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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

TOMATO

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Solanum lycopersicum L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by an expert from the European Community**to be considered by**the Technical Working Party for Vegetables**at its forty-fourth session, to be held in Veliko Tarnovo, Bulgaria, from July 5 to 9, 2010*

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Lycopersicon esculentum</i> Mill., <i>Lycopersicon lycopersicum</i> (L.) Karsten ex Farw., <i>Solanum lycopersicum</i> L.	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.]

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yellow highlighting: changes made by the Leading Expert to the previous draft

highlighting: amendments in accordance with document TGP/7/2

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: 2500 or 10g seeds
- b) vegetatively propagated varieties: 25 plants

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

3.3.1 The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 20 plants, which should be divided between **at least** 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, all observations **for the purpose of distinctness** should be made on 20 plants or parts taken from each of 20 plants, **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: division of blade (characteristic 10)
- (c) Peduncle: abscission layer (characteristic 18)
- (d) Fruit: green shoulder (before maturity) (characteristic 20)
- (e) Fruit: size (characteristic 25)
- (f) Fruit: shape in longitudinal section (characteristic 27)
- (g) Fruit: number of locules (characteristic 35)
- (h) Fruit: color (at maturity) (characteristic 36)
- (i) Resistance to *Meloidogyne incognita* (characteristic 47)
- (j) Resistance to *Verticillium dahliae* sp. – Race 0 (characteristic 48)
- (k) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* – Race 0 (ex1) (characteristic 49.1)
- (l) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* – Race 1 (ex2) (characteristic 49.2)
- (m) Resistance to Tomato Mosaic Tobamovirus – Strain 0 (characteristic 52.1)
- (n) Resistance to Tomato Spotted Wilt Tospovirus - Race 0 (characteristic 59)

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

6. Introduction to the Table of Characteristics

6.1 *Categories of Characteristics*

6.1.1 Standard Test Guidelines Characteristics

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

6.1.2 Asterisked Characteristics

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

6.2 *States of Expression and Corresponding Notes*

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

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

State	Note
small	3
medium	5
large	7

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

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

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

6.3 *Types of Expression*

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

6.4 *Example Varieties*

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

6.5 *Legend*

(*) 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 Beispielsorten Variedades ejemplo	Note/ Nota
1. VG (+)	Seedling: anthocyanin coloration of hypocotyl	Plantule: pigmentation anthocyanique de l'hypocotyle	Keimpflanze: Anthocyanfärbung des Hypocotyls	Plántula: pigmentación antociánica del hipocótilo		
QL	absent	absente	fehlend	ausente	Colt, Heinz 8104, Mogeor, Momorvert, VTM215	1
	present	présente	vorhanden	presente	Montfavet H 63.4, DG-039	9
2. VG (* (+)	Plant: growth type	Plante: type de croissance	Pflanze: Wuchstyp	Planta: hábito de crecimiento		
QL	determinate	déterminé	begrenzt wachsend	determinado	Campbell 1327, Prisca	1
	indeterminate	indéterminé	unbegrenzt wachsend	indeterminado	Marmande VR, Saint-Pierre, San Marzano 2	2
3. VG/ MS	<u>Only varieties with plant growth type determinate:</u> Plant: number of inflorescences on main stem (side shoots to be removed)	<u>Seulement variétés à type de croissance déterminée:</u> Plante: nombre d'inflores- cences sur la tige principale (bourgeons axillaires à éliminer)	<u>Nur begrenzt wachsende Sorten:</u> Pflanze: Anzahl Blütenstände am Haupttrieb (Seitentriebe sind zu entfernen)	<u>Sólo variedades con tipo de crecimiento determinado:</u> Planta: número de inflorescencias (eliminar ramas laterales)		
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 Beispielsorten Variedades ejemplo	Note/ Nota
4.	VG	Stem: anthocyanin coloration	Tige: pigmentation anthocyanique du tiers supérieur	Stengel: Anthocyanfärbung des oberen Drittels	Tallo: pigmentación antocianica del tercio superior	
(+)						
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	<u>Only varieties with plant growth type indeterminate:</u> Stem: length of internode (between 1st and 4th inflorescence)	<u>Seulement variétés à type de croissance indéterminée:</u> Tige: longueur de l'entrenœud (entre la 1^{ère} et la 4^{ème} inflorescence)	<u>Nur unbegrenzt wachsende Sorten:</u> Stengel: Internodienlänge (zwischen dem 1. und dem 4. Blütenstand)	<u>Sólo variedades con tipo de crecimiento indeterminado:</u> Tallo: longitud del entrenudo (entre la 1^a y 4^a inflorescencia)	
(+)						
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	<u>Only varieties with plant growth type indeterminate:</u> Plant: height				
(+)						
QN		very short				Cherry Belle 1
		short				Carson, Despina 3
		medium				Brooklyn, Buffalo, Vision 5
		long				Classy, Clarence, Climberly, Massada 7
		very long				Daydream, Minired 9

