26. (*)	**VG**	**Fruit: size**	**Fruit : taille**	**Frucht: Größe**	**Fruto: tamaño**		
QN	**(c)**	very small	très petit	sehr klein	muy pequeño	Cerise, Sweet 100	1
		small	petit	klein	pequeño	Early Mech, Europeel, Roma	3
		medium	moyen	mittel	medio	Alphamech, Diego	5
		large	grand	groß	grande	Carmello, Ringo	7
		very large	très grand	sehr groß	muy grande	Erlidor, Lydia, Muril	9
27. (*)	**VG/ MS**	**Fruit: ratio length/diameter**	**Fruit : rapport longueur/diamètre**	**Frucht: Verhältnis Länge/Durchmesser**	**Fruto: relación longitud/diámetro**		
QN	**(c)**	very compressed	très comprimé	stark zusammengedrückt	muy comprimida	Campbell 28, Marmande VR	1
		moderately compressed	modérément comprimé	mäßig zusammengedrückt	moderadamente comprimida	Alicia	3
		medium	moyen	mittel	media	Early Mech, Peto Gro	5
		moderately elongated	modérément allongé	mäßig langgezogen	moderadamente alargada	Rimone, Rio Grande	7
		very elongated	très allongé	stark langgezogen	muy alargada	Elko, Macero II	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28. (*) (+)	**VG**	**Fruit: shape in longitudinal section**	**Fruit : forme en section longitudinale**	**Frucht: Form im Längsschnitt**	**Fruto: forma en sección longitudinal**		
PQ	**(c)**	flattened	nettement aplatie	abgeflacht	aplanada	Campbell 28, Marmande VR	1
		oblate	aplatie	breitrund	achatada	Montfavet H 63.4, Montfavet H 63.5	2
		circular	ronde	kreisförmig	circular	Cerise, Moneymaker	3
		oblong	oblongue	rechteckig	oblonga	Early Mech, Peto Gro	4
		cylindric	cylindrique	zylindrisch	cilíndrica	Hypeel 244, Macero II, San Marzano 2	5
		elliptic	elliptique	elliptisch	elíptica	Alcaria, Castone	6
		cordate	cordiforme	herzförmig	cordada	Valenciano	7
		ovate	ovale	eiförmig	oval	Dualrow, Soto	8
		obovate	obovale	verkehrt eiförmig	oboval	Duquesa, Estelle Rimone, Rio Grande	9
		pyriform	pyriforme	birnenförmig	piriforme	Europeel	10
		obcordate	obcordiforme	verkehrt herzförmig	obcordada	Cuore del Ponente, Magno	11
29. (*) (+)	**VG**	**Fruit: ribbing at peduncle end**	**Fruit : côtes au niveau de l'attache pédonculaire**	**Frucht: Rippung am Stielende**	**Fruto: acostillado en la zona peduncular**		
QN	**(c)**	absent or very weak	absentes ou très faibles	fehlend oder sehr gering	ausente o muy débil	Calimero, Cerise	1
		weak	faibles	gering	débil	Early Mech, Hypeel 244, Melody, Peto Gro, Rio Grande	3
		medium	moyennes	mittel	medio	Montfavet H 63.4, Montfavet H 63.5	5
		strong	fortes	stark	fuerte	Campbell 1327, Carmello, Count	7
		very strong	très fortes	sehr stark	muy fuerte	Costeluto Fiorentino, Ingrid, Marmande VR	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30. **(+)**	**VG**	**Fruit: depression at peduncle end**	**Fruit : dépression à l'attache pédonculaire**	**Frucht: Einsenkung am Stielende**	**Fruto: depresión en la zona peduncular**		
QN	**(c)**	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Europeel, Heinz 1706, Rossol, Sweet Baby	1
		weak	faible	gering	débil	Futuria, Melody	3
		medium	moyenne	mittel	media	Carmello, Count, Fandango, Saint-Pierre	5
		strong	forte	stark	fuerte	Ballon Rouge, Marmande VR	7
31. **(+)**	**VG/ MS**	**Fruit: size of peduncle scar**	**Fruit : taille de la cicatrice pédonculaire**	**Frucht: Größe des Stielansatzes**	**Fruto: tamaño de la cicatriz peduncular**		
QN	**(c)**	very small	très petite	sehr klein	muy pequeña	Cerise, Heinz 1706, Sweet Baby	1
		small	petite	klein	pequeña	Early Mech, Peto Gro, Rio Grande	3
		medium	moyenne	mittel	media	Montfavet H 63 4, Montfavet H 63 5	5
		large	grande	groß	grande	Apla, Campbell 1327, Carmello, Fandango, Flora Dade	7
		very large	très grande	sehr groß	muy grande	Marmande VR	9
32. **(+)**	**VG/ MS**	**Fruit: size of blossom scar**	**Fruit : taille de la cicatrice pistillaire**	**Frucht: Größe des Blütenansatzes**	**Fruto: tamaño de la cicatriz pistilar**		
QN	**(c)**	very small	très petite	sehr klein	muy pequeña	Cerise, Early Mech, Europeel, Heinz 1706, Peto Gro, Rio Grande	1
		small	petite	klein	pequeña	Montfavet H 63.4, Montfavet H 63.5	3
		medium	moyenne	mittel	media	Alphamech, Apla, Carmello, Floradade	5
		large	grande	groß	grande	Campbell 1327, Count, Marmande VR, Saint-Pierre	7
		very large	très grande	sehr groß	muy grande	Rozova Magia	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
33. **(+)**	**VG**	**Fruit: shape at blossom end**	**Fruit : forme au sommet**	**Frucht: Form am Blütenende**	**Fruto: forma del extremo distal**		
QN	**(c)**	indented	déprimée	eingesenkt	hundida	Marmande VR, Super Mech	1
		indented to flat	déprimée à aplatie	eingesenkt bis flach	hundida a plana		2
		flat	aplatie	flach	plana	Montfavet H 63.4, Montfavet H 63.5	3
		flat to pointed	aplatie à pointue	flach bis spitz	plana a puntiaguda	Cal J, Early Mech, Peto Gro	4
		pointed	pointue	spitz	puntiaguda	Europeel, Heinz 1706, Hypeel 244, Roma VF	5
34. **(+)**	**VG/ MS**	**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**		
QN	**(c)**	very small	très petite	sehr klein	muy pequeño	Cerise	1
		small	petite	klein	pequeño	Early Mech, Europeel, Heinz 1706, Peto Gro, Rio Grande, Rossol	3
		medium	moyenne	mittel	medio	Montfavet H 63.4, Montfavet H 63.5	5
		large	grande	groß	grande	Apla, Campbell 1327, Carmello, Count, Fandango, Floradade	7
		very large	très grande	sehr groß	muy grande	Marmande VR, Valenciano	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
35. **(+)**	**VG**	**Fruit: thickness of pericarp**	**Fruit : épaisseur du péricarpe**	**Frucht: Dicke des Perikarps**	**Fruto: espesor del pericarpio**		
QN	**(c)**	very thin	très mince	sehr dünn	muy delgado	Cerise	1
		thin	mince	dünn	delgado	Marmande VR	3
		medium	moyen	mittel	medio	Carmello, Europeel, Floradade, Heinz 1706, Montfavet H 63.5	5
		thick	épais	dick	grueso	Cal J, Daniela, Ferline, Peto Gro, Rio Grande	7
		very thick	très épais	sehr dick	muy grueso	Myriade, Rondex	9
36. **(*)** **(+)**	**VG/** **MS**	**Fruit: number of locules**	**Fruit : nombre de loges**	**Frucht: Anzahl Kammern**	**Fruto: número de lóculos**		
QN	**(c)**	only two	seulement deux	nur zwei	sólo dos	Early Mech, Europeel, San Marzano,	1
		two and three	deux et trois	zwei und drei	dos y tres	Alphamech, Futuria	2
		three and four	trois et quatre	drei und vier	tres y cuatro	Montfavet H 63.5	3
		four, five or six	quatre, cinq ou six	vier, fünf oder sechs	cuatro, cinco o seis	Raïssa, Tradiro	4
		more than six	plus de six	mehr als sechs	más de seis	Marmande VR	5
37. **(*)** **(+)**	**VG**	**Fruit: color (at maturity)**	**Fruit : couleur (à maturité)**	**Frucht: Farbe (bei Reife)**	**Fruto: color (en la madurez)**		
PQ	**(c)**	cream	crème	cremefarben	crema	Jazon, White Mirabell	1
		yellow	jaune	gelb	amarillo	Goldene Königin, Yellow Pear	2
		orange	orange	orange	anaranjado	Sungold	3
		pink	rose	rosa	rosa	Aichi First	4
		red	rouge	rot	rojo	Daniela, Ferline, Montfavet H 63.5	5
		brown	brunâtre	braun	marronáceo	Ozyrys	6
		green	vert	grün	verde	Green Grape, Green Zebra	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
38. **(*)** **(+)**	**VG**	**Fruit: color of flesh (at maturity)**	**Fruit : couleur de la chair (à maturité)**	**Frucht: Fleischfarbe (bei Reife)**	**Fruto: color de la pulpa (en la madurez)**		
PQ	**(c)**	cream	crème	cremefarben	crema	Jazon	1
		yellow	jaune	gelb	amarillo	Jubilée	2
		orange	orange	orange	anaranjado	Sungold	3
		pink	rose	rosa	rosa	Regina	4
		red	rouge	rot	rojo	Ferline, Saint-Pierre	5
		brown	brunâtre	braun	marrón	Ozyrys	6
		green	verte	grün	verde	Green Grape, Green Zebra	7
39.	**VG**	**Fruit: glossiness of skin**	**Fruit : brillance de la peau**	**Frucht: Glanz der Schale**	**Fruto: brillo de la epidermis**		
QN	**(c)**	weak	faible	gering	débil	Josefina	1
		medium	moyenne	mittel	medio	Roncardo	2
		strong	forte	stark	fuerte	Mecano	3
40. **(+)**	**VG**	**Fruit: color of epidermis**	**Fruit : couleur de l'épiderme**	**Frucht: Farbe der Epidermis**	**Fruto: color de la epidermis**		
QL	**(c)**	colorless	incolore	farblos	incoloro	Fruits, House Momotaro	1
		yellow	jaune	gelb	amarillo	Black Cherry, Daniela, Kurikoma	2
41. **(*)** **(+)**	**VG**	**Fruit: firmness**	**Fruit : fermeté**	**Frucht: Festigkeit**	**Fruto: firmeza**		
QN	**(c)**	very soft	très mou	sehr weich	muy blando	Marmande VR	1
		soft	mou	weich	blando	Trend	3
		medium	moyen	mittel	medio	Cristina	5
		firm	ferme	fest	firme	Fernova, Konsul, Tradiro	7
		very firm	très ferme	sehr fest	muy firme	Daniela, Karat, Lolek	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
42. **(+)**	**VG**	**Fruit: shelf-life**	**Fruit : durée de conservation**	**Frucht: Haltbarkeit**	**Fruto: vida de anaquel**		
QN		very short	très courte	sehr kurz	muy corta	Marmande VR	1
		short	courte	kurz	corta	Rambo	3
		medium	moyenne	mittel	media	Durinta	5
		long	longue	lang	larga	Daniela	7
		very long	très longue	sehr lang	muy larga	Ernesto	9
