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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

UNION INTERNATIONALE POUR LA PROTECTION DES OBTENTIONS VÉGÉTALES

INTERNATIONALER VERBAND ZUM SCHUTZ VON PFLANZEN-ZÜCHTUNGEN

UNIÓN INTERNACIONAL PARA LA PROTECCIÓN DE LAS OBTENCIONES VEGETALES

DRAFT

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

TOMATO

(*Lycopersicon lycopersicum* (L.) Karsten ex Farw.)

These Guidelines should be read in conjunction with document TG/1/2, which contains explanatory notes on the general principles on which the Guidelines have been established.

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I. Subject of these Guidelines

These Test Guidelines apply to all varieties of *Lycopersicon lycopersicum* (L.) Karsten ex Farw. (*Lycopersicum esculentum* P. Mill).

II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the seed required for testing the variety is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must make sure that all customs formalities are complied with. The minimum quantity of plant material to be supplied by the applicant in one or several samples should be:

(a) vegetatively propagated varieties: 25 plants for greenhouse varieties, 50 plants for outdoor varieties per growing season

(b) seed propagated varieties: 10 g or 2500 seeds.

The plant material/seed supplied should be visibly healthy, not lacking in vigor or affected by any important pest or disease. The seed should at least meet the minimum requirements for germination capacity, moisture content and purity for marketing seed in the country in which the application is made. The germination capacity should be as high as possible.

2. The plant material must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of Tests

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

2. The tests should normally be conducted at one place. If any important characteristics of the variety cannot be seen at that place, the variety may be tested at an additional place.

3. The tests should be carried out under conditions ensuring normal growth. The size of the plots should be such that plants or parts of plants may be removed for measurement and counting without prejudice to the observations which must be made up to the end of the growing period. Each test should include a total of 20 plants in the greenhouse or 40 plants in the open which should be divided between two or more replicates. Separate plots for observation and for measuring can only be used if they have been subject to similar environmental conditions. Varieties stemming from tissue culture should, in addition, be compared to plant material of comparable varieties raised under the same conditions.

4. Additional tests for special purposes may be established.

IV. Methods and Observations

1. Unless otherwise indicated, all observations determined by measurement, weighting or counting should be made on 20 plants or parts taken from each of 20 plants.

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, the maximum number of off-types allowed would be 1. In the case of a sample size of 40 plants, the maximum number of off-types allowed would be 2.

3. 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 10 plants.

4. All observations on the leaf should be made before ripening of fruit.

V. Grouping of Varieties

1. The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety. Their various states of expression should be fairly evenly distributed throughout the collection.

2. It is recommended that the competent authorities use the following characteristics for grouping varieties:

(a) Plant: growth type (characteristic 2)
(b) Leaf: division of blade (characteristic 9)
(c) Peduncle: abscission layer (characteristic 20)
(d) Fruit: shape in longitudinal section (characteristic 24)
(e) Fruit: number of locules within a plant (characteristic 33)
(f) Fruit: green shoulder (before maturity) (characteristic 34)
(g) Fruit: color at maturity (characteristic 38)

VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states as given in the Table of Characteristics should be used.

2. Notes (numbers), for the purposes of electronic data processing, are given opposite the states of the different characteristics.

3. Legend:

(*) Characteristics that should be used on all varieties in every growing cycle over which the examinations are made and always be included in the variety descriptions, except when the state of expression of a preceding characteristic or regional environmental conditions render this impossible.

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

VIII. Explanations on the Table of Characteristics

Ad. 2: Plant: growth type

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

Indeterminate (1): This type is controlled by the dominant allele, self-pruning + (Sp +). In this type, three leaves or internodes are generally observed between inflorescences. Each trusse produces three buds: the terminal bud is transformed into a flowering bud; one of the two axillary buds is transformed into a lateral shoot which produces next three buds and carries on the prolongation of stem. Plants of this type grows 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., progenies from the variety “Daniela”).

Marmande, San Marzano and Costoluto Fiorentino types 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 this type.

Determinate (2): This type is 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 inflorescences varies from one to three. In the terminal trusse, the stem ends with an inflorescence and no lateral shoots are produced.

This type includes some “semi-determinate” varieties which do not have three leaves or internodes consistently between inflorecences, 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 Pach 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 inter node).