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
7. VG (* (+)	Leaf: attitude (in middle third of plant)	Feuille: port (au tiers moyen de la plante)	Blatt: Stellung (im mittleren Drittel der Pflanze)	Hoja: porte (en el tercio medio de la planta)		
QN (a)	erect				Turbo, Tyanos	1
	semi-erect	demi-dressé	halbaufrecht	semierecto	Allround, Drakar, Vitador	3
	horizontal	horizontal	waagrecht	horizontal	Aromata, Triton	5
	semi-drooping	demi-retombant	halbüberhängend	semicolgante	Montfavet H 63.5	7
	drooping				Multolino, Naram, Tibet	9
8. VG/ MG	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/ MG	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: division of blade	Feuille: division du limbe	Blatt: Fiederung	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 Beispielsorten Variedades ejemplo	Note/ Nota
11. VG	Leaf: size of leaflets (in middle of leaf)	Feuille: taille des folioles (au centre de la feuille)	Blatt: Größe der Blattfiedern (in der Blattmitte)	Hoja: tamaño de los folíolos (en el medio de la hoja)		
(+)						
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	claro	Macero II, Poncette, Rossol	3
	medium	moyenne	mittel	medio	Lucy	5
	dark	foncée	dunkel	oscuro	Allround, Daniela, Lorena, Red Robin	7
13. VG	Leaf: glossiness (in middle third of plant)	Feuille: brillance (au tiers moyen de la plante)	Blatt: Glanz (im mittleren Drittel der Pflanze)	Hoja: brillo (en el tercio medio de la planta)		
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 (in middle third of plant)	Feuille: cloûre (au tiers moyen de la plante)	Blatt: Blasigkeit (im mittleren Drittel der Pflanze)	Hoja: abullonado (en el tercio medio de la planta)		
(+)						
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 Beispielsorten Variedades ejemplo	Note/ Nota
15. VG (+)	Leaf: attitude of petiole of leaflet in relation to main axis (in middle third of plant)	Feuille: port des pétioles par rapport à l'axe central (au tiers moyen de la plante)	Blatt: Stellung des Blattstiels im Verhältnis zur Hauptachse (im mittleren Drittel der Pflanze)	Hoja: porte del peciolo de los folíolos en relación con el eje principal (en el tercio medio de la planta)		
QN (a)	semi-erect	demi-dressé	halbaufrecht	semierecto	Blizzard, Marmande VR	3
	horizontal	horizontal	waagrecht	horizontal	Sonatine	5
	semi-drooping	demi-retombant	halbüberhängend	semicolgante	Montfavet H63.5	7
16. VG/VS (+)	Inflorescence: type (2nd and 3rd truss)	Inflorescence: type (2^{ème} et 3^{ème} cymes)	Blütenstand: Typ (2. und 3. Blütenstand)	Inflorescencia: tipo (2^o y 3^{er} racimo)		
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 múltipara	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	Pericherry, Orama	2
18. VG (* (+)	Peduncle: abscission layer	Pédoncule: assise d'abscission	Blütenstandstiel: 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 Beispielsorten Variedades ejemplo	Note/ Nota	
19.	VG/ MS	<u>Only varieties with peduncle abscission layer present:</u> Peduncle: length (from abscission layer to calyx)	<u>Seulement pour variétés avec assise d'abscission :</u> Pédoncule : longueur (du point d'abscission au calice)	<u>Nur für Sorten mit Bruchstellen des Stiels:</u> Blütenstandstiel: Länge (von der Bruchstelle bis zum Kelch)	<u>Sólo para variedades con abscisión:</u> Pedúnculo: longitud (desde la zona de abscisión hasta el cáliz)		
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	
20.	VG	Fruit: green shoulder (before maturity)	Fruit: collet vert (avant maturité)	Frucht: Flammung (vor der Reife)	Fruto: hombro verde (antes de madurez)		
QL	(b)	absent	<u>absent</u>	<u>fehlend</u>	<u>ausente</u>	<u>Felicia, Rio Grande, Trust</u>	<u>1</u>
		present	<u>présent</u>	<u>vorhanden</u>	<u>presente</u>	<u>Daniela, Montfavet H 63.5</u>	<u>9</u>
21.	VG	Fruit: extent of green shoulder (before maturity)	Fruit : taille du collet vert (avant maturité)	Frucht: Größe der Flammung (vor der Reife)	Fruto: tamaño del hombro verde (antes de madurez)		
QN	(b)	absent or very small				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
22.	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 Flammung (vor der Reife)	Fruto: intensidad del color verde del hombro (antes de madurez)		
QN	(b)	light	claire	hell	claro	Ballet, Juboline	3
		medium	moyenne	mittel	medio	Montfavet H 63.5, Siluet	5
		dark	foncée	dunkel	oscuro	Ayala, Erlidor, Xenon	7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23. VG	Fruit: green stripes (before maturity)					
(+)						
QL	(b) absent				Daniela	1
	present				Green Zebra, Tigerella	9
24. VG	Fruit: intensity of green color excluding shoulder (before maturity)	Fruit: intensité de la couleur verte (avant maturité)	Frucht: Intensität der Grünfärbung (vor der Reife)	Fruto: intensidad del color verde (como para 34)		
(*)						
(+)						
QN	(b) very light				Clarée	1
	light	claire	hell	claro	Capello, Daniela, Duranto, Durinta, Trust	3
	medium	moyenne	mittel	medio	Marmande, Rody	5
	dark	foncée	dunkel	oscuro	Ayala, Centella, Tatiana, Uragano	7
	very dark				Verdi	9
25. 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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26. VG/MS	Fruit: ratio length/diameter	Fruit: rapport longueur/diamètre	Frucht: Verhältnis Länge/Durchmesser	Fruto: relación longitud/diámetro		
QN (c)	very small (compressed)	très petit	sehr klein	muy pequeña	Campbell 28, Marmande VR	1
	small (moderately compressed)	petit	klein	pequeña	Alicia	3
	medium	moyen	mittel	media	Early Mech, Peto Gro	5
	large (moderately elongated)	grand	groß	grande	Rimone, Rio Grande	7
	very large (elongated)	très grand	sehr groß	muy grande	Elko, Macero II	9
27. VG(+)	Fruit: shape in longitudinal section	Fruit: forme en section longitudinale	Frucht: Form im Längsschnitt	Fruto: forma en sección longitudinal		
PQ (c)	cordate				Valenciano	1
	ovate				Barbara, Dualrow, Soto	2
	elliptic				Alcaria, Castone	3
	circular				Cerise, Moneymaker	4
	oblate				Montfavet H 63.4, Montfavet H 63.5	5
	cylindric				Hypeel 244, Macero II, San Marzano 2	6
	square				Early Mech, Peto Gro	7
	obovate				Duquesa, Estelle Rimone, Rio Grande	8
	obcordate				Cuore del Ponente, Magno	9
	pyriform				Europeel	10
	trapezoid				Ingrid	11
	flattened				Campbell 28, Marmande VR	12

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota	
28.	VG	Fruit: ribbing at peduncle end	Fruit: côtes à l'attache pédonculaire	Frucht: Rippung am Stielende	Fruto: acostillado en la zona pedúncular		
(*) (+)							
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
29.	VG	Fruit: depression at peduncle end	Fruit: dépression à l'attache pédonculaire	Frucht: Einsenkung am Stielende	Fruto: depresión en la zona pedúncular		
(+)							
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	Futura, Melody	3
		medium	moyenne	mittel	media	Carmello, Count, Fandango, Saint-Pierre	5
		strong	forte	stark	fuerte	Ballon Rouge, Marmande VR	7
		very strong	très forte	sehr stark	muy fuerte		9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota	
30.	VG/ MS	Fruit: size of peduncle scar	Fruit: taille de l'attache pédonculaire	Frucht: Größe des Stielansatzes	Fruto: tamaño de la cicatriz pedúncular		
(+)							
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	Montfvet H 63 4, Montfvet 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
31.	VG/ MS	Fruit: size of blossom scar	Fruit: taille de l'attache 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	Montfvet H 63.4, Montfvet 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		9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32. 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	Montfavel H 63.4, Montfavel 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
33. VG/MS	Fruit: size of core in cross section (in relation to total diameter)	Fruit: taille du cœur en coupe transversale (par rapport au diamètre total)	Frucht: Herzgröße im Querschnitt (im Verhältnis zum Gesamtdurchmesser)	Fruto: tamaño del corazón en corte transversal (en relación al diámetro total)		
(+)						
QN (c)	very small	très petit	sehr klein	muy pequeño	Cerise	1
	small	petit	klein	pequeño	Early Mech, Europeel, Heinz 1706, Peto Gro, Rio Grande, Rossol	3
	medium	moyen	mittel	medio	Montfavel H 63.4, Monfavel H 63.5	5
	large	grand	groß	grande	Apla, Campbell 1327, Carmello, Count, Fandango, Floradade	7
	very large	très grand	sehr groß	muy grande	Marmande VR, Valenciano	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
34. VG	Fruit: thickness of pericarp	Fruit: épaisseur du péricarpe	Frucht: Dicke des Perikarps	Fruto: espesor del pericarpio		
(+)						
QN	(c) very thin				Cerise	1
	thin	mince	dünn	delgado	Marmande VR	3
	medium	moyen	mittel	medio	Carmello, Europeel, Floradade, Heinz 1706, Montfavit H 63.5	5
	thick	épais	dick	grueso	Cal J, Daniela, Ferline, Peto Gro, Rio Grande	7
	very thick				Myriade, Rondex	9
35. 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, San Marzano, Europeel,	1
	two or three	deux ou trois	zwei oder drei	dos o tres	Alphamech, Futuria	2
	three or four	trois ou quatre	drei oder vier	tres o cuatro	Montfavit 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 que six	mehr als sechs	más que seis	Marmande VR	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36. VG (* (+)	Fruit: color (at maturity)	Fruit: couleur à maturité	Frucht: Farbe bei der 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	Ferline, Daniela, Montfavet H 63.5	5
	brown	brunâtre	bräunlich	marrónáceo	Ozyrys	6
	green				Green Grape, Green Zebra	7
37. VG	Only varieties with red-colored fruit: Fruit: hue of red color					
PQ (c)	absent				Durinta, Favorita	1
	orangish				Daniela, Shiren	2
	pinkish				Recento	3
38. VG	Fruit: stripes (at maturity)					
PQ	absent				Daniela	1
	present				Green Zebra, Tigerella	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
39. VG	Fruit: color of flesh (at maturity)	Fruit: couleur de la chair (à maturité)	Frucht: Fleischfarbe (bei Reife)	Fruto: color de la pulpa (en su madurez)		
(*) (+)						
PQ	(c) cream	crème	cremefarben	crema	Jazon	
	yellow	jaune	gelb	amarillo	Jubilée	
	orange	orange	orange	anaranjado	Sungold	
	pink	rose	rosa	rosa	Regina	
	red	rouge	rot	rojo	Ferline, Saint-Pierre	
	brown	brunâtre	bräunlich	marrónaco	Ozyrys	
	green				Green Grape, Green Zebra	7
40. VG	Fruit: glossiness of skin					
QN	(c) very weak				Josefina	1
	weak				Mondragon	3
	medium				Roncardo	5
	strong				Supersweet 100	7
	very strong				Mecano	9
41. VG	Fruit: color of epidermis					
(+)						
QL	(c) colorless				Fruits, House Momotaro	1
	yellow				Black Cherry, Daniela, Kurikoma	2