43. **(+)**	**MS**	**Time of flowering**	**Époque de floraison**	**Zeitpunkt der Blüte**	**Época de floración**		
QN		early	précoce	früh	precoz	Feria, Primabel	3
		medium	moyenne	mittel	media	Montfavet H 63.5, Prisca	5
		late	tardive	spät	tardía	Manific, Saint-Pierre	7
44. **(*)** **(+)**	**MG**	**Time of maturity**	**Époque de maturité**	**Zeitpunkt der Reife**	**Época de madurez**		
QN		very early	très précoce	sehr früh	muy precoz	Dolcevita, Sungold, Sweet Baby	1
		early	précoce	früh	precoz	Bianca, Rossol, Shiren	3
		medium	moyenne	mittel	media	Gourmet, UC 82B	5
		late	tardive	spät	tardía	Arletta, Durinta	7
		very late	très tardive	sehr spät	muy tardía	Daniela	9
45. **(+)**	**VG**	**Sensitivity to silvering**	**Sensibilité à l'argenture**	**Empfindlichkeit für Silberblattbildung**	**Sensibilidad al plateado**		
QL		insensitive	insensible	fehlend	insensible	Marathon, Quest, Sano, Tradiro	1
		sensitive	sensible	vorhanden	sensible	Belliro, Paradiso, Sonatine	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
46. **(*)** **(+)**	**VG**	**Resistance to *Meloidogyne incognita* (Mi)**	**Résistance à *Meloidogyne incognita* (Mi)**	**Resistenz gegen *Meloidogyne incognita* (Mi)**	**Resistencia a *Meloidogyne incognita* (Mi)**		
QN		susceptible	sensible	anfällig	sensible	Casaque Rouge	1
		moderately resistant	modérément résistante	mäßig resistent	moderadamente resistente	Campeon, Madyta, Vinchy	2
		highly resistant	fortement résistante	stark resistent	muy resistente	Anabel, Anahu	3
47. **(*)** **(+)**	**VG**	**Resistance to *Verticillium* sp. (Va and Vd)** **– Race 0**	**Résistance à *Verticillium* sp. (Va et Vd)** **– Pathotype 0**	**Resistenz gegen *Verticillium* sp. (Va und Vd)** **– Pathotyp 0**	**Resistencia a *Verticillium* sp. (Va y Vd)** **– Raza 0**		
QL		absent	absente	fehlend	ausente	Anabel, Marmande verte	1
		present	présente	vorhanden	presente	Daniela, Marmande VR	9
48. **(+)**	**VG**	**Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol)**	**Résistance à *Fusarium oxysporum* f. sp. *lycopersici* (Fol)**	**Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* (Fol)**	**Resistencia a *Fusarium oxysporum* f. sp. *lycopersici* (Fol)**		
48.1 **(*)**	**VG**	**– Race 0EU/1US**	**– Race 0EU/1US**	**– Pathotyp 0EU/1US**	**– Raza 0EU/1US**		
QL		absent	absente	fehlend	ausente	Marmande verte	1
		present	présente	vorhanden	presente	Anabel, Marporum, Marsol	9
48.2 **(*)**	**VG**	**– Race 1EU/2US**	**– Race 1EU/2US**	**– Pathotyp 1EU/2US**	**– Raza 1EU/2US**		
QL		absent	absente	fehlend	ausente	Marmande verte	1
		present	présente	vorhanden	presente	Motelle, Walter	9
48.3	**VG**	**– Race 2EU/3US**	**– Race 2EU/3US**	**– Pathotyp 2EU/3US**	**– Raza 2EU/3US**		
QL		absent	absente	fehlend	ausente	Marmande verte, Motelle	1
		present	présente	vorhanden	presente	Alliance, Florida, Ivanhoé, Tributes	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
49. **(+)**	**VG**	**Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (Forl)**	**Résistance à *Fusarium oxysporum* f. sp. *radicis-lycopersici* (Forl)**	**Resistenz gegen *Fusarium oxysporum* f. sp. *radicis-lycopersici* (Forl)**	**Resistencia a *Fusarium oxysporum* f. sp. *radicis-lycopersici* (Forl)**		
QL		absent	absente	fehlend	ausente	Motelle	1
		present	présente	vorhanden	presente	Momor	9
50. **(+)**	**VG**	**Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)**	**Résistance à *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)**	**Resistenz gegen *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)**	**Resistencia a *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)**		
50.1	**VG**	**– Race 0**	**– Pathotype 0**	**– Pathotyp 0**	**– Raza 0**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Angela, Estrella, Sonatine, Sonato, Vemone	9
50.2	**VG**	**– Group A**	**– Groupe A**	**– Gruppe A**	**– Grupo A**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Angela, Estrella, Sonatine, Sonato	9
50.3	**VG**	**– Group B**	**– Groupe B**	**– Gruppe B**	**– Grupo B**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Angela, Estrella, Sonatine, Sonato, Vemone	9
50.4	**VG**	**– Group C**	**– Groupe C**	**– Gruppe C**	**– Grupo C**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Angela, Estrella, Sonatine	9
50.5	**VG**	**– Group D**	**– Groupe D**	**– Gruppe D**	**– Grupo D**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Estrella, Sonatine, Vemone	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
50.6	**VG**	**– Group E**	**– Groupe E**	**– Gruppe E**	**– Grupo E**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Jadviga, Rhianna, Sonatine	9
51. **(+)**	**VG**	**Resistance to Tomato mosaic virus (ToMV)**	**Résistance au virus de la mosaïque de la tomate (ToMV)**	**Resistenz gegen das Tomatenmosaik-virus (ToMV)**	**Resistencia al virus del mosaico del tomate (ToMV)**		
51.1	**VG**	**– Strain 0**	**– Souche 0**	**– Pathotyp 0**	**– Cepa 0**		
QL		absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
		present	présente	vorhanden	presente	Mobaci, Mocimor, Momor, Moperou	9
51.2	**VG**	**– Strain 1**	**– Souche 1**	**– Pathotyp 1**	**– Cepa 1**		
QL		absent	absente	fehlend	ausente	Monalbo, Moneymaker	1
		present	présente	vorhanden	presente	Mocimor, Momor, Moperou	9
51.3	**VG**	**– Strain 2**	**– Souche 2**	**– Pathotyp 2**	**– Cepa 2**		
QL		absent	absente	fehlend	ausente	Monalbo, Moneymaker, Moperou	1
		present	présente	vorhanden	presente	Mobaci, Mocimor, Momor	9
52. **(+)**	**VG**	**Resistance to *Phytophthora infestans* (Pi)**	**Résistance à *Phytophthora infestans* (Pi)**	**Resistenz gegen *Phytophthora infestans* (Pi)**	**Resistencia a *Phytophthora infestans* (Pi)**		
QL		absent	absente	fehlend	ausente	Heinz 1706, Saint Pierre	1
		present	présente	vorhanden	presente	Fline, Heline, Pieraline, Pyros	9
53. **(+)**	**VG**	**Resistance to *Pyrenochaeta lycopersici* (Pl)**	**Résistance à *Pyrenochaeta lycopersici* (Pl)**	**Resistenz gegen *Pyrenochaeta lycopersici* (Pl)**	**Resistencia a *Pyrenochaeta lycopersici* (Pl)**		
QL		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
54. **(+)**	**VG**	**Resistance to *Stemphylium* spp. (Ss)**	**Résistance à *Stemphylium* spp. (Ss)**	**Resistenz gegen *Stemphylium* spp. (Ss)**	**Resistencia a *Stemphylium* spp. (Ss)**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Motelle	9
55. **(+)**	**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)**		
QL		absent	absente	fehlend	ausente	Monalbo	1
		present	présente	vorhanden	presente	Ontario 7710	9
56. **(+)**	**VG**	**Resistance to *Ralstonia solanacearum* (Rs)** **– Race 1**	**Résistance à *Ralstonia solanacearum* (Rs)** **– Pathotype 1**	**Resistenz gegen *Ralstonia solanacearum* (Rs)** **– Pathotyp 1**	**Resistencia a *Ralstonia solanacearum* (Rs)** **– Raza 1**		
QL		absent	absente	fehlend	ausente	Floradel	1
		present	présente	vorhanden	presente	Caraïbo	9
57. **(+)**	**VG**	**Resistance to Tomato yellow leaf curl virus (TYLCV)**	**Résistance au virus des feuilles jaunes en cuillère de la tomate (TYLCV)**	**Resistenz gegen gelbes Tomatenblatt-rollvirus (TYLCV)**	**Resistencia al virus del rizado amarillo de la hoja del tomate (TYLCV)**		
QL		absent	absente	fehlend	ausente	Marmande, Moneymaker	1
		present	présente	vorhanden	presente	Anastasia, Mohawk, TY 20	9
58. **(+)**	**VG**	**Resistance to Tomato spotted wilt virus (TSWV)** **- Race 0**	**Résistance au virus de la tache bronzée de la tomate (TSWV)** **– Pathotype 0**	**Resistenz gegen das Tomatenbronzen-fleckenvirus (TSWV)** **- Pathotyp 0**	**Resistencia al virus del bronceado del tomate (TSWV)** **– Raza 0**		
QL		absent	absente	fehlend	ausente	Moneymaker, Montfavet H 63.5, Mountain Magic	1
		present	présente	vorhanden	presente	Bodar, Montealto	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
59. **(+)**	**VG**	**Resistance to *Leveillula taurica* (Lt)**	**Résistance à *Leveillula taurica* (Lt)**	**Resistenz gegen *Leveillula taurica* (Lt)**	**Resistencia a *Leveillula taurica* (Lt)**		
QL		absent	absente	fehlend	ausente	Montfavet H 63.5	1
		present	présente	vorhanden	presente	Atlanta	9
60. **(+)**	**VG**	**Resistance to *Oidium neolycopersici* (On) (ex *Oidium lycopersicum* (Ol))**	**Résistance à *Oidium neolycopersici* (On) (ex *Oidium lycopersicum* (Ol))**	**Resistenz gegen *Oidium neolycopersici* (On) (ex *Oidium lycopersicum* (Ol))**	**Resistencia a *Oidium neolycopersici* (On) (ex *Oidium lycopersicum* (Ol))**		
QL		absent	absente	fehlend	ausente	Montfavet H 63.5	1
		present	présente	vorhanden	presente	Romiro	9
61. **(+)**	**VG**	**Resistance to Tomato torrado virus (ToTV)**	**Résistance au virus tomato torrado (ToTV)**	**Resistenz gegen Tomato Torrado Virus (ToTV)**	**Resistencia al virus del torrado del tomate (ToTV)**		
QL		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 second column of the Table of Characteristics should be examined as indicated below:

(a) In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five trusses and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on the second truss. Observations should be done before deterioration of the leaves.
(b) Observations should be made on the plant before maturity (see Ad. 44).
(c) Observations should be made on fruits at maturity (see Ad. 44) 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

1
absent

9
present

Ad. 2: Plant: growth type

Determinate (1):

This type produces a fix number of trusses on each stem. The number of trusses is different among varieties (Note: can be influenced by agro climatic conditions). In this type, the number of leaves or internodes between inflorescence is irregular within a plant and varies from one to three. The stem ends with an inflorescence and no lateral shoots are produced.

This type also includes some so-called "semi-determinate" varieties which do not have consistently three leaves or internodes between inflorescences, and show semi-determinate growth, for example, with the termination of the stem with the 9th inflorescence (e.g. 'Prisca' type) or higher than the 20th inflorescence (e.g. Early Pack type).

Indeterminate (2):

In this type, as a rule, three leaves or internodes are observed between inflorescences. After every group of three leaves, the plant produces three buds: the terminal bud is transformed into an inflorescence and one of the two lateral buds starts the prolongation of stem. Plants of this type grow with the continuous repetition of this growth pattern.

It should be noted that sometimes only two leaves or internodes might be observed between inflorescences in some parts of plants in a certain group of indeterminate variety types (e.g. varieties originating from 'Daniela'). These varieties nevertheless are indeterminate.

This type includes 'Marmande' and 'Costoluto Fiorentino' types which might be considered to be categorized into an intermediate class between indeterminate and determinate, but they always have three leaves or internodes between inflorescences. They should therefore be categorized into the indeterminate type.

Ad. 4. Stem: anthocyanin coloration

Most of the varieties are classed 1 to 5. Expression of anthocyanin is influenced by day temperature. Under greenhouse conditions, the variation is rather low.

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

The length of the internode should be observed/measured 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 1st and 4th trusses. 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 growth type indeterminate: Plant: height

The height of the plant should be measured at one time for the whole trial, e.g. 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 in respect to the main stem should be observed. The line in the picture indicates the angle between the stem and leaf (middle third of petiole).

3
semi-erect

5
horizontal

7
semi-drooping

9
drooping

Ad. 10: Leaf: type of blade

Pinnate leaf: primary leaflets do not bear secondary leaflets
Bipinnate leaf: primary leaflets again are pinnate, so they bear secondary leaflets

1
pinnate

2
bipinnate

Ad. 11: Leaf: size of leaflets

The size of leaflet should be observed in the middle of the leaf.

Ad. 13: Leaf: glossiness

The glossiness of the leaf should be observed in the middle of the plant.

Ad. 14: Leaf: blistering

Caution is required for confusion between blistering and creasing.

Blistering is the difference in height of the surface of the leaf between the veins. Creasing is independent form the veins. The blistering should be observed in the middle third of the plant.

blistering

creasing

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

3	5	7
semi-erect	horizontal	semi-drooping

The attitude should be observed in the middle third of the plant.

Ad. 16: Inflorescence: type

The number of uniparous and multiparous trusses on the second and third truss of 10 plants should be counted. When the ratio of uniparous to multiparous is 40-60 percent, the expression of the characteristic should correspond to note "2".

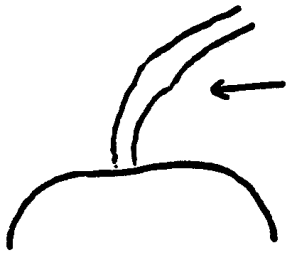
uniparous multiparous (biparous)

multiparous (triparous)

Ad. 18: Flower: pubescence of style

Some varieties with pubescence of style "present" may have only rare and small hairs at the base of the style

Ad. 19: Peduncle: abscission layer

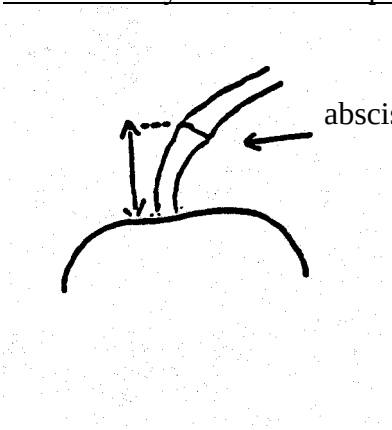


1
absent

9
present

Varieties which have only a collar instead of an abscission layer are heterozygous for the gene which controls the presence of the joint. These varieties are considered jointless and the abscission layer is considered absent.

Ad. 20: Only varieties with peduncle abscission layer present: Pedicel: length



Ad. 21: Fruit: green shoulder (before maturity)

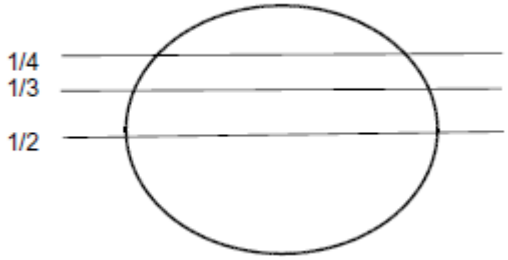
The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.