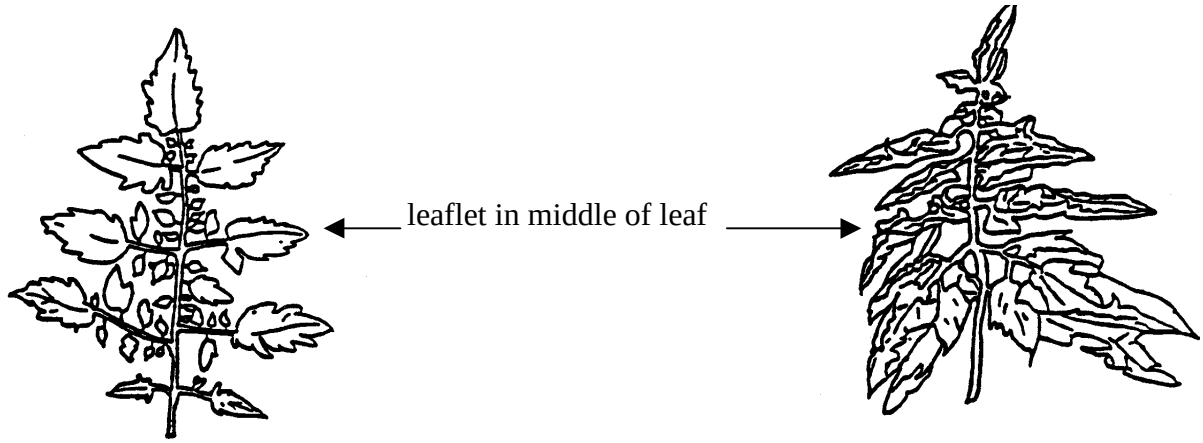
Ad. 5: Only indeterminate varieties: Stem length of internode (between 1st and 4th inflorescence)

Measure the length between 1st and 4th inflorescence, count the number of internodes. In order to obtain the average length of an internode, calculate the ratio length/number of internodes. The observation should be made at following stage:

- one leave after the 5th or 6th inflorescence on staked open field crops
- one leave after the 7th to 12th inflorescence under greenhouses, depending on the height of the greenhouse.

Indeterminate varieties have generally 3 internodes between inflorences except some genotypes (see Ad. 2). After checking it, measure the length of main stem between first and fourth inflorescence and divide the length by 12 internodes to obtain the average length of an internode.

Ad. 10: Leaf: size of leaflets (in middle of leaf)



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

3	5	7
semi-erect	horizontal	semi-drooping

Ad. 18: Flower: pubescence of style

Some non-hairy varieties can present some rare and small hairs at the base of the style.

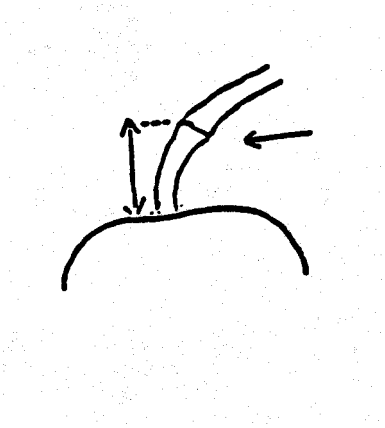
Ad. 20: Peduncle abscission layer

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)").

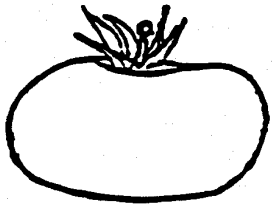
Ad. 21: Only for varieties with abscission layers: Peduncle: length (from abscission layer to calyx)



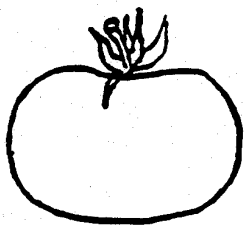
abscission layer

short	3	7-9 mm
medium	5	9-14 mm
long	7	14-18 mm

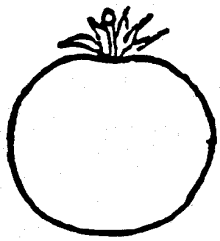
Ad. 24: Fruit: shape in longitudinal section