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota	
42.	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
43.	VG	Fruit: shelf-life	Fruit: durée de conservation	Frucht: Haltbarkeit	Fruto: duración de la conservación		
(+)							
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
44.	MG	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
45.	MG	Time of maturity	Époque de maturité	Reifezeit	Época de madurez		
(*) (+)							
QN	(c)	very early	très précoce	sehr früh	muy precoz	Dolcevita, Sungold, Sweet Baby	1
		early	précoce	früh	precoz	Feria, Rossol	3
		medium	moyenne	mittel	media	Montfavet H 63.5	5
		late	tardive	spät	tardía	Manific, Saint-Pierre	7
		very late	très tardive	sehr spät	muy tardía	Daniela	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
46. VG	Sensitivity to silvering	Sensibilité à l'argentine	Empfindlichkeit gegen Silberblatt	Sensibilidad al plateado		
(+)						
QL	insensitive	insensible	fehlend	insensible	Marathon, Quest, Sano, Tradiro	1
	sensitive	sensible	vorhanden	sensible	Belliro, Paradiso, Sonatine	9
47. VG	Resistance to <i>Meloidogyne incognita</i> (Mi)	Résistance au <i>Meloidogyne incognita</i>	Resistenz gegen <i>Meloidogyne incognita</i>	Resistencia a <i>Meloidogyne incognita</i>		
(*)						
(+)						
QN	susceptible	absente	fehlend	ausente	Casaque Rouge	1
	moderately resistant				Campeon, Madyta, Vinchy	2
	highly resistant	présente	vorhanden	presente	Anabel, Anahu	3
48. VG	Resistance to <i>Verticillium dahliae</i> sp. (Va and Vd)	Résistance au <i>Verticillium dahliae</i>	Resistenz gegen <i>Verticillium dahliae</i>	Resistencia a <i>Verticillium dahliae</i>		
(*)						
(+)						
	– Race 0	– Pathotype 0	– Pathotyp 0	– Raza 0		
QL	absent	absente	fehlend	ausente	Anabel, Marmande verte	1
	present	présente	vorhanden	presente	Daniela, Marmande VR	9
49. VG	Resistance to <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i> (Fol)	Résistance au <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i>	Resistenz gegen <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i>	Resistencia a <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i>		
(+)						
49. 1	– Race 0 (ex 1)	– Pathotype 0 (ex 1)	– Pathotyp 0 (ex 1)	– Raza 0 (ex 1)		
(*)						
QL	absent	absente	fehlend	ausente	Marmande verte	1
	present	présente	vorhanden	presente	Anabel, Marporum, Marsol	9
49. 2	– Race 1 (ex 2)	– Pathotype 1 (ex 2)	– Pathotyp 1 (ex 2)	– Raza 1 (ex 2)		
(*)						
QL	absent	absente	fehlend	ausente	Marmande verte	1
	present	présente	vorhanden	presente	Motelle, Walter	9

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
49. VG 3	– Race 2 (ex 3)	– Pathotype 2 (ex 3)	– Pathotyp 2 (ex 3)	– Raza 2 (ex 3)		
QL	absent	absente	fehlend	ausente	Marmande verte, Motelle	1
	present	présente	vorhanden	presente	Florida, Alliance, Ivanhoé, Tributes	9
50. VG (+)	Resistance to <i>Fusarium oxysporum</i> f. sp. <i>radicis lycopersici</i> (Forl)	Résistance au <i>Fusarium oxysporum</i> f. sp. <i>radicis lycopersici</i>	Resistenz gegen <i>Fusarium oxysporum</i> f. sp. <i>radicis lycopersici</i>	Resistencia a <i>Fusarium oxysporum</i> f. sp. <i>radicis lycopersici</i>		
QL	absent	absente	fehlend	ausente	Motelle	1
	present	présente	vorhanden	presente	Momor	9
51. VG (+)	Resistance to <i>Fulvia fulva</i> (Ff) (ex <i>Cladosporium fulvum</i>)	Résistance au <i>Cladosporium fulvum</i>	Resistenz gegen <i>Cladosporium fulvum</i>	Resistencia a <i>Cladosporium fulvum</i>		
51. 1	– 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
51. 2	– Group A	– Groupe A	– Gruppe A	– Grupo A		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Angela, Estrella, Sonatine, Sonato	9
51. 3	– 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

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
51. VG – Group C 4		– Groupe C	– Gruppe C	– Grupo C		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Angela, Estrella, Sonatine	9
51. VG – Group D 5		– Groupe D	– Gruppe D	– Grupo D		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Estrella, Sonatine, Vemone	9
51. VG – Group E 6		– Groupe E	– Gruppe E	– Grupo E		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Jadвига, Rhianna, Sonatine	9
52. (+)	Resistance to Tomato Mosaic Tobamovirus (ToMV)	Résistance au virus de la mosaïque de la tomate	Resistenz gegen das Tomatenmosaikvirus	Resistencia al virus del mosaico del tomate		
52. VG – Strain 0 1		– Souche 0	– Pathotyp 0	– Cepa 0		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Mobaci, Mocimor, Moperou	9
52. VG – Strain 1 2		– Souche 1	– Pathotyp 1	– Cepa 1		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Mocimor, Moperou	9
52. VG – Strain 2 3		– Souche 2	– Pathotyp 2	– Cepa 2		
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Mobaci, Mocimor	9