1
absent

9
present

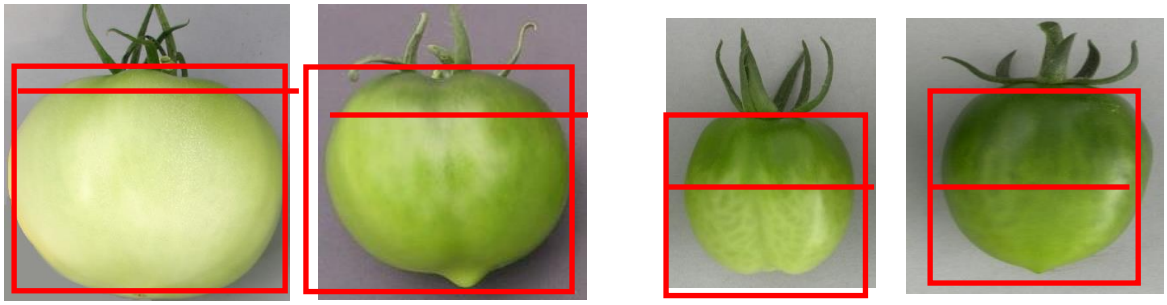
Ad. 22: Fruit: extent of green shoulder (before maturity)

The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.



3: small (1/4)
5: medium (1/3)

7: large (1/2)



1
very small

3
small

5
medium

7
large

Ad. 23: Fruit: intensity of green color of shoulder (before maturity)
Ad. 24: Fruit: intensity of green color excluding shoulder (before maturity)

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. The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.

Ad. 25: Fruit: green stripes (before maturity)

The green stripes should be observed before maturity, *excluding* the green shoulder.

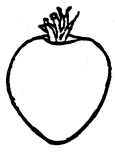
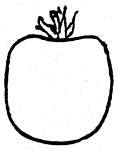
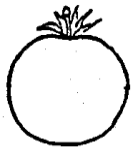
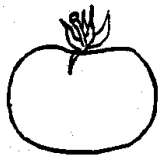
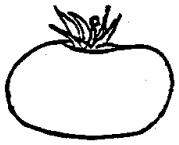
1
absent

9
present

Ad. 28: Fruit: shape in longitudinal section

	← broadest part →		
	(below middle)	at middle	(above middle)

broad (compressed) ← width (ratio length/width) → narrow (elongated)

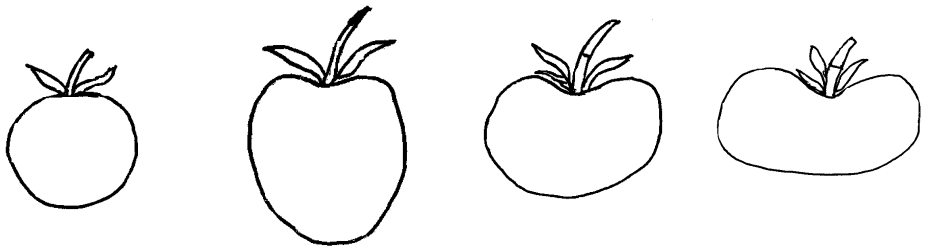
 10 pyriform	 8 ovate	 (parallel) 5 cylindric	 (rounded) 6 elliptic	 9 obovate	 7 cordate
 11 obcordate		 (parallel) 4 oblong	 (rounded) 3 circular		
		 2 oblate			
		 1 flattened			

The apex is considered to be the part that is farthest from the peduncle end.

Ad. 29: Fruit: ribbing at peduncle end

1	3	5	7	9
absent or very weak	weak	medium	strong	very strong

Ad. 30: Fruit: depression at peduncle end



1	3	5	7
absent or very weak	weak	medium	strong

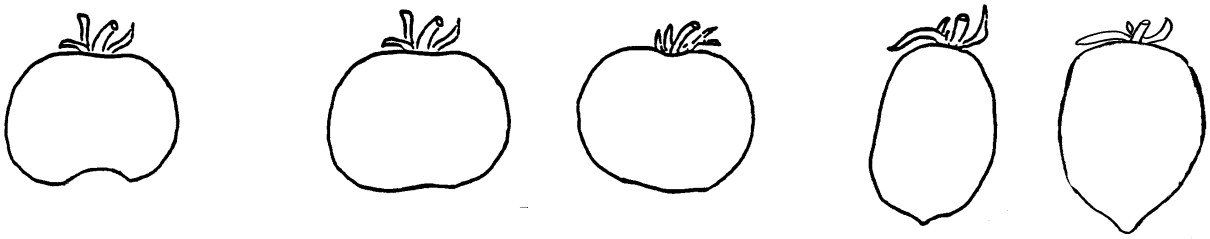
Ad. 31: Fruit: size of peduncle scar

The size of the peduncle scar has to be observed as an absolute characteristic, i.e. irrespective of the size of the fruit. The peduncle should be removed and the green ring observed (not the full scar).

Ad. 32: Fruit: size of blossom scar

The size of the blossom scar has to be observed as an absolute characteristic, i.e. irrespective of the size of the fruit.

Ad. 33: Fruit: shape at blossom end



1	2	3	4	5
indented	indented to flat	flat	flat to pointed	pointed

1	3	5
indented	flat	pointed

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

1	3	5	7	9
very small	small	medium	large	very large

Ad. 35: Fruit: thickness of pericarp

The absolute thickness of the pericarp should be observed, i.e. irrespective of the size of the fruit.

Ad. 36: Fruit: number of locules

This characteristic is assessed by making cross sections of representative shaped and sized fruits but excluding the first and last fruits from 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: color (at maturity)

The color at maturity has to be observed after a full change of color, when placenta is found clearly in the cross section.

Ad. 38: Fruit: color of flesh (at maturity)

The color of flesh should be observed at maturity (see Ad. 44).

Ad. 40: Fruit: color of epidermis

The color of the epidermis should be observed after the epidermis has been peeled off the fruit.

Ad. 41: Fruit: firmness

Method

Harvesting stage: fruits should be harvested when they are completely coloured.

Determining firmness: determine by hand the firmness of the fruits compared to the standard varieties.

Ad. 42: Fruit: shelf-life

The length of shelf life is estimated by the number of weeks that the fruit remains commercially viable on the shelf.

Twenty fruits per plot (2 per plant) are picked from the 4th, 5th or 6th cluster in similar stages of exterior ripening (when green color disappears in half of whole fruit). Fruits are stored in boxes in single layers. The boxes can be stored one on top on another if they permit the air to circulate between them. The storage place does not need to be climatically controlled, but must have similar conditions to those in which the trial was performed, but not in direct sunshine. An observation is made every 7 days, noting the firmness of fruits, taking care not to damage them, and removing those accidentally damaged or rotten. The observation is made to determine when the firmness of fruits becomes no longer commercially viable (the firmness is lower than or equal to Note 3 “soft” in characteristics 40). The length of shelf life is calculated by the number of weeks between picking of fruits and the time that the firmness becomes no longer commercially viable.

The observations can be completed in the 8th week if some varieties still remain.

Ad. 43: Time of flowering

For staked varieties, this characteristic is assessed by observing the flowering date of the third flower on the second [and third] trusses, plant by plant. It is recommended not to record the time of flowering on the first truss, as the expression on the first truss is more influenced by the seed vigor and the plantation quality.

The date of flowering is recorded by the plot average, truss by truss.

For determinate non-staked varieties, it is recommended to grow them on pruned stakes on the main stem and to record the characteristics in the same way as those for 'staked varieties'. On non-staked plants, this characteristic cannot be easily observed due to the branching of the plant.

Ad. 44: Time of maturity

This characteristic is assessed by observing the date of maturity of the first fully ripe fruit on the second truss, plant by plant. It is recommended not to record the time of maturity on the first truss, as the expression on the first truss is more influenced by the seed vigor and the plantation quality.

The date of maturity is recorded by the plot average, truss by truss.

This characteristic can be observed as described on all types of tomato varieties, irrespective whether the plants are staked or non-staked.