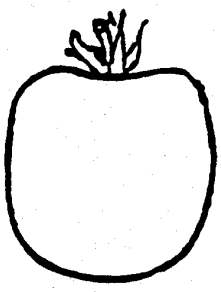
1
transverse elliptic



2
transverse broad elliptic



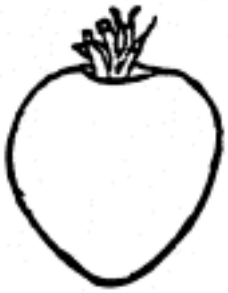
3
circular



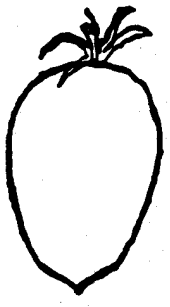
4
rectangular

5
cylindrical

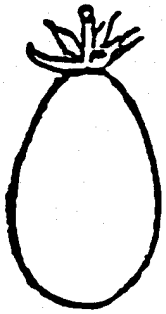
6
elliptic



7
heart-shaped



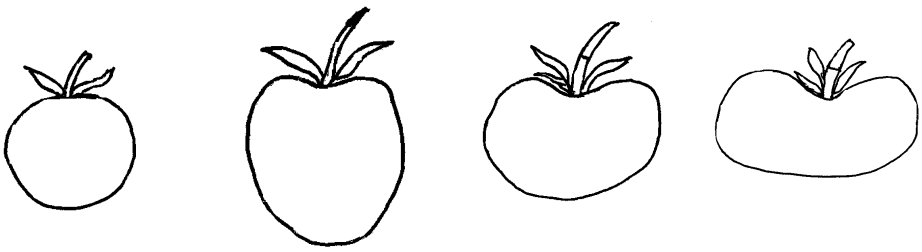
8
obovate



9
ovate

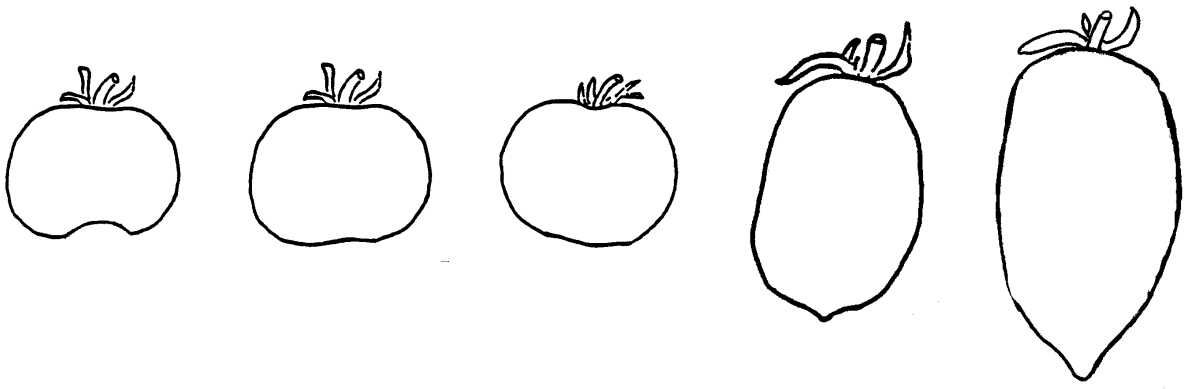
10
pear-shaped

Ad. 27: Fruit: depression at peduncle end



1	3	5	7
absent or very weak	weak	medium	strong

Ad. 30: Fruit: shape at blossom end



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

Ad. 40: Fruit: firmness

Method

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

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

Ad. 41: Fruit: shelf-life

Explanation

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. 42: 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 trusse, as the expression on the first trusse is more influenced by the seed vigor and the plantation quality.

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

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: Sensitivity to expression of 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

Ad. 46: Resistance to *Meloidogyne incognita*

Method

Maintenance of strain

Type of medium:	on roots of susceptible varieties (grown in the green-house)
Special conditions:	avoid rotting of roots

Execution of test

Temperature:	not over 28° C
Growing method:	in the greenhouse
Method of inoculation:	dishes are inoculated with eggs (totally or on sowing lines)

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 on hybrid varieties

Heterozygote varieties can have a slightly lower level of expression in the test.