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
53. VG	Resistance to <i>Phytophthora</i> <i>infestans</i> (Pi)	Résistance au <i>Phytophthora</i> <i>infestans</i>	Resistenz gegen <i>Phytophthora</i> <i>infestans</i>	Resistencia a <i>Phytophthora</i> <i>infestans</i>		
(+)						
QL	absent	absente	fehlend	ausente	Heinz 1706, Saint Pierre	1
	present	présente	vorhanden	presente	Fline, Heline, Perialine, Pyros	9
54. VG	Resistance to <i>Pyrenochaeta</i> <i>lycopersici</i> (Pl)	Résistance au <i>Pyrenochaeta</i> <i>lycopersici</i>	Resistenz gegen <i>Pyrenochaeta</i> <i>lycopersici</i>	Resistencia a <i>Pyrenochaeta</i> <i>lycopersici</i>		
(+)						
QL	absent	absente	fehlend	ausente	Montfavet H 63.5	1
	present	présente	vorhanden	presente	Kyndia, Moboglan, Pyrella	9
55. VG	Resistance to <i>Stemphylium</i> spp.	Résistance au <i>Stemphylium</i> spp.	Resistenz gegen <i>Stemphylium</i> spp.	Resistencia a <i>Stemphylium</i> spp.		
(+)						
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Motelle	9
56. VG	Resistance to <i>Pseudomonas syringae</i> pv. tomato (Pst)	Résistance au <i>Pseudomonas syringae</i> pv. tomato	Resistenz gegen <i>Pseudomonas syringae</i> pv. tomato	Resistencia a <i>Pseudomonas syringae</i> pv. tomato		
(+)						
QL	absent	absente	fehlend	ausente	Monalbo	1
	present	présente	vorhanden	presente	Ontario 7710	9
57. VG	Resistance to <i>Ralstonia solanacearum</i> (Rs)	Résistance au <i>Ralstonia solanacearum</i>	Resistenz gegen <i>Ralstonia solanacearum</i>	Resistencia a <i>Ralstonia solanacearum</i>		
(+)						
	– Race 1	– Pathotype 1	– Pathotyp 1	– Raza 1		
QL	absent	absente	fehlend	ausente	Floradel	1
	present	présente	vorhanden	presente	Caraĩbo	9
58. VG	Resistance to Tomato Yellow Leaf Curl Begomovirus TYLCV)	Résistance au Tomato Yellow Leaf Curl Virus	Resistenz gegen gelbes Tomatenblattrollvirus	Resistencia a virus de la hoja en cuchara		
(+)						
QL	absent	absente	fehlend	ausente	Montfavet H 63.5	1
	present	présente	vorhanden	presente	Anastasia, Mohawk, TY 20	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
59.	VG	Resistance to Tomato Spotted Wilt Tospovirus (TSWV) - Race 0	Résistance au Tomato Spotted Wilt Virus	Resistenz gegen das gefleckte Tomatenwelkevirus	Resistencia a Tomato Spotted Wilt Virus	
(+)						
QL	absent	absente	fehlend	ausente	Montfavet H 63.5	1
	present	présente	vorhanden	presente	Lisboa	9
60.	VG	Resistance to <i>Leveillula taurica</i> (Lt)	Résistance au <i>Leveillula taurica</i>	Resistenz gegen <i>Leveillula taurica</i>	Resistencia a <i>Leveillula taurica</i>	
(+)						
QL	absent	absente	fehlend	ausente	Montfavet H 63.5	1
	present	présente	vorhanden	presente	Atlanta	9
61.	VG	Resistance to <i>Oidium neolycopersici</i>(On) (ex <i>Oidium lycopersicum</i> (Ol))	Résistance au <i>Oidium lycopersicum</i>	Resistenz gegen <i>Oidium lycopersicum</i>	Resistencia a <i>Oidium lycopersicum</i>	
(+)						
QL	absent	absente	fehlend	ausente	Montfavet H 63.5	1
	present	présente	vorhanden	presente	Romiro	9
62.	VG	Resistance to Tomato Torrado Virus (ToTV)				
(+)						
QL	absent				Daniela	1
	present				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, all observations on the plant, stem and leaves 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) All observations on the green shoulder of the fruit should be made on the plant before maturity.
- (c) All observations on the fruit should be made on fruits of commercial maturity from the second or higher truss.

8.2 *Explanations for individual characteristics*

Ad. 1: Seedling: anthocyanin coloration of hypocotyl



1
absent



9
present

Ad. 2: Plant: growth type

The growth type is predominantly controlled by one monoallelic gene (self-pruning +/ self-pruning -).

Determinate (1): This type is predominantly controlled by the recessive allele, self-pruning – (Sp-). This type produces a limited number of trusses. The number of trusses is different among plants and is influenced by agroclimatic conditions. In this type, the number of leaves or internodes between inflorescence varies from one to three. In the terminal truss, the stem ends with an inflorescence and no lateral shoots are produced.

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

Indeterminate (2): This type is predominantly controlled by the dominant allele, self-pruning + (Sp +). In this type, three leaves or internodes are generally 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 and varies on the prolongation of stem. Plants of this type grow with the continuous repeat of this growth pattern.

It should be noted that 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 are indeterminate and uniform.

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

Ad. 4. Stem: anthocyanin coloration of upper third

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, except for varieties with Tm2 allele which is linked to anthocyanin of the stem (especially at the internode).



3
weak



5
medium



7
strong

Ad. 5: Only varieties with growth type indeterminate varieties: Stem: length of internode (between 1st and 4th inflorescence)

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. Alternatively, the date when the variety has reached the wire in the greenhouse or the top of the stake should be noted.

Ad. 7: Leaf: attitude (in middle third of plant)

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).



1
erect



3
semi-erect

5
horizontal



7
semi-drooping



9
drooping

Ad. 10: Leaf: division of blade

Pinnate leaf: primary leaflets do not bear secondary leaflets

Bipinnate leaf: primary leaflets again are pinnate, so they bear secondary leaflets

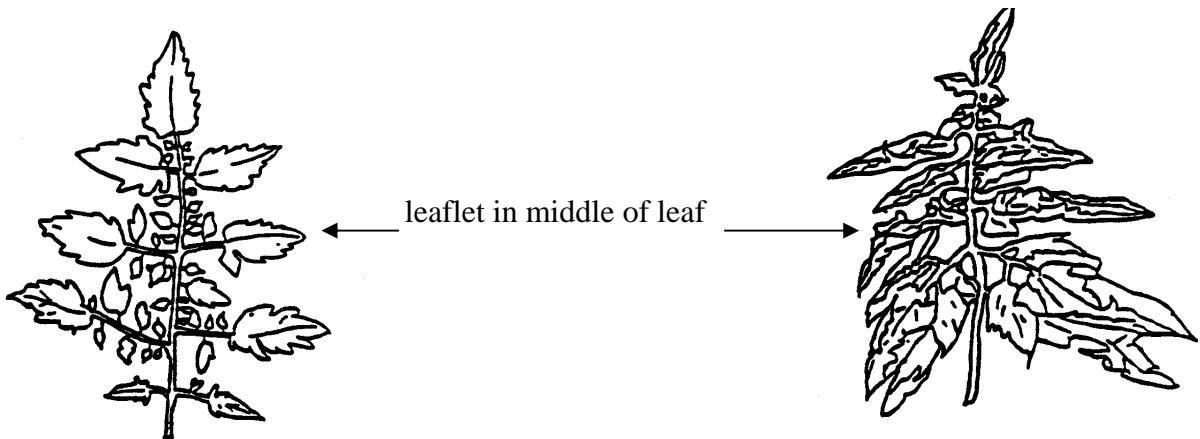


1
pinnate



2
bipinnate

Ad. 11: Leaf: size of leaflets (in middle of leaf)



Ad. 14: Leaf: blistering (in middle third of plant)

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.

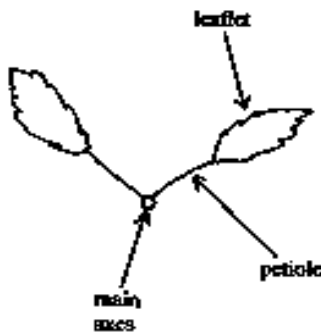


blistering

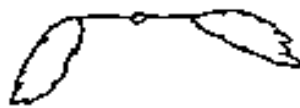


creasing

Ad. 15: Leaf: attitude of petiole of leaflet in relation to main axis (in middle third of plant)



3
semi-erect



5
horizontal



7
semi-drooping

Ad. 16: Inflorescence: type (2nd and 3rd truss)

The number of uniparous and multiparous trusses on the second and third truss of 20 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. 17: Flower: color

Orange flower color is linked to orange fruit color.