Ad. 45: Sensitivity to silvering

Method:

Evaluation: Evaluation is done on fully-grown plants

Execution of test: As silvering only occurs under specific growing conditions, these conditions have to be present during growth

Sowing: Under short day conditions (November/December in Northern Europe). Normal planting in the soil or in an artificial medium in the greenhouse

Temperature: day temperature maximum 18°C

Light: normal daylight

Growing method: no special method necessary

Duration of test: 4 - 5 months

Number of plants tested: minimum of 20

Observation of the expression: A visual survey has to be made on the presence of leaves that show signs of silvering

Standard varieties: expression absent: Marathon, Sano
expression present: Sonatine

It is to be noted that this characteristic may not be observable under "sunny" climates

Ad. 46: Resistance to *Meloidogyne incognita* (Mi)

1. Pathogen	*Meloidogyne incognita*
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	Naktuinbouw[1] (NL) or GEVES[2] (FR)
5. Isolate	non-resistance breaking
6. Establishment isolate identity	use rootstock or tomato standards
7. Establishment pathogenicity	use susceptible rootstock or tomato standard
8. Multiplication inoculum	
8.1 Multiplication medium	living plant
8.2 Multiplication variety	preferably resistant to powdery mildew
8.3 Plant stage at inoculation	see 10.3
8.5 Inoculation method	see 10.4
8.6 Harvest of inoculum	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
8.8 Shelf life/viability inoculum	1 day
9. Format of the test	
9.1 Number of plants per genotype	20 plants
9.2 Number of replicates	1 replicate
9.3 Control varieties	
Susceptible	Clairvil, Casaque Rouge
Moderately resistant	Campeon, Madyta, Vinchy
Highly resistant	Anabel, Anahu, Anahu x Casaque Rouge
9.4 Test design	include standard varieties
9.5 Test facility	greenhouse or climate room
9.6 Temperature	not over 28° C
9.7 Light	at least 12 h per day
10. Inoculation	
10.1 Preparation inoculum	small pieces of diseased root mixed with soil mix soil and infested root pieces
10.2 Quantification inoculum	soil: root ratio = 8:1, or depending on experience
10.3 Plant stage at inoculation	seed, or cotyledons
10.4 Inoculation method	plants are sown in infested soil or contamination of soil after sowing when plantlets are at cotyledon stage
10.7 Final observations	28 to 45 days after inoculation
11. Observations	
11.1 Method	root inspection
11.2 Observation scale	symptoms: galling, root malformation, growth reduction, plant death
11.3 Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls on standards

12. Interpretation of test results in comparison with control varieties:

To consider that resistant varieties may have a few plants with a few galls. These are not considered as off-types.

absent (susceptible)	[1]	growth strongly reduced, high gall count
intermediate (moderately resistant)	[2]	medium growth reduction, medium gall count
present (highly resistant)	[3]	present; no growth reduction, no galls

13. Critical control points:

Avoid rotting of roots; high temperature causes breakdown of resistance.

[1] Naktuinbouw: resistentie@naktuinbouw.nl
[2] Geves: matref@geves.fr

Ad. 47: Resistance to *Verticillium* sp. (Va and Vd)

1. Pathogen	*Verticillium dahliae* or *Verticillium albo-atrum*
3. Host species.....	*Solanum lycopersicum*
4. Source of inoculum	Naktuinbouw[3] (NL) and GEVES[4] (FR)
5. Isolate	Race 0 (e.g. strain Toreilles 4-1-4-1)
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 inoculums .	spore count; adjust to 10^6 per ml
8.8 Shelf life/viability inoculums...	1 d at 4°C
9. Format of the test	
9.1 Number of plants per genotype	35 seeds for 24 plants
9.2 Number of replicates	1 replicate
9.3 Control varieties	
Susceptible	Flix, Marmande verte, Clarion, Santonio, Anabel
Resistant	Monalbo, Elias, Monalbo x Marmande verte, Daniela, Marmande VR
9.4 Test design.....	20 plants inoculated at least, 2 blanks at least
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 inoculums.....	aerated, liquid culture (8.4)
10.2 Quantification inoculums.....	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.
10.7 Final observations	14-33 d 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 test results in comparison with control varieties

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.

[3] Naktuinbouw: resistentie@naktuinbouw.nl
[4] Geves: matref@geves.fr

Ad. 48: Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol)

1.	Pathogen	*Fusarium oxysporum* f. sp. *lycopersici*
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw[5] (NL), GEVES[6] (FR) or INIA[7] (ES)
5.	Isolate	race 0EU/1US (e.g. strains Orange 71 or PRI 20698 or Fol 071) race 1EU/2US (e.g. strains 4152 or PRI40698 or RAF 70) race 2EU/3US (e.g. strain Fol029)
6.	Establishment isolate identity	use differential varieties (see ISF website: http://www.worldseed.org)
7.	Establishment pathogenicity	on susceptible tomato varieties
8.	Multiplication inoculum	
8.1	Multiplication medium	Potato Dextrose Agar, Medium "S" of Messiaen
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	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	1 replicate
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, Mohawk, Tradiro
9.3.2	Control varieties for the test with race 1EU/2US	
	Susceptible	Marmande verte, Cherry Belle, Roma, Marporum, Ranco, Moneymaker
	Resistant	Tradiro, Odisea, "Motelle x Marmande verte", Motelle
9.3.3	Control varieties for the test with race 2EU/3US	
	Susceptible	Marmande verte, Motelle, Marporum
	Resistant	Tributes, Murdoch, "Marmande verte x Florida", Alliance, Florida, Ivanhoe
9.4	Test design	>20 plants; e.g. 35 seeds for 24 plants, including 2 blanks
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

[5] Naktuinbouw: resistentie@naktuinbouw.nl
[6] GEVES: matref@geves.fr
[7] INIA: resistencias@inia.es

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 Messiaen or PDA or Agar Medium S of Messiaen or Czapek Dox culture or scraping of plates
10.2	Quantification inoculum	spore count, adjust to 10^6 spores per ml, lower concentration for a very aggressive isolate
10.3	Plant stage at inoculation	10-18 d, cotyledon to first leaf
10.4	Inoculation method	roots and hypocotyls are immersed in spore suspension for 5-15 min; trimming of roots is an option
10.7	Final observations	14-21 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	symptoms: growth retardation, wilting, yellowing, vessel browning extending above cotyledon
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls. Standards near borderline R/S will help to compare between labs.
12.	Interpretation of test results in comparison with control varieties	
	absent	[1] severe symptoms
	present	[9] mild or no symptoms
13.	Critical control points	Test results may vary slightly in inoculum pressure due to differences in isolate, spore concentration, soil humidity and temperature.

Ad. 49: Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (Forl)

1. Pathogen	*Fusarium oxysporum* f. sp. *radicis-lycopersici*
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	Naktuinbouw[8] (NL) and GEVES[9] (FR)
5. Isolate	
7. Establishment pathogenicity	symptoms on susceptible tomato Multiplication inoculum
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 Shelf life/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	1 replicate
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 blanks
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

12. Interpretation of test results in comparison with control varieties

absent	[1]	symptoms
present	[9]	no symptoms

13. Critical control points:

Temperature should never exceed 27°C during the test period; frequent renewal of races may be needed because of loss of pathogenicity

[8] Naktuinbouw: resistentie@naktuinbouw.nl
[9] Geves: matref@geves.fr

Ad. 50: Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum)*

1. Pathogen	*Fulvia fulva* (ex *Cladosporium fulvum)*
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	Naktuinbouw[10] (NL) or GEVES[11] (FR)
5. Isolate	Race group 0, A, B, C, D, and E
6. Establishment isolate identity	with genetically defined differentials from GEVES (FR) A breaks Cf-2, B Cf-4, C Cf-2&4, D Cf-5, E Cf-2&4&5
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 Shelf life/viability inoculum	4 hours, keep cool
9. Format of the test	
9.1 Number of plants per genotype	more than 20 plants
9.2 Number of replicates	1 replicate
9.3 Control varieties	
Susceptible	Monalbo, Moneymaker
Resistant for race 0	Angela, Estrella, Sonatine, Sonato, Vemone, Vagabond, IVT 1149, Vagabond × IVT 1149, IVT 1154
Resistant for race group A	Angela, Estrella, Sonatine, Sonato
Resistant for race group B	Angela, Estrella, Sonatine, Sonato, Vemone
Resistant for race group C	Angela, Estrella, Sonatine
Resistant for race group D	Estrella, Sonatine, Vemone
Resistant for race group E	Sonatine, Jadviga, Rhianna, IVT 1154
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
9.9 Special measures	depending on facility and weather, there may be a need to raise the humidity e.g. humidity tent closed 3-4 days after inoculation and after this, 66% until 80% closed during 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
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 test results in comparison with control varieties	
absent	[1] symptoms
present	[9] no symptoms Excessively high humidity may cause rugged brown spot on all leaves. These are not to be considered as off-types.

13. Critical control points:
Ff spores have a variable size and morphology. Small spores are also viable.
Fungal plates will gradually become sterile after 6-10 weeks. Store good culture at -80°C.
For practical purposes, it is not possible to keep plants longer than 14 days inside a tent.