Standard varieties: susceptible: CLAIRVIL, CASAQUE ROUGE
resistant: ANABEL, ANAHU, F1 "ANAHU x MONALBO"

Ad.47: Resistance to *Verticillium dahliae* race 0

Method

Maintenance of races

Type of medium: on agar medium

Special conditions: transplantation of races each month

Execution of test

Growth stage of plants: cotyledons expanded

Temperature: day: 22° C, night: 16 - 18° C

Light: 10 hours

Growing method: in the greenhouse, under high humidity

Method of inoculation: soaking of root system in liquid medium of fungi, after cutting radicels, thereafter replanting

Duration of test

- from sowing to inoculation: 15 to 20 days
- from inoculation to reading: 25 to 30 days

Number of plants tested: 10 to 20 plants

Remarks: reading: control presence of *Verticillium* by external symptoms and inside vessels

Heterozygote varieties can show symptoms of a slightly lower level of expression.

Standard varieties: susceptible: ANABEL, MARMANDE Verte
resistant: CLAIRVIL - MARMANDE VR, F1 "MARMANDE Verte x MARMANDE VR"

Ad. 48.1 + 48.2: Resistance to *Fusarium oxysporum* f. sp. *lycopersici* race 0 (ex 1) and race 1 (ex 2)

Method

Maintenance of races

Type of medium:	on agar medium
Special conditions:	22 - 25° C, transplantation of races each month

Execution of test

Growth stage of plants:	cotyledons expanded
Temperature:	day: 28° C, night: 25° C
Light:	12 hours
Growing method:	under high humidity, in the greenhouse or climatic room
Method of inoculation:	soaking of roots, plants in liquid medium of fungi, after cutting radicels, thereafter replanting

Duration of test

- from sowing to inoculation: 10 to 20 days
- from inoculation to reading: 20 to 25 days

Number of plants tested:

Remarks: reading: test with heterozygous F1 varieties must be interpreted carefully because on test race 1, and even race 0, can attack some plants.

Heterozygote varieties can show symptoms of a slightly lower level of expression

Standard varieties:	susceptible:	MARMANDE Verte
	resistant to race 0:	MARSOL, ANABEL, MARPORUM, F1 "MARSOL x MARMANDE Verte"
	resistant to race 0 and race 1:	WALTER, MOTELLE, F1 "MOTELLE x MONALBO"

Ad. 49: Resistance to *Fusarium oxysporum* f. sp. *radicis lycopersici*

Method

Maintenance of race

Type of medium:	on 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:	climatic room
Method of inoculation:	soaking of roots and of hypocotyl axis for five minutes in the inoculum. After inoculation, transplantation of plantlets in steam disinfected sand

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

Ad. 50.1 - 50.5: Resistance to *Cladosporium fulvum*

Method

Maintenance of races

Type of medium:	synthetic medium

Special conditions: 20 - 22° C, transplantation of races every six weeks

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 (daminazoide)

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 alleles of resistance

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.51.1 - 51.4: Resistance to Tomato Mosaic Virus, strains 0, 1, 2 and 1-2

Method

Maintenance of strains

Type of medium:	on plants or dry leaf
Special conditions:	congelation or BOS method
Identification:	use the strain 0 inducing necrosis on varieties with allele $Tm2^2$

Execution of test

Growth stage of plants:	expanded cotyledons
Temperature:	day: 30 to 35° C, night: 25 to 30° C
Light:	12 hours
Growing method:	in the greenhouse
Method of inoculation:	mechanical, by rubbing of cotyledons

Duration of test

- from sowing to inoculation:	12 to 14 days
- from inoculation to reading:	10 to 12 days
Number of plants tested:	15 to 30 plants

Standard varieties:

susceptible : MONALBO
resistant :

- with alleles		Resistant to race
Tm 1	: MOBACI	strains 0 and 2
Tm 2	: MOPEROU	strains 0 and 1
$Tm\ 2^2$	: MOMOR - RAPIDS	strains 0, 1, 2 and 1-2
Tm 1 - $Tm\ 2^2$	: MOCIMOR	strains 0, 1, 2 and 1-2
$Tm\ 2^2$/+	: MOMOR x MONALBO	strains 0, 1, 2 and 1-2

Ad. 52: Resistance to *Phytophthora infestans*

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
Method of inoculation:	spraying of spore suspension, use race replicated 3 weeks before inoculation

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:	heterozygote varieties can show symptoms of a slightly lower level of expression
Standard varieties:	susceptible : SAINT PIERRE, HEINZ 1706 resistant : PIERALINE, HELINE, PYROS, F1 “PIERALINE x PIERALBO”

Ad. 53: Resistance to Pyrenochaeta lycopersici

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 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. 54: Resistance to *Stemphylium* spp.