However varieties with orange fruits do not always have orange flowers because orange fruits can be caused by two different genes:

- Tangerine gene, fruits are lighter orange, flower is orange
- B-carotene gene, fruits are darker orange, but flower is yellow



1
yellow

2
orange

Ad. 18: Peduncle: abscission layer



1
absent

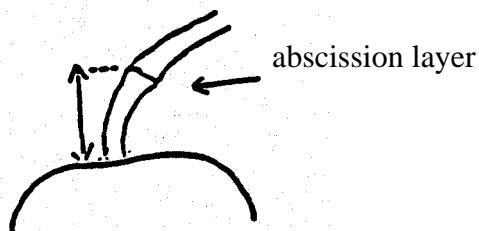


9
present

Some varieties which have only a collar instead of an abscission layer (heterozygous for the gene which controls the presence of the joint) are considered as jointless (“absent (1)”).

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. 19: Only varieties with peduncle abscission layer present: Peduncle: length (from abscission layer to calyx)



Ad. 20: 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.



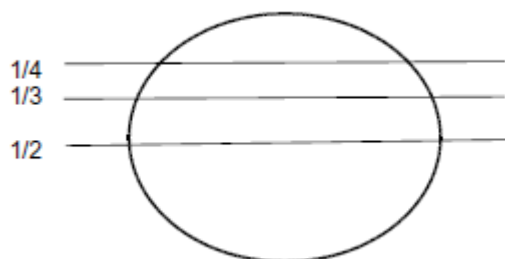
1
absent



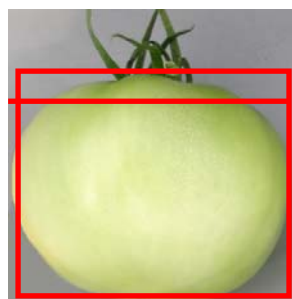
9
present

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

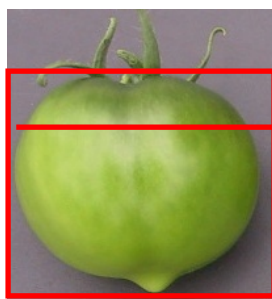
The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.



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



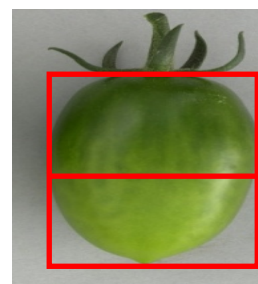
1
absent or very small



3
small



5
medium



7
large

Ad. 22: Fruit: intensity of green color of 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.



1
absent

3
light

5
medium

7
dark

Ad. 23: Fruit: green stripes (before maturity)

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



1
absent



9
present

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.










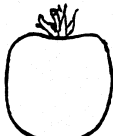
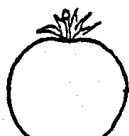
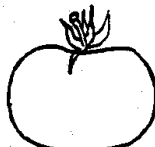

3
light

5
medium

7
dark

Ad. 25: Fruit: size

Ad. 27: Fruit: shape in longitudinal section

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

The position of the state of expression “trapezoid (11)” should be determined.

Ad. 28: Fruit: ribbing at peduncle end

For ease of observation, it is recommended to remove the peduncle.



1
absent or very weak

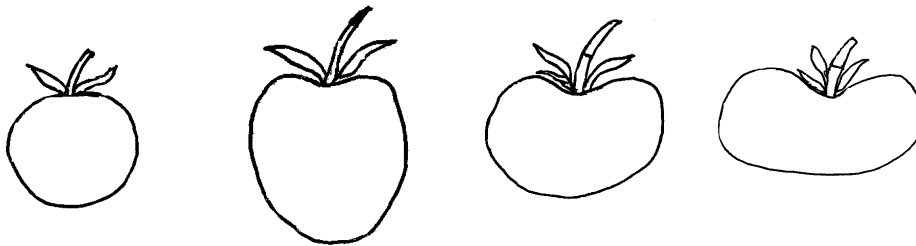
3
weak

5
medium

7
strong

9
very strong

Ad. 29: Fruit: depression at peduncle end



1
absent or
very weak

3
weak

5
medium

7
strong

9
very strong

Ad. 30: 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).



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

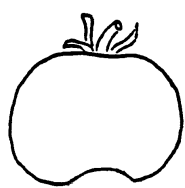
Ad. 31: Fruit: size of blossom scar

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

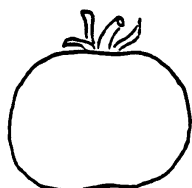


1 very small 3 small 5 medium 7 large 9 very large

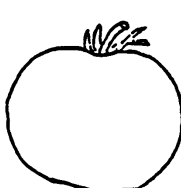
Ad. 32: Fruit: shape at blossom end



1
indented



2
indented to flat



3
flat



4
flat to
pointed



5
pointed



1
indented

3
flat

5
pointed

Ad. 33: Fruit: size of core in cross section (in relation to total diameter)



1
very small



3
small



5
medium



7
large



very large

Ad. 34: Fruit: thickness of pericarp

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



Ad. 35: 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 or three



3
three or four



4
four, five or six



5
more than six

Ad. 36: 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.

It should be noted that parent lines homozygous for the RIN gene do not ripen at all. In that case this characteristic is not applicable.

Green is color of fruit that cannot ripe in the normal conditions of the DUS trial, therefore there is no color at maturity. In that case this characteristic is not applicable.

Ad. 39: Fruit: color of flesh (at maturity)

The color at maturity has to be observed after a full change of color.

Ad. 41: Fruit: color of epidermis

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

Ad. 42: 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. 43: 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 to have naturally good conditions for storing fruits. 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. 44: 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 crops, this characteristic cannot be observed due to the branching of the plant.

Ad. 45: 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.

Ad. 46: 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. 47: Resistance to *Meloidogyne incognita* (Mi)

Method

Maintenance of strain

Type of medium: on roots of susceptible varieties

Special conditions avoid rotting of roots

Execution of test

Temperature: not over 28° C

Growing method: preferably in the greenhouse

Method of inoculation: plants are sown in infested soil

Duration of test

- from sowing to inoculation: inoculation before sowing,
- from inoculation to reading: 30 to 45 days

Number of plants tested: 10 to 20

Remarks: avoid rotting of roots avoid high temperature

Notation: number of root knots and root deformation

Standard varieties: susceptible: CLAIRVIL, CASAQUE ROUGE
intermediate resistant : MADYTA, VINCHY
resistant: ANABEL, ANAHU, F1 ANAHU x MONALBO

Ad. 48: Resistance to *Verticillium dahliae* sp.(Va and Vd)

Method

Maintenance of strains

Race 0 represented by strain Toreilles 4-1-4-1 is used. Race 0 is the common race defined by its ability to infect plants with the Ve gene.

Long term storage of strains: conidia suspended in glycerol solution at -80°C.
Strain can be subcultured on PDA or S of Messiaen media.

Execution of test

Growth stage of plants

Plants are grown in greenhouse or growth chamber. Inoculation can be done from the cotyledon stage (first leaves emerging) to 2 expanded leaves stage.