[10] Naktuinbouw: resistentie@naktuinbouw.nl
[11] Geves: matref@geves.fr

Ad. 51: Resistance to Tomato mosaic virus (ToMV)

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[12] (NL), GEVES[13] (FR) or INIA[14] (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 ($Tm2^2$)
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	Shelflife/viability inoculum	fresh>1 day, desiccated>1year
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	Marmande, Monalbo
	Resistant for ToMV: 0 and 2	Mobaci
	Resistant for ToMV: 0 and 1	Moperou
	Resistant with necrosis	"Monalbo x Momor"
	Resistant	Gourmet
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 (1g/30ml)
10.3	Plant stage at inoculation	cotyledons or 2 leaves

[12] Naktuinbouw: resistentie@naktuinbouw.nl
[13] GEVES: matref@geves.fr
[14] INIA: resistencias@inia.es

10.4	Inoculation method	gentle rubbing
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 test results in comparison with control varieties	
	absent	[1] symptoms of susceptibility
	present	[9] no symptoms, or symptoms of hypersensitive resistance
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. Note: 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 gene Tm2 gives resistance to ToMV. Gene Tm2 has two dominant allele for resistance: allele Tm2 is always associated with resistance to strain 0 and 1, allele $Tm2^2$ is always associated with resistance to strain 0, 1 and 2. The presence or absence of both allele for resistance can be detected by the co-dominant markers as described in Arens, P. et al (2010). Specific aspects:

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 resistance 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 allele for susceptibility or resistance	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 allele for susceptibility tm2 present: Mobaci, Monalbo, Moneymaker homozygous allele for resistance Tm2 present: Moperou homozygous allele for resistance $Tm2^2$ present: Mocimor, Momor
6.	PCR conditions	1. Initial denaturation step at 94°C for 3 minutes 2. 35 cycles at 94°C for 1 minute, 55°C for 1 minute, 72°C for 2 minutes 3. Final extension step of 72°C for 10 minutes
8.	Interpretation of test results	The presence of the alleles tm2, Tm2, $Tm2^2$ lead to different interpretation for characteristics 51.1, 51.2 and 51.3, 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 variety is resistant due to another mechanism like 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
51.1 Strain 0	[1] absent	[9] resistant	[9] resistant
51.2 Strain 1	[1] absent	[9] resistant	[9] resistant
51.3 Strain 2	[1] absent	[1] absent	[9] resistant

Ad. 52: Resistance to *Phytophthora infestans* (Pi)

1. Pathogen	*Phytophthora infestans*
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	-
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 sporangiospores
8.8 Shelf life/viability inoculum	4 h after chilling at 8-10°C
9. Format of the test	
9.1 Number of plants per genotype	20 plants
9.2 Number of replicates	1 replicate
9.3 Control varieties	
Susceptible	Saint Pierre, Heinz 1706
Resistant	Pieraline, Heline, Pyros, “Pieraline x Pieralbo”, Fline
Remark	heterozygote varieties may have a slightly lower level of expression of resistance.
9.5 Test facility	glasshouse
9.6 Temperature	18°C
9.7 Light	after inoculation darkness during 24 hours, thereafter 10 hour darkness per 24 hours
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

12. Interpretation of test results in comparison with control varieties

absent	[1]	severe symptoms
present	[9]	no or mild symptoms

13. Critical control points:

Resistance is only well-expressed in the adult plant.

Ad. 53: Resistance to *Pyrenochaeta lycopersici* (Pl)

1.	Pathogen	*Pyrenochaeta lycopersici*
2.	Quarantine status	No
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	GEVES[15] (FR)
5.	Isolate	e.g. strain Pl 21
6.	Establishment isolate identity	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 of contaminated 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
9.2	Number of replicates	1 replicate
9.3	Control varieties	Susceptible: Marmande verte 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
10.3	Plant stage at inoculation	3-4 leaf stage
10.4	Inoculation method	Transplanting of plantlets in a mixture of soil (e.g. 3750 ml of soil with 750 ml of inoculum)
10.7	Final observations	40 days post inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	Class 0: no necrosic lesion 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 pivot) Class 3: several brown necrotic lesions clearly visible (more than half the surface of the pivot) Class 4: complete necrosis or destruction of the pivot
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

[15] GEVES: matref@geves.fr

Ad. 54: Resistance to *Stemphylium* spp. (Ss)

1. Pathogen	*Stemphylium* spp. e.g. *Stemphylium solani*
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	GEVES[16] (FR)
5. Isolate	-
7. Establishment pathogenicity	biotest
8. Multiplication inoculum	
8.1 Multiplication medium	PDA (12 hours per day under near-ultraviolet light to induce sporulation) or V8
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
Resistant	Motelle, F1 Motelle x Monalbo
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% 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 Tween The spore suspension is sieved through a double layer of muslin.
10.2 Quantification inoculum	$5.10^3 – 10^5$ 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	symptoms: necrotic lesions on cotyledons and leaves; yellowing of leaves
11.3 Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls

12. Interpretation of test results in comparison with control varieties

absent	[1]	symptoms (11.2)
present	[9]	no symptoms, or less than resistant standard

13. Critical control points:

8.1 and 10.1

Note: 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*.

[16] Geves: matref@geves.fr

Ad. 55: Resistance to *Pseudomonas syringae* pv. *tomato* (Pst)

1. Pathogen	*Pseudomonas syringae* pv. *tomato*
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	GEVES[17] (FR) or Naktuinbouw[18] (NL)
5. Isolate	
6. Establishment isolate identity	
7. Establishment pathogenicity	biotest
8. Multiplication inoculum	
8.1 Multiplication medium	King's B agar medium, darkness
8.2 Multiplication variety	susceptible variety
8.4 Inoculation medium	water
8.8 Shelf life/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	1 replicate
9.3 Control varieties	
Susceptible	Monalbo
Resistant	Ontario 7710, "Monalbo x Ontario 7710", Tradiro, Hypeel 45
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. Plate should be less than 2-4 days old.
10.2 Quantification inoculum	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 < 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 test results in comparison with control varieties

absent	[1]	bacterial speck
present	[9]	no symptoms or pinpoint lesions

13. Critical control points:

Strains may lose virulence in storage

[17] Geves: matref@geves.fr
[18] Naktuinbouw: resistentie@naktuinbouw.nl

Ad. 56: Resistance to *Ralstonia solanacearum*, race 1 (Rs)

1. Pathogen	*Ralstonia solanacearum* (ex *Pseudomonas solanacearum)*
2. Quarantine status	yes
3. Host species	*Solanum lycopersicum*
4. Source of inoculum	
5. Isolate	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	20 plants
9.2 Number of replicates	1 replicate
9.3 Control varieties	
Susceptible	Floradel
Resistant	Caraibo
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.....	density 10^7 colony forming units per ml
10.3 Plant stage at inoculation.....	three to four well-developed leaves (3 weeks)
10.4 Inoculation method	
10.7 Final observations	3 weeks after inoculation
11. Observations	in intermediate resistance 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 test results in comparison with control varieties

absent	[1]	symptoms
present	[9]	no symptoms, or less than resistant standard

13. Critical control points:

Ralstonia solanacearum has a quarantine status in some countries and is on the EPPO alert list.

Ad. 57: Resistance to Tomato yellow leaf curl virus (TYLCV)

(i) agroinoculation method

1. Pathogen	Tomato yellow leaf curl virus (TYLCV) IL strain. (See note below)
2. Quarantine status	yes (see 13.)
3. Host species	*Solanum lycopersicum*
4. Source of inoculums	Dr. Eduardo R. Bejarano, Plant Genetics Laboratory, IHSM-UMA-CSIC[19]
5. Isolate	Alm:Pep:99, strain IL
6. Establishment isolate identity.....	
7. Establishment pathogenicity	
8. Multiplication inoculum	
8.1 Multiplication medium	YEP/Kanamycin.
8.2 Multiplication variety	
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)
8.6 Harvest of inoculums	
8.7 Check of harvested inoculums .	
8.8 Shelflife/viability inoculums	*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 28ªC.
9. Format of the test	
9.1 Number of plants per genotype	20
9.2 Number of replicates	2
9.3 Control varieties	Susceptible: Moneymaker, Marmande,
.....	Resistant: Delyca, Montenegro, Anastasia, TY20, Mohawk
9.4 Test design.....	
9.5 Test facility.....	Glasshouse or climatic chamber with permission to confined use of LMO/GMO, confinement level 1 (N-1)[20]
9.6 Temperature	23-25°C
9.7 Light	16 h
9.8 Season.....	
9.9 Special measures	Permission to confined use of LMO/GMO, at least level 1 (N-1)[20]

[19] Source of inoculum: IHSM-UMA-CSIC edu_rodri@uma.es; INIA: resistencias@inia.es

[20] The transformed *Agrobacterium tumefaciens* is a living modified organism (LMO; or genetically modified organism (GMO)) and in many countries it requires to comply with Cartagena Protocol on Biosafety in case of transboundary movement, transit, handling and use that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health.

10. Inoculation

10.1 Preparation inoculums.....	Streak the surface of the frozen *A. tumefaciens* stock tube and submerge in 5 ml YEP+2.5 µl kanamycin (100mg/ml) during 48 h at 28ªC. 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 inoculums	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
10.6 Second observation	30 dpi
*10.7 End of test – Final observation.....	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

12. Interpretation of data in terms of UPOV characteristic states

absent	[1] severe symptoms
present	[9] no 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.

TYLCV is on the EPPO alert list. 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.....	yes (see 13.)
3. Host species.....	*Solanum lycopersicum*
4. Source of inoculum	IHSM-UMA-CSIC or INIA (ES)[21]
5. Isolate	TYLCV-IL La Mayora
8. Multiplication inoculum.....	White flies
8.6 Harvest of inoculum.....	
9. Format of the test	
9.1 Number of plants per genotype	20
9.2 Number of replicates.....	Two replicates

[21] Source of inoculum: IHSM-UMA-CSIC, CSIC guillamon@eelm.csic.es or INIA: resistencias@inia.es

9.3 Control varieties
Susceptible: ..... Moneymaker, Marmande,
Resistant: ..... Delyca, Montenegro, Anastasia, TY20, Mohawk
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 TYLCV resistant varieties may be susceptible to the closely related virus Tomato yellow leaf curl Sardinia virus (TYLCSV).