Method

Maintenance of isolate

Type of medium:	on 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:	climatic 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. 55: Resistance to *Pseudomonas syringae* pv. tomato

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. 56: Resistance to *Ralstonia solanacearum*, (ex. *Pseudomonas solanacearum)* 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 emersed 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
Temperature (in climatic chamber):	day: 26-30° C; night: 25° C
Light:	10 - 12 hours
Growing method:	two 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. 57: Resistance to Tomato Yellow Leaf Curl Virus (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
Remarks:	
Standard varieties:	susceptible: local varieties resistant : TY 20 or accessions from L. pimpinellifolium and from L. peruvianum

Ad. 58: Resistance to Tomato Spotted Wilt Virus

Method

Maintenance of races

Type of medium:	on tomato plants or freezing at –70° C
Special conditions:	

Execution of test

Growth stage of plants:	one or two leaves expanded
Temperature:	day: 20° C, night: 20° C
Light:	extra light in winter
Growing method:	glasshouse
Method of inoculation:	mechanical, rubbing with carborundum on cotyledons, inoculum suspension < 10° C
Duration of test	
- from sowing to inoculation:	20 days
- from inoculation to reading:	14 to 20 days
Number of plants tested:	15 to 30 plants
Remarks:	be aware of thrips
Standard varieties:	susceptible: MONALBO resistant : TSUNAMI, BODAR

Ad. 59: Resistance to *Leveillula taurica*

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 cleistochecia under microscope if it really concerns Leveillula and not another powdrey mildew.
Standard varieties:	susceptible: MONALBO resistant: ATLANTA

Ad. 60: Resistance to *Oidium lycopersicum*

Method

Type of medium:	on tomato plants
Special conditions:	climatic room
Growth stage of plants:	3 weeks
Temperature:	24°C during the day ; 18°C during the night
Light:	12 hours
Method of innoculation:	- by spraying (10^4 conidies/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 (nécrotic points)	}Resistant }
	- moderated sporulation	}
	- abundant sporulation	}Susceptible

Standard varieties:	susceptible	: Momor (L. *esculentum*)
	resistant	: L. *hirsutum* P1247087 (accession)
	hétérozygote	: F1 Momor x L. *hirsutum* P1247087

IX. Literature

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X. Technical Questionnaire

	Reference Number (not to be filled in by the applicant)

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

1. Species	*Lycopersicon lycopersicum* (L.) Karsten ex Farw. TOMATO
2. Applicant (Name and address)	
3. Proposed denomination or breeder's reference	

4. Information on origin, maintenance and reproduction of the variety

4.1 Method of maintenance and reproduction

(a) vegetative propagation [ ]

(b) seed propagation [ ]

- hybrid [ ]

- open-pollinated [ ]

4.2 Other information

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the state of expression 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 (9)	**Leaf: division of blade**		
	pinnate	Pilot, Red Jacket, Mikado	1[ ]
	bipinate	Lukullus, Saint-Pierre	2[ ]
5.3 (20)	**Peduncle: abscission layer**		
	absent	Aledo, Bandera, Count, Lerica	1[ ]
	present	Montfavet H 63.5, Roma	9[ ]
5.4 (22)	**Fruit: size**		
	very small	Cerise, Sweet 100	1[ ]
	small	Early Mech, Europeel, Roma	3[ ]
	medium	Alphamech, Diego	5[ ]
	large	Carmello, Ringo	7[ ]
	very large	Erlidor, Lydia, Muril	9[ ]

	Characteristics	Example Varieties	Note
5.5 (24)	**Fruit: shape in longitudinal section**		
	transverse elliptic	Campbell 28, Marmande VR	1[ ]
	transverse broad ellipitc	Montfavet H 63.5, Montfavet H 63.4	2[ ]
	circular	Cerise Moneymaker	3[ ]
	rectangular	Early Mech, Peto Gro	4[ ]
	cylindrical	Hypeel 244, Macero II, San Marzano 2	5[ ]
	elliptic	Alcaria, Castone	6[ ]
	heart-shaped	Valenciano	7[ ]
	obovate	Barbara	8[ ]
	ovate	Rimone, Rio Grande	9[ ]
	pear-shaped	Europeel	10[ ]
5.6 (25)	**Fruit: ribbing at peduncle end**		
	absent or very weak	Calimero, Cerise	1[ ]
	weak	Early Mech, Hypeel 244, Melody, Peto Gro, Rio Grande	3[ ]
	medium	Montfavet H 63.4, Montfavet H 63.5	5[ ]
	strong	Campbell 1327, Carmello, Count	7[ ]
	very strong	Costeluto Fiorentino, Marmande VR	9[ ]