The following varieties can be used as controls. As a minimum, there should be one resistant and one susceptible control in the test. The heterozygous variety will help interpretation of results in case of aggressive test. Clarion could be interesting to add to susceptible controls as it is less susceptible and could also help to check the inoculation pressure of the test. These 2 varieties are optional.

Standard variety Vd:0

Marmande verte, Flix	S
Clarion	s
Monalbo x Marmande verte	RH
Monalbo, Elias	R

R	resistance present; no symptoms
RH	resistance present; sometimes very weak symptoms
s	resistance absent; weak symptoms
S	resistance absent; clear symptoms

Temperature:

Test performed under controlled conditions at 20 to 22°C .

Inoculum:

Verticillium sp. is grown on liquid Czapek Dox Broth or S of Messiaen media for 3 to 7 days in the dark, at 20 to 25°C with aeration. Spores are harvested and adjusted to 10⁶sp/ml.

Method of inoculation

Plantlets are harvested, roots are cut and soaked for 5 to 15 min in the inoculum suspension. Plantlets are then transplanted in soil.

Duration of test

At least 33 days from sowing to notation.

Number of plants tested:

At least 20 plants.

Notation:

25-30 days after inoculation.

Notation scale and interpretation of results:

R: no symptoms

S: chlorosis in the lower leaves, growth reduced and brown vessels or growth not reduced and brown vessels.

Analysis of results should be calibrated with results on R and S controls.

Ad. 49.1 + 49.2 + 49.3: Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) -Race 0 (ex 1), Race 1 (ex 2) and Race 2 (ex 3)

Method

Maintenance of strains

Long term storage of strains: at -80°C in 20% glycerol.

Race 0 (ex 1) represented by strains Orange 71 or PRI 20698 or Fol 071 and race 1 represented by strains 4152 (more aggressive) or PRI40698 or RAF 70 (less aggressive) are used.

Strains can be multiplied on PDA or S of Messiaen media.

Execution of test

Growth stage of plants

Plants are grown in greenhouse or growth chamber for 10 to 18 days (cotyledons to first leaf stages).

The following varieties are used as controls. Each line will be represented by at least one variety which can be chosen in the varieties indicated; the resistance phenotype to the two pathotypes of Fol is indicated. The heterozygous variety has a resistance phenotype usually weaker than in homozygous lines. This weak resistance can be used to calibrate the borderline between resistance and susceptibility. The heterozygous control for Fol:1 is optional.

<u>Controls for Fol:0 resistance test</u>	Fol:0	Fol:1*
Marmande, Marmande verte, Resal	S	S
Marporum x Marmande verte (heterozygous)	R	S
Marporum, Larissa	R	S
Motelle, Gourmet, Mohawk	R	R

* For information

<u>Controls for Fol:1 resistance test</u>	Fol:0*	Fol:1
Cherry Belle, Roma, Marmande verte	S	S
Ranco**, Marporum	R	S
Motelle x Marmande verte	R	R
Tradiro, Odisea	R	R

* *For information*

** *For Ranco: weak resistance to Fol0 with many escapes*

R = resistance present

S = resistance absent

Temperature:

Test performed in climatic chambers or greenhouse at 24-28°C. In case of aggressive test, temperature can be decreased to 20-24°C.

Inoculum:

Fusarium oxysporum f. sp. *lycopersici* is grown on PDA or S of Messiaen media or in aerated Czapek-Dox liquid cultures for 7 to 10 days. Spores are harvested and adjusted to 10⁶sp/ml for strains grown on media. In case of very aggressive isolate, inoculum concentration can be decreased.

Method of inoculation

Soaking of roots (cutting of roots optional) and of hypocotyls axis for 5 to 15 min in the inoculum suspension and transplantation of inoculated plantlets in soil.

Duration of test

At least 28 days from sowing to notation.

Number of plants tested:

At least 20 plants.

Notation:

At least 21 days after inoculation.

Notation scale:

4 qualitative classes:

- 0: no symptoms,
- 1: external healthy aspect of plant (without growth reduction) with brown vessels (sometimes extending above cotyledons, generally remaining below cotyledons),
- 2: growth reduction and brown vessels above cotyledons,
- 3: dead plant.

Interpretation of scale:

Generally 0 and 1 are considered resistant, 2 and 3 are susceptible but analysis of results should be calibrated with results of R and S controls.

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

Method

Maintenance of race

Type of medium: on PDA or synthetic medium (according to Messiaen)

Special conditions: fridge 4° C

Execution of test

Growth stage of plants: appearance of third leaf

Temperature: day: 22° C, night: 16° C

Light: 14 hours

Growing method: climate room or glasshouse

Method of inoculation: soaking of roots and of hypocotyl axis for five minutes in the inoculum.

Duration of test

- from sowing to inoculation: 18 to 20 days
- from inoculation to reading: 10 days

Number of plants tested: 10 to 20 plants

Remarks: need for frequent renewal of races because of loss of pathogenicity

Standard varieties:

- susceptible: MOTELLE
- resistant:
 - MOMOR (homozygote)
 - F1 MOMOR x MOTELLE (heterozygote)
 - the Frl gene does not completely control the disease in the heterozygous stage.

Ad. 51.1 – 51.6 Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)

Method

Maintenance of races

Type of medium: PDA or synthetic medium

Special conditions: subculturing of isolates

Execution of test

Growth stage of plants: 3 leaves expanded

Temperature: day: 24° C, night: 16° C

Light: 12 hours

Growing method: in climatic room, highest possible humidity, arresting growth a few days before inoculation by irrigation of roots with ALAR 85 (daminozide), or in glasshouse with high humidity, for example under a polyethylene cover.

Method of inoculation: spraying of a solution with the fungus on leaves.

Duration of test

- from sowing to inoculation: 22 to 25 days
- from inoculation to reading: 20 to 25 days

Number of plants tested: 30 plants

Remarks: the level of expression of symptoms may vary between plants due to complex resistance genetics

Standard varieties:

- susceptible: MONALBO
- resistant : has to be chosen with the concerned alleles
 - cf1: STIRLING CASTLE
 - cf2: VETOMOLD
 - cf3: V 121
 - cf4: PURDUE 135
 - cf5: IVT 1149
 - cf2 cf4: VAGABOND
 - cf2 cf5: F1 “VETOMOLD x IVT 1149”
 - cf2 cf4 cf5: F1 “VAGABOND x IVT 1149”
 - cf6: F 77-38
 - cf9: IVT 1154

Race 0: Angela, Estrella, Sonatine, Sonato, Vemone

Group A: Angela, Estrella, Sonatine, Sonato

Group B: Angela, Estrella, Sonatine, Sonato, Vemone

Group C: Angela, Estrella, Sonatine
Group D: Estrella, Sonatine, Vemone
Group E: Sonatine

Ad. 52.1 – 52.3: Resistance to Tomato mosaic tobamovirus (ToMV)- Strains 0, 1 and 2

Method

Maintenance of strains

Strains are long term stored as desiccated leaves below 10°C.
Race 0 represented by isolate INRA Avignon 6-5-1-1 (aucuba mosaic strain) is used.
Virus should be multiplied on the susceptible control before being used for inoculation of the test.

Execution of test

Growth stage of plants

Plants are grown in greenhouse or growth chamber until cotyledons (first leaves emerging) to two expanded leaves have appeared.

Within each test at least one resistant and one susceptible standard variety is included.

The following varieties are used as controls. Each line will be represented by at least one resistance phenotype which can be chosen from the varieties indicated; the resistance phenotype to the 3 pathotypes of ToMV is indicated. Mobaci and Moperou will allow checking the pathotype identity of the virus. Monalbo x Momor will help the interpretation of the distinct resistance phenotype with necrosis.