Ad. 58: Resistance to Tomato spotted wilt virus (TSWV)

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
2.	Quarantine status	yes (see note below)
3.	Host species	*Solanum lycopersicum*
4.	Source of inoculum	Naktuinbouw [22] (NL), GEVES [23] (FR)
5.	Isolate	race 0, preferably a thrips-transmission deficient variant
7.	Establishment pathogenicity	biotest
8.	Multiplication inoculum	
8.6	Harvest of inoculum	symptomatic leaves may be stored at -70°C
9.	Format of the test	
9.1	Number of plants per genotype	20 plants
9.2	Number of replicates	1 replicate
9.3	Control varieties	
	Susceptible	Monalbo, Momor, Montfavet H 63.5
	Resistant	Tsunami, Bodar, Mospomor, Lisboa
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 carborundum on cotyledons, inoculum suspension < 10° C
10.7	Final observations	7-21 days after inoculation
11.	Observations	
11.1	Method	visual
11.2	Observation scale	symptoms: top mosaic, bronzing, various malformations, necrosis
11.3	Validation of test	evaluation of variety resistance should be calibrated with results of resistant and susceptible controls
12.	Interpretation of test results in comparison with control varieties	
	absent	[1] symptoms
	present	[9] no symptoms
13.	Critical control points	TSWV has a quarantine status in some countries. TSWV is transmitted by *Thrips tabac*i 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.

[22] Naktuinbouw: resistentie@naktuinbouw.nl
[23] Geves: matref@geves.fr

(ii) DNA marker test

Dominant resistance gene Sw-5 is always associated with resistance to TSWV strain 0. The presence or absence of the allele for resistance can be detected by the co dominant marker as described in Dianese, E.C. et al (2010). Specific aspects:

1.	Pathogen	Tomato spotted wilt virus
2.	Functional gene	Sw-5b
3.	Primers	
3.1	Allele for susceptibility	Sw5-Vat1-F: 5'-ACAACATCAAACAATGTTAGCC-3' Sw5-Vat2-F: 5'-CATCAAACAATGCAGTTAGCC-3'
3.2	Allele for resistance	Sw5-Res-F: 5'-ATCAACCAATACAGCCTAACC-3
3.3	Universal reverse	Sw5-universal-R: 5'-TTTCTCCCTGCAAGTTCACC-3'
3.4	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 allele 1 for susceptibility present: Moneymaker homozygous allele 2 for susceptibility present: Mountain Magic homozygous allele for resistance present: Montealto heterozygous (allele for resistance and allele 1 for susceptibility present): Bodar
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.
8.	Interpretation of test results	
	absent	[1] allele(s) for susceptibility present and allele for resistance absent
	present	[9] allele for resistance 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 variety is resistant due to another mechanism.

Ad. 59: Resistance to *Leveillula taurica* (Lt)

1. Pathogen ..... *Leveillula taurica*
3. Host species ..... *Solanum lycopersicum*
4. Source of inoculum ..... no long term storage method is available
5. Isolate
8. Multiplication inoculum
8.1 Multiplication medium ..... detached leaves of a susceptible host plant
9. Format of the test
9.1 Number of plants per genotype 20 plants
9.2 Number of replicates ..... 1 replicate
9.3 Control varieties
Susceptible ..... Monalbo, Montfavet H 63.5
Resistant ..... Atlanta
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 harvest
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 test results in comparison with control varieties
absent..... [1] symptoms
present ..... [9] no symptoms, or less than resistant standard
13. Critical control points:
Check cleistothecia under microscope to confirm presence of *Leveillula* and not another powdery mildew.

Ad. 60: Resistance to *Oidium neolycopersici* (On)

1. Pathogen ..... *Oidium neolycopersici* (Powdery mildew)
3. Host species ..... *Solanum lycopersicum*
4. Source of inoculum .....
5. Isolate ..... see remark under 13
7. Establishment pathogenicity ..... biotest
8. Multiplication inoculum
8.1 Multiplication medium ..... plant
8.3 Plant stage at inoculation ..... 3 weeks
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 20 plants
9.2 Number of replicates ..... 1 replicate
9.3 Control varieties
Susceptible ..... Momor, Montfavet H 63.5
Resistant ..... Atlanta, 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 test results in comparison with control varieties
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. 61: Resistance to Tomato torrado virus (ToTV)

1. Pathogen ..... Tomato torrado virus
2. Quarantine status ..... in regions with temperate climate
3. Host species ..... *Solanum lycopersicum*
4. Source of inoculum ..... -
5. Isolate ..... -
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 20 plants
9.2 Number of replicates ..... 1 replicate
9.3 Control varieties
Susceptible ..... Daniela
Resistant tomato ..... 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 test results in comparison with control varieties
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

Note: Patents pending on part of the method: WO2006/085749 and WO2008/150158 and equivalents. Use solely for DUS purposes and for the development of variety descriptions by UPOV and authorities of UPOV members, courtesy to De Ruiter Seeds R&D B.V./Monsanto Invest N.V.

9. Literature

Ano, G., Brand, R., Causse, M., Chauvet, M., Damidaux, R., Laterrot, H., Philouze, J., Plages, J.N., Rousselle, 2006: La Tomate, in Histoire et amélioration de cinquante plantes cultivées au XXème siècle. Coordinatrice C. Doré, Collection « Savoir faire », Editions INRA Quae, Paris, FR, 840 pp.

Arens P., Mansilla C., Deinum D., Cavellini L., Moretti A., Rolland S., van der Schoot H., Calvache D., Ponz F., Collonnier C., Mathis R., Smilde D., Caranta C,; Vosman B., 2010. Development and evaluation of robust molecular markers linked to disease resistance in tomato for distinctness, uniformity and stability testing. Theoretical and applied genetics. 120(3): 655-64

Bai, Y. 2004. The genetics and mechanisms of resistance to tomato powdery mildew (*Oidium neolycopersici*) in *Lycopersicon* species. Thesis Wageningen University, The Netherlands.

Barbieri, M., et al., 2010. Introgressions of resistance to two Mediterranean virus species causing tomato yellow leaf curl into a valuable traditional tomato variety. Journal of Plant Pathology 92(2):485-493

Brand, R., 2000: Evolution des variétés de Tomate au cours du siècle, dans 'La Tomate : pour un produit de qualité', Edition Ctifl, C85105 (ouvrage collectif), FR, p. 97-105

Denby, L.G., Wooliams, G.E., 1962: The Development of Verticillium Resistant Strains of Established Tomato Varieties, Canadian Journal Plant Science 42, CA, pp. 681-685

Dianese, E.C. et al, 2010: Development of a locus-specific, co-dominant SCAR marker for assisted-selection of the Sw-5 (Topovirus resistance) gene cluster in a wide range of tomato accessions. Molecular Breeding, 25(1), pp. 133-142.

Garcia, S., et al., 2009. Resistance driven selection of begomoviruses associated with the TYLCV. Virus research 146: 66-72

Garland, S., Sharman, M., Persley, D. and McGrath, D. (2005) The development of an improved PCR-based marker system for Sw-5, an important TSWV resistance gene of tomato. Australian Journal of Agricultural Research, 56 (3): 285-289.

Gordillo, L.F. and M. R. Stevens (2008) Screening two Lycopersicon peruvianum collections for resistance to Tomato spotted wilt virus. Plant Disease 92(5): 694-704

Hubbeling, N., 1978. Breakdown of resistance to the Cf-5 gene in tomato by another new race of *Fulvia fulva*. Mededelingen van de Faculteit Landbouwwetenschappen Universiteit Gent 42/2

International Seed Federation (ISF): Trade Issues, Phytosanitary Matters, Pathogen coding, Strain Denomination, Differential sets. http://www.worldseed.org/isf/pathogen_coding_3.html

Kjellberg, L., 1973: Sortundersökningar av tomat enligt UPOV, Swedish University of Agricultural Sciences, Research Information Centre, Alnarp Trädgaard 162, SE

Laterrot, H., 1973: Sélection de variétés de Tomate résistantes aux Meloidogyne, OEPP/EPPO Bulletin 3(1), pp. 89-92

Laterrot, H., 1972: Sélection de tomates résistantes à Fusarium oxysporum f. sp. lycopersici, Phytopathologia Mediterranea, 11(3), Firenze, IT, pp. 154-158

Laterrot, H., 1981: La lutte génétique contre la Cladosporiose de la Tomate en France. P.H.M. Revue Horticole, No. 214, Montpellier, FR, pp. 27-30

Laterrot, H., 1973: Résistance de la Tomate au virus de la Mosaïque du Tabac. Difficultés rencontrées pour la sélection de variétés résistantes. Ann. Amelior. Plantes, 23 (49), pp. 287-313

Laterrot, H., 1990: Situation de la lutte génétique contre les parasites de la Tomate dans les pays méditerranéens. P.H.M. Revue Horticole, No. 303, Montpellier, FR

Laterrot, H., 1975: Sélection pour la résistance au Mildiou, Phytophthora infestans MONT. DE BARY chez la Tomate, Ann. Amelior. Plantes, 25 (2), pp.129-149

Laterrot, H., 1982: L'argenture de la Tomate. P.H.M. Revue Horticole, No. 225, Montpellier, FR, pp. 21/22