	Characteristics	Example Varieties	Note
5.7 (33)	**Fruit: number of locules**		
	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[ ]
5.9 (34)	**Fruit: green shoulder (before maturity)**		
	absent	Felicia, Rio Grande, Trust	1[ ]
	present	Montfavet H63.5, Daniela	9[ ]
5.10 (38)	**Fruit: color at maturity**		
	cream	Jazon, White Miraball	1[ ]
	yellow	Golden Königin, Yellow Pear	2[ ]
	orange	Sungold	3[ ]
	pink	House Momotaro	4[ ]
	red	Daniela, Ferline, Montfavet H 63.5	5[ ]
	brownish	Ozyrys	6[ ]
5.11 (40)	**Fruit: firmness**		
	very soft	Marmande VR	1[ ]
	soft	Trend	3[ ]
	medium	Cristina	5[ ]
	firm	Fernova, Konsul, Tradiro	7[ ]
	very firm	Daniela, Karat, Lolek	9[ ]

6. Similar varieties and differences between these varieties

Denomination of similar variety	Characteristic in which the similar variety is different [o)]	State of expression of similar variety	State of expression of candidate variety

[o)] In the case of identical states of expressions of both varieties, please indicate the size of the difference.

7. Additional information which may help to distinguish the variety

7.1 Resistance to pests and diseases (please specify races/strains if possible)

	absent	present	Not tested
- *Meloïdogyne incognita* (characteristic 46)	[ ]	[ ]	[ ]
- *Verticillium dahliae* race 0 (characteristic 47)	[ ]	[ ]	[ ]
- *Fusarium oxysporum* f. sp. *lycopersici*;			
Race 0 (ex 1) (characteristic 48.1)	[ ]	[ ]	[ ]
Race 0 (ex 2) (characteristic 48.2)	[ ]	[ ]	[ ]
- *Fusarium oxysporum* f. sp. *radicis lycopersici* (characteristic 49)	[ ]	[ ]	[ ]
- *Cladosporium fulvum*;			
Race 0 (characteristic 50.1)	[ ]	[ ]	[ ]
Group A (characteristic 50.2)	[ ]	[ ]	[ ]
Group B (characteristic 50.3)	[ ]	[ ]	[ ]
Group C (characteristic 50.4)	[ ]	[ ]	[ ]
Group D (characteristic 50.5)	[ ]	[ ]	[ ]
Group E (characteristic 50.6)	[ ]	[ ]	[ ]
-Tomato Mosaic Virus			
Strain 0 (characteristic 51.1)	[ ]	[ ]	[ ]
Strain 1 (characteristic 51.2)	[ ]	[ ]	[ ]
Strain 2 (characteristic 51.3)	[ ]	[ ]	[ ]

- *Phytophtora infestans* (characteristic 52)	[ ]	[ ]	[ ]
- *Pyrenochaeta lycopersici* (characteristic 53)	[ ]	[ ]	[ ]
- *Stemphylium* spp. (characteristic 54)	[ ]	[ ]	[ ]
- *Pseudomonas* syringae pv. tomato (characteristic 55)	[ ]	[ ]	[ ]
- *Ralstonia solanacearum* race 1(characteristic 56)	[ ]	[ ]	[ ]
- Tomato Yellow Leaf Curl Virus (characteristic 57)	[ ]	[ ]	[ ]
- Tomato Spotted Wilt Virus (characteristic 58)	[ ]	[ ]	[ ]
- *Leveillula taurica* (characteristic 59)	[ ]	[ ]	[ ]
- *Oidium lycopersicum* (characteristic 60)	[ ]	[ ]	[ ]
Others (specify)	[ ]	[ ]	[ ]

7.2 Special conditions for the examination of the variety

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

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

(c) Other conditions

7.3 Other information

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 that question is yes, please attach a copy of such an authorization.

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