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| International Union for the Protection of New Varieties of Plants |  |

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| Technical Committee  Fifty-Seventh Session Geneva, October 25 and 26, 2021 | TC/57/18  Original: English  Date: September 6, 2021 |

Partial revision of the Test Guidelines for TOMATO ROOTSTOCKS

Document prepared by an expert from the Netherlands

Disclaimer: this document does not represent UPOV policies or guidance

The purpose of this document is to present a proposal for a partial revision of the Test Guidelines for Tomato Rootstocks (document TG/294/1 Corr. Rev. 3).

The Technical Working Party for Vegetables (TWV), at its fifty-fifth session[[1]](#footnote-2), considered a proposal for a partial revision of the Test Guidelines for Tomato Rootstocks on the basis of documents TG/294/1 Corr. Rev. 3 and TWV/55/13 “Partial revision of the Test Guidelines for Tomato Rootstocks” and proposed the following changes (see document TWV/55/16 “Report”, paragraph 128):

1. Deletion of *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg (UPOV code SOLAN\_LCH) from the coverage of the Test Guidelines:
   1. Deletion from the cover page
   2. Chapter 1 “Subject of these Test Guidelines”: Deletion from Chapter 1.1 and addition to Chapter 1.2
   3. Deletion from Technical Questionnaire, Section 1 “Subject of the Technical Questionnaire”
2. Changes to notes and method of observation of characteristic 22 “Resistance to *Meloidogyne incognita* (Mi)” and explanation Ad. 22
3. Changes to Characteristics 23 “Resistance to *Verticillium* sp. (Va and Vd)”, 24.1 “Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) Race 0EU/1US” and characteristic 24.2 “Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) Race 1EU/2US”:
   1. Deletion of asterisks
   2. Deletion from grouping characteristics in Chapter 5.3.
4. Changes to the explanation Ad. 24 “Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol)”
5. Correction of title of characteristic 26 “Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)” and changes to explanation Ad. 26
6. Chapter 10: Technical Questionnaire:
   1. Section 5: Addition of all diseases resistances to Section TQ 5 with an option “not tested” for characteristics without (\*)

The proposed changes to are presented below in highlight and underline (insertion) and ~~strikethrough~~ (deletion).

## Proposed deletion of *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg (UPOV code SOLAN\_LCH) from the coverage of the Test Guidelines

### Deletion from the cover page

#### Current wording

|  |  |  |
| --- | --- | --- |
|  | **TOMATO ROOTSTOCKS**  UPOV Code: SOLAN\_HAB; SOLAN\_LHA; SOLAN\_LPE; SOLAN\_LCH; SOLAN\_PHA  *Solanum habrochaites* S. Knapp *&* D.M. Spooner*;*  *Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner;  *Solanum lycopersicum* L. x  *Solanum peruvianum* (L.) Mill*.;*  *Solanum lycopersicum* L. x  *Solanum cheesmaniae* (L. Ridley) Fosberg;  *Solanum pimpinellifolium* L. *x Solanum habrochaites* S. Knapp & D.M. Spooner | [[2]](#footnote-3)\* |

Alternative Names:\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Botanical name* | *English* | *French* | *German* | *Spanish* |
| *Solanum habrochaites* S. Knapp & D.M. Spooner, *Lycopersicon agrimoniifolium* Dunal, *Lycopersicon hirsutum* Dunal,  *Lycopersicon hirsutum* f. *glabratum* C. H. Müll. |  |  |  |  |
| *Solanum lycopersicum* L*.* x *Solanum habrochaites* S. Knapp & D.M. Spooner |  |  |  |  |
| *Solanum lycopersicum* L.x  *Solanum peruvianum* (L.) Mill*.* |  |  |  |  |
| *Solanum lycopersicum* L.x  *Solanum cheesmaniae* (L. Ridley) Fosberg |  |  |  |  |
| *Solanum pimpinellifolium* L.x  *Solanum habrochaites* S. Knapp & D.M. Spooner |  |  |  |  |

#### Proposed new wording

|  |  |  |
| --- | --- | --- |
|  | **TOMATO ROOTSTOCKS**  UPOV Code: SOLAN\_HAB; SOLAN\_LHA; SOLAN\_LPE; ~~SOLAN\_LCH;~~ SOLAN\_PHA  *Solanum habrochaites* S. Knapp *&* D.M. Spooner*;*  *Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner;  *Solanum lycopersicum* L. x  *Solanum peruvianum* (L.) Mill*.;*  *~~Solanum lycopersicum~~* ~~L. x~~ *~~Solanum cheesmaniae~~* ~~(L. Ridley) Fosberg;~~  *Solanum pimpinellifolium* L. *x Solanum habrochaites* S. Knapp & D.M. Spooner | [[3]](#footnote-4)\* |