Controls for ToMV:0, these varieties were not validated as standard varieties for ToMV:1 and ToMV:2:

Variety	Resistance phenotype		
	ToMV:0	ToMV:1	ToMV:2
Marmande, Monalbo	S	S	S
Mobaci	R	S	R
Moperou	R	R	S
Monalbo x Momor	RN	RN	RN
Momor, Gourmet	R	R	R

R = resistance present; no symptoms

RN = resistance present; a variable proportion of plants showing some or extensive necrosis; all other plants have no symptoms.

S = resistance absent; mosaic symptoms

Temperature:

Test performed in climatic chambers or greenhouse at 24 to 26°C. At higher temperatures, resistance can break down.

Inoculum and method of inoculation

Mechanical inoculation by rubbing cotyledons (first leaves emerging) or two expanded leaves with an inoculum solution consisting of symptomatic leaves grinded in a buffer with carborundum added. Leaves can be rinsed after inoculation. Light is important for symptom expression.

Duration of test

24 to 42 days from sowing to notation.

Number of plants tested:

At least 20 plants.

Notation:

12-21 days after inoculation when symptoms are well developed on susceptible control.

Notation scale and interpretation results:

R: without symptoms or with necrosis (necrosis can be observed on plants heterozygous for resistance gene, these plants are noted resistant)

S: mosaic symptoms.

Ad. 53: Resistance to *Phytophthora infestans* (Pi)

Method

Maintenance of race

Type of medium: on agar medium

Special conditions: 18° C

Execution of test

Growth stage of plants: 10 leaves developed

Temperature: 18° C

Light: after inoculation darkness during 24 hours, thereafter 10 hours darkness per day

Growing method: climatic room or glasshouse

Method of inoculation: spraying of spore suspension, isolate harvested freshly from leaves

Duration of test

- from sowing to inoculation: 6 to 7 weeks
- from inoculation to reading: 7 to 8 days

Hygrometry: very high during the first four days after inoculation
(cover plants with polyethylene cover)

Remarks: heterozygotes may show a lower level of expression of resistance

Standard varieties:

- susceptible: SAINT PIERRE, HEINZ 1706
- resistant: PIERALINE, HELINE, PYROS,
F1 "PIERALINE x PIERALBO"

Ad. 54: Resistance to *Pyrenochaeta lycopersici* (Pl)

Method

Maintenance of race: method 1: on roots obtained from plants grown in the greenhouse on naturally contaminated soil (or with enforced natural contamination);

method 2: inoculum grown on sand or mould, mixed with oat-meal and sterilized in the autoclave (artificial infection)

Execution of test:

Growth stage of plants: method 1: on adult plants around fruit maturity
method 2: 4 to 6 weeks after sowing (first flowering inflorescence)

Temperature: day: 24° C; night: 14° C

Light: 12 hours minimum

Growing method and Method of inoculation:

- method 1: plants are planted in contaminated soil mixed with cut contaminated roots
- method 2: plants are sown in steam-disinfected sandy mould mixed with inoculum

Duration of test

- from sowing to inoculation: method 1: 6 weeks
method 2: when sowing
- from inoculation to reading: method 1: 3 to 4 months
method 2: 4 to 6 weeks

Number of plants tested: 10 as a minimum

Remarks: method 1: is more efficient to clearly separate susceptible from resistant plants
method 2: pathogenicity of the strains has to be tested before inoculation on roots of young plants

Standard varieties: susceptible: MONTFAVET H 63.5
resistant: KYNDIA, MOBOGLAN, PYRELLA

Ad. 55: Resistance to *Stemphylium* spp.

Method

Maintenance of isolate

Type of medium: on PDA or synthetic medium

Special conditions: fridge 4° C without light

Execution of test

Growth stage of plants: three leaves expanded

Temperature: constant, day: 24° C, night: 24° C

Light: 12 hours

Growing method: glasshouse or climate room

Method of inoculation: pulverisation on leaves

Duration of test

- from sowing to inoculation: 20 to 22 days
- from inoculation to reading: 10 days

Number of plants tested: 30 plants

Remarks: production of inoculum on medium V8 under light

Standard varieties: susceptible: MONALBO
resistant: MOTELLE, F1 MOTELLE x MONALBO

Ad. 56: Resistance to *Pseudomonas syringae* pv. tomato (Pst)

Method

Maintenance of races

Type of medium: on KING B medium
Special conditions: 20 - 22° C in the dark, transplantation every 10 days

Execution of test

Growth stage of plants: three leaves expanded
Temperature: day: 22° C, night: 16° C
Light: 12 hours
Growing method: climatic room in summer, glasshouse in winter
Method of inoculation: pulverisation on leaves

Duration of test

- from sowing to inoculation: 20 to 22 days
- from inoculation to reading: 8 days

Number of plants tested: 30 plants
Remarks: races to be renewed each year

Standard varieties: susceptible: MONALBO
resistant: ONTARIO 7710, F1 MONALBO x ONTARIO 7710

Ad. 57: Resistance to *Ralstonia solanacearum* (Rs) – Race 1

Method

Maintenance of race : Two races may affect Tomato: race 1 (active between 25-30° C) and race 3 (active between 20-23° C)
Type of medium: Freezing at -80° C; culture in PYDAC immersed in oil; suspension in sterile distilled water
Special conditions: conservation at 15° C in sterile distilled water

Execution of test

Growth stage of plants:	three to four well-developed leaves
Temp. (in climatic chamber):	day: 26-30° C; night: 25° C
Light:	10 - 12 hours
Growing method: 2 possibilities:	- in climatic chamber: rapid test - in the field: long test (applicable in tropical climate only)
Method of inoculation:	deposit of at least 2 ml of inoculum, adjusted to 10 ⁷ colonies per ml, at the foot of each plantlet prior to planting

Duration of test

- from sowing to inoculation: 3 to 4 weeks
- from inoculation to reading: - 3 weeks for the fast test
- 2 months for the long test

Number of plants tested: minimum of 30

Remarks: maintain high humidity

Standard varieties: - susceptible: FLORADEL
- resistant: CARAIBO

Ad. 58: Resistance to Tomato Yellow Leaf Curl Begamovirus (TYLCV)

Method

Execution of test: Plants are tested under field crop conditions respecting a period of planting and a place where the disease has been proven to exist. 100% contaminated plants are grown of susceptible local varieties to ensure natural transmission by *Bemisia* insect and repeatability of the results

Growth stage of plants: on adult plants of field crop outside

Method of inoculation: natural inoculation by *Bemisia*

Duration of test

- from sowing to inoculation: 6 weeks minimum
- from inoculation to reading: 2.5 months maximum

Number of plants tested: 20 plants minimum

Ad. 60: Resistance to *Leveillula taurica* (Lt)

Method

Maintenance of races

Type of medium: tomato plants

Special conditions:

Execution of test

Growth stage of plants: on adult plants of field crop outside

Method of inoculation: natural infection

Duration of test

- from sowing to inoculation: infection possible from planting stage to full grown plants
- from inoculation to reading: before harvest

Number of plants tested: 20 plants

Remarks: Yellow chlorotic spots on upper side of leaves, mycelium on lower side of leaves.
Check cleistothecia under microscope if it really concerns *Leveillula* and not another powdery mildew.