Laterrot, H., 1983: La lutte génétique contre la maladie des racines liégeuses de la Tomate, P.H.M. Revue Horticole, No. 238, Montpellier, FR, pp. 23-26

Laterrot, H., Blancard, D., 1983: Criblage d'une série de lignées et d'hybrides F1 de Tomate pour la résistance à la Stemphyliose, Phytopathologia Mediterranea, 22, Firenze, IT, pp. 188-193

Laterrot, H., Blancard, D., 1986: Les Stemphylia rencontrés sur la Tomate, Phytopathologia Mediterranea, 25, Firenze, IT, pp.140-144

Martin, G. B., A. Frary, T. Wu, S. Brommonschenkel, J. Chunwongse, E. D. Earle, S. D. Tanksley (1994) A member of the tomato Pto family confers sensitivity to fenthion resulting in rapid cell death. The Plant Cell 6: 1543-1552

Smilde, W.D., Peters, D., 2007: Pathotyping TSWV in pepper and tomato. In: K. Niemirowicz-Szczytt (ed.), Progress in Research on Capsicum and Eggplant, Proceedings of Eucarpia Meeting, Warszawa, PL, pp. 231-236

10. Technical Questionnaire

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

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

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

1. Subject of the Technical Questionnaire

1.1 Botanical name	*Solanum lycopersicum* L.
1.2 Common name	Tomato

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

(i)	Inbred line	[ ]
(ii)	Hybrid	[ ]
(iii)	Open-pollinated variety	[ ]
(iv)	Other (provide details)	[ ]

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]
(please state parent varieties)

(……..……..…) x (……..……..…)
female parent male parent

(b) partially known cross [ ]
(please state known parent variety(ies))

(……..……..…) x (……..……..…)
female parent male parent

(c) unknown cross [ ]

4.1.2 Mutation [ ]
(please state parent variety)

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

4.1.4 Other [ ]
(please provide details)

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

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

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) Cross-pollination
(i) population [ ]
(ii) synthetic variety [ ]
(c) Hybrid [ ]
(d) Other [ ]
(please provide details)

4.2.2 Vegetatively propagated varieties

(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).

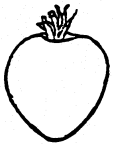
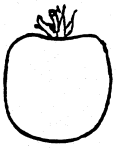
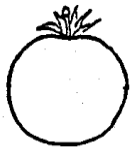
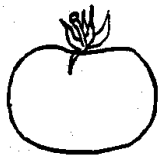
	Characteristics	Example Varieties	Note
5.1 (2)	**Plant: growth type**		
	determinate	Campbell 1327, Prisca	1 [ ]
	indeterminate	Marmande VR, Saint-Pierre, San Marzano 2	2 [ ]
5.2 (10)	**Leaf: type of blade**		
	pinnate	Mikado, Pilot, Red Jacket	1 [ ]
	bipinnate	Lukullus, Saint-Pierre	2 [ ]
5.3 (19)	**Peduncle: abscission layer**		
	absent	Aledo, Bandera, Count, Lerica	1 [ ]
	present	Montfavet H 63.5, Roma	9 [ ]
5.4 (21)	**Fruit: green shoulder (before maturity)**		
	absent	Felicia, Rio Grande, Trust	1 [ ]
	present	Daniela, Montfavet H 63.5	9 [ ]

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

	Characteristics	Example Varieties	Note
5.5 (26)	**Fruit: size**		
	very small	Cerise, Sweet 100	1 [ ]
	very small to small		2 [ ]
	small	Early Mech, Europeel, Roma	3 [ ]
	small to medium		4 [ ]
	medium	Alphamech, Diego	5 [ ]
	medium to large		6 [ ]
	large	Carmello, Ringo	7 [ ]
	large to very large		8 [ ]
	very large	Erlidor, Lydia, Muril	9 [ ]
5.6 (28)	**Fruit: shape in longitudinal section**		
	flattened	Campbell 28, Marmande VR	1 [ ]
	oblate	Montfavet H 63.4, Montfavet H 63.5	2 [ ]
	circular	Cerise, Moneymaker	3 [ ]
	oblong	Early Mech, Peto Gro	4 [ ]
	cylindric	Hypeel 244, Macero II, San Marzano 2	5 [ ]
	elliptic	Alcaria, Castone	6 [ ]
	cordate	Valenciano	7 [ ]
	ovate	Dualrow, Soto	8 [ ]
	obovate	Duquesa, Estelle Rimone, Rio Grande	9 [ ]
	pyriform	Europeel	10 [ ]
	obcordate	Cuore del Ponente, Magno	11 [ ]

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

Ad. 28: Fruit: shape in longitudinal section

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

The apex is considered to be the part that is farthest from the peduncle end.

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

	Characteristics	Example Varieties	Note
5.7 (36)	**Fruit: number of locules**		
	only two	Early Mech, Europeel, San Marzano	1 [ ]
	two and three	Alphamech, Futuria	2 [ ]
	three and four	Montfavet H 63.5	3 [ ]
	four, five or six	Raïssa, Tradiro	4 [ ]
	more than six	Marmande VR	5 [ ]
5.8 (37)	**Fruit: color (at maturity)**		
	cream	Jazon, White Mirabell	1 [ ]
	yellow	Goldene Königin, Yellow Pear	2 [ ]
	orange	Sungold	3 [ ]
	pink	Aichi First	4 [ ]
	red	Daniela, Ferline, Montfavet H 63.5	5 [ ]
	brown	Ozyrys	6 [ ]
	green	Green Grape, Green Zebra	7 [ ]
5.9 (46)	**Resistance to *Meloidogyne incognita* (Mi)**		
	susceptible	Casaque Rouge	1 [ ]
	moderately resistant	Campeon, Madyta, Vinchy	2 [ ]
	highly resistant	Anabel, Anahu	3 [ ]
5.10 (47)	**Resistance to *Verticillium* sp. (Va and Vd) –Race 0**		
	absent	Anabel, Marmande verte	1 [ ]
	present	Daniela, Marmande VR	9 [ ]

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

	Characteristics	Example Varieties	Note
5.11 (48.1)	**Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) Race 0EU/1US**		
	absent	Marmande verte	1 [ ]
	present	Anabel, Marporum, Marsol	9 [ ]
5.12 (48.2)	**Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) Race 1EU/2US**		
	absent	Marmande verte	1 [ ]
	present	Motelle, Walter	9 [ ]
5.13 (51.1)	**Resistance to Tomato mosaic virus (ToMV) – Strain 0**		
	absent	Monalbo, Moneymaker	1 [ ]
	present	Mobaci, Mocimor, Momor, Moperou	9 [ ]

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

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Daniela	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 Resistance to pests and diseases (please specify races/strains if possible)

	absent	present	not tested
a) Sensitivity to silvering (char. 45)	[ ]	[ ]	[ ]
Resistance to :			
b) *Fusarium oxysporum* f. sp. *radicis-lycopersici* (char. 49)	[ ]	[ ]	[ ]
c) <u>*Fulvia fulva*</u>:			
(i) Race 0 (char. 50.1)	[ ]	[ ]	[ ]
(ii) Group A (char. 50.2)	[ ]	[ ]	[ ]
(iii) Group B (char. 50.3)	[ ]	[ ]	[ ]
(iv) Group C (char. 50.4)	[ ]	[ ]	[ ]
(v) Group D (char. 50.5)	[ ]	[ ]	[ ]
(vi) Group E (char. 50.6)	[ ]	[ ]	[ ]
d) Tomato mosaic virus			
(i) Strain 1 (char. 51.2)	[ ]	[ ]	[ ]
(ii) Strain 2 (char. 51.3)	[ ]	[ ]	[ ]
e) *Phytophtora infestans* (char. 52)	[ ]	[ ]	[ ]
f) *Pyrenochaeta lycopersici* (char. 53)	[ ]	[ ]	[ ]
g) *Stemphylium* spp. (char. 54)	[ ]	[ ]	[ ]

[#] 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:

	absent	present	not tested
h) *Pseudomonas syringae* pv. *tomato* (char. 55)	[ ]	[ ]	[ ]
i) *Ralstonia solanacearum* race 1 (char. 56)	[ ]	[ ]	[ ]
j) Tomato yellow leaf curl virus (char. 57)	[ ]	[ ]	[ ]
k) Tomato spotted wilt virus (char. 58)	[ ]	[ ]	[ ]
l) *Leveillula taurica* (char. 59)	[ ]	[ ]	[ ]
m) *Oidium neolycopersici* (char. 60)	[ ]	[ ]	[ ]
n) Tomato torrado virus (char. 61)	[ ]	[ ]	[ ]

o) Others (please specify)

7.3.2 Special conditions for the examination of the variety

(i) Type of culture
- under glass [ ]
- in the open [ ]

(ii) Main use
- fresh market or garden [ ]
- industrial processing (indicate type) [ ]
- pot plant [ ]
- other [ ]

8. Authorization for release

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

Yes [ ] No [ ]

(b) Has such authorization been obtained?
Yes [ ] No [ ]

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

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

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]