Standard varieties: - susceptible: MONALBO
- resistant: ATLANTA

Ad. 61: Resistance to *Oidium neolycopersici* (On) (ex *Oidium lycopersicum* (Ol))

Method

Maintenance of races

Type of medium: on tomato plants

Special conditions: climatic room

Execution of test

Growth stage of plants: 3 weeks

Temperature: 24°C during the day; 18°C during the night

Light: 12 hours

Method of inoculation: - by spraying (10⁴ conidia/ml) on leaves
- by dredging (uncontrolled inoculum) on leaves

Execution of test

Duration of test

- from sowing to inoculation: 18 - 20 days
- from inoculation to reading: 15 – 18 days

Number of plants tested: 30 plants/lot

Remarks:

Scale of notes:

- no sporulation	}
- sporulation without extension (necrotic points)	}Resistant
- moderate sporulation	}
- abundant sporulation	}Susceptible

Standard varieties:

- susceptible: Momor (*L. esculentum*)
- resistant: *L. hirsutum* PI-247087 (accession), Romiror

Ad. 65: Resistance to Tomato Torrado Virus (ToTV)

Method

Maintenance of races

Type of medium: plant material with symptoms, stored at –80° C

Multiplication: on *N. tabacum* ‘Xanthi’ 3 weeks before start of experiment

Special conditions: use Quarantine procedures

Remarks: white fly may be a vector of ToTV

Execution of test

Growth stage of plants: inoculate when cotyledons are fully grown, re-inoculate 7 days later on first true leaves one or two leaves

Temperature: day: 23° C, night: 21° C; avoid temperature above 25°C

Light: extra light in winter, 16 h day, 8 h night

Growing method: Quarantine facilities; glasshouse

Method of inoculation: with ice-cold 0,01 M PBS pH 7 and carborundum

Duration of test

- from sowing to inoculation: 14 days
- from inoculation to reading: 14-21 days

Number of plants tested: 20 to 30 plants

Remarks: Necrotic spots on the top leaves of susceptible plants

Standard varieties: Resistant standard variety: Matias

Note: The method for assessing the expression of this characteristic is protected by patent, but the patent holder has waived his/her rights for the purpose of DUS testing and development of variety descriptions.

9. Literature

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10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights		
1. Subject of the Technical Questionnaire		
1.1 Botanical name	<input type="text" value="Solanum lycopersicum L."/>	
1.2 Common name	<input type="text" value="Tomato"/>	
2. Applicant		
Name	<input type="text"/>	
Address	<input type="text"/>	
Telephone No.	<input type="text"/>	
Fax No.	<input type="text"/>	
E-mail address	<input type="text"/>	
Breeder (if different from applicant)	<input type="text"/>	
3. Proposed denomination and breeder's reference		
Proposed denomination (if available)	<input type="text"/>	
Breeder's reference	<input type="text"/>	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross []
 (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.

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)

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TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

Characteristics	Example Varieties	Note
5.1 Plant: growth type (2)		
determinate	Campbell 1327, Prisca	1 []
indeterminate	Marmande VR, Saint-Pierre, San Marzano 2	2 []
5.2 Leaf: division of blade (10)		
pinnate	Mikado, Pilot, Red Jacket	1 []
bipinnate	Lukullus, Saint-Pierre	2 []
5.3 Peduncle: abscission layer (18)		
absent	Aledo, Bandera, Count, Lerica	1 []
present	Montfavet H 63.5, Roma	9 []
5.4 Fruit: green shoulder (before maturity) (20)		
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 Fruit: size (25)			
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 Fruit: shape in longitudinal section (27)			
cordate	Valenciano	1 []	
ovate	Barbara, Dualrow, Soto	2 []	
elliptic	Alcaria, Castone	3 []	
circular	Cerise, Moneymaker	4 []	
oblate	Montfavet H 63.4, Montfavet H 63.5	5 []	
cylindric	Hypeel 244, Macero II, San Marzano 2	6 []	
square	Early Mech, Peto Gro	7 []	
obovate	Duquesa, Estelle Rimone, Rio Grande	8 []	
pyriform	Europeel	10 []	
trapezoid	Ingrid	11 []	
flattened	Campbell 28, Marmande VR	12 []	

TECHNICAL QUESTIONNAIRE		Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note	
5.7 Fruit: number of locules (35)			
only two	Early Mech, Europeel, San Marzano	1 []	
two or three	Alphamech, Futuria	2 []	
three or four	Montfavet H 63.5	3 []	
four, five or six	Raïssa, Tradiro	4 []	
more than six	Marmande VR	5 []	
5.8 Fruit: color at maturity (36)			
cream	Jazon, White Mirabell	1 []	
yellow	Goldene Königin, Yellow Pear	2 []	
orange	Sungold	3 []	
pink	Aichi First	4 []	
red	Ferline, Daniela, Montfavet H 63.5	5 []	
brown	Ozyrys	6 []	
green	Green Grape, Green Zebra	7 []	
5.9 Resistance to <i>Meloidogyne incognita</i> (Mi) (47)			
susceptible	Casaque Rouge	1 []	
moderately resistant	Campeon, Madyta, Vinchy	2 []	
highly resistant	Anabel, Anahu	3 []	
5.10 Resistance to <i>Verticillium dahliae</i> sp. (Va and Vd) –Race 0 (48)			
absent	Anabel, Marmande verte	1 []	
present	Daniela, Marmande VR	9 []	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.11 Resistance to <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i> (Fol) Race 0 (49.1) (ex 1)		
absent	Marmande verte	1 []
present	Anabel, Marporum, Marsol	9 []
5.12 Resistance to <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i> (Fol) Race 1 (49.2) (ex 2)		
absent	Marmande verte	1 []
present	Motelle, Walter	9 []
5.13 Resistance to Tomato Mosaic Tobamovirus (ToMV) – Strain 0 (52.1)		
absent	Monalbo	1 []
present	Mobaci, Mocimor, Moperou	9 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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6. Similar varieties and differences from these varieties

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

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

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#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. 46)	[]	[]	[]
Resistance to :			
b) <i>Fusarium oxysporum</i> f. sp. <i>radicis lycopersici</i> (char. 50)	[]	[]	[]
c) <i>Fulvia fulva</i> :			
(i) Race 0 (char. 51.1)	[]	[]	[]
(ii) Group A (char. 51.2)	[]	[]	[]
(iii) Group B (char. 51.3)	[]	[]	[]
(iv) Group C (char. 51.4)	[]	[]	[]
(v) Group D (char. 51.5)	[]	[]	[]
(vi) Group E (char. 51.6)	[]	[]	[]
d) Tomato Mosaic tobamovirus			
(i) Strain 1 (char. 52.2)	[]	[]	[]
(ii) Strain 2 (char. 52.3)	[]	[]	[]
e) <i>Phytophthora infestans</i> (char. 53)	[]	[]	[]
f) <i>Pyrenochaeta lycopersici</i> (char. 58)	[]	[]	[]
g) <i>Stemphylium</i> spp. (char. 55)	[]	[]	[]

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:
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	absent	present	not tested
h) <i>Pseudomonas syringae</i> pv. tomato (char. 56)	[]	[]	[]
i) <i>Ralstonia solanacearum</i> race 1 (char. 57)	[]	[]	[]
j) Tomato Yellow Leaf Curl Begamovirus (char. 58)	[]	[]	[]
k) Tomato Spotted Wilt Tospovirus (char. 59)	[]	[]	[]
l) <i>Leveillula taurica</i> (char. 60)	[]	[]	[]
m) <i>Oidium lycopersicum neolycopersici</i> (char. 61)	[]	[]	[]
n) Tomato Torrado Virus (char. 62)	[]	[]	[]
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	[]		

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:
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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]