Alternative Names:\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Botanical name* | *English* | *French* | *German* | *Spanish* |
| *Solanum habrochaites* S. Knapp & D.M. Spooner, *Lycopersicon agrimoniifolium* Dunal, *Lycopersicon hirsutum* Dunal,  *Lycopersicon hirsutum* f. *glabratum* C. H. Müll. |  |  |  |  |
| *Solanum lycopersicum* L*.* x *Solanum habrochaites* S. Knapp & D.M. Spooner |  |  |  |  |
| *Solanum lycopersicum* L.x  *Solanum peruvianum* (L.) Mill*.* |  |  |  |  |
| *~~Solanum lycopersicum~~* ~~L.~~~~x~~ *~~Solanum cheesmaniae~~* ~~(L. Ridley) Fosberg~~ |  |  |  |  |
| *Solanum pimpinellifolium* L.x  *Solanum habrochaites* S. Knapp & D.M. Spooner |  |  |  |  |

### Chapter 1 “Subject of these Test Guidelines”: Deletion from Chapter 1.1 and addition to Chapter 1.2

#### Current wording

Subject of these Test Guidelines

1.1 These Test Guidelines apply to all varieties of *Solanum habrochaites* S. Knapp & D.M. Spooner*; Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner, *Solanum lycopersicum* L. x *Solanum* *peruvianum* L. (Mill.), *Solanum lycopersicum* L*.* x *Solanum cheesmaniae* (L. Ridley) Fosberg and *Solanum pimpinellifolium* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner*.* Such varieties are generally used as rootstocks for tomato varieties (varieties of *Solanum lycopersicum* L.(*Lycopersicum esculentum* L.(Mill.)).

1.2 Rootstocks belonging to *Solanum lycopersicum* L. (*Lycopersicum esculentum* Mill.) or to *Solanum lycopersicum* L. x *Solanum pimpinellifolium* L. (*Lycopersicum esculentum* Mill. x *Lycopersicum pimpinellifolium* Mill.) should be covered by UPOV Test Guidelines TG/44.

#### Proposed new wording

Subject of these Test Guidelines

1.1 These Test Guidelines apply to all varieties of *Solanum habrochaites* S. Knapp & D.M. Spooner*; Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner, *Solanum lycopersicum* L. x *Solanum* *peruvianum* L. (Mill.)~~,~~*~~Solanum lycopersicum~~* ~~L~~*~~.~~* ~~x~~ *~~Solanum cheesmaniae~~* ~~(L. Ridley) Fosberg~~ and *Solanum pimpinellifolium* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner*.* Such varieties are generally used as rootstocks for tomato varieties (varieties of *Solanum lycopersicum* L.(*Lycopersicum esculentum* L.(Mill.)).

1.2 Rootstocks belonging to *Solanum lycopersicum* L. (*Lycopersicum esculentum* Mill.), to *Solanum lycopersicum* L*.* x *Solanum cheesmaniae* (L. Ridley) Fosberg or to *Solanum lycopersicum* L. x *Solanum pimpinellifolium* L. (*Lycopersicum esculentum* Mill. x *Lycopersicum pimpinellifolium* Mill.) should be covered by UPOV Test Guidelines TG/44.

### Deletion from Technical Questionnaire, Section 1 “Subject of the Technical Questionnaire”

#### Current wording

| 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 | | | | | |
|  |  | | |  | |
| Tomato Rootstocks belonging to: | | | |  | |
|  |  | | |  | |
| 1.1 Botanical name | *Solanum habrochaites* S. Knapp & D.M. Spooner | | | […] | |
|  |  | | |  | |
| 1.2 Botanical name | *Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner | | | […] | |
|  |  | | |  | |
| 1.3 Botanical name | *Solanum lycopersicum* L.x *Solanum peruvianum* (L.) Mill*.* | | | […] | |
|  |  | | |  | |
| 1.4 Botanical name | *Solanum lycopersicum* L.x *Solanum cheesmaniae* (L. Ridley) Fosberg | | | […] | |
|  |  | | |  | |
| 1.5 Botanical name | *Solanum pimpinellifolium* L.x *Solanum habrochaites* S. Knapp & D.M. Spooner | | | […] | |
|  |  | | | |  |

#### Proposed new wording

| 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 | | | | | |
|  |  | | |  | |
| Tomato Rootstocks belonging to: | | | |  | |
|  |  | | |  | |
| 1.1 Botanical name | *Solanum habrochaites* S. Knapp & D.M. Spooner | | | […] | |
|  |  | | |  | |
| 1.2 Botanical name | *Solanum lycopersicum* L. x *Solanum habrochaites* S. Knapp & D.M. Spooner | | | […] | |
|  |  | | |  | |
| 1.3 Botanical name | *Solanum lycopersicum* L.x *Solanum peruvianum* (L.) Mill*.* | | | […] | |
|  |  | | |  | |
| ~~1.4 Botanical name~~ | *~~Solanum lycopersicum~~* ~~L.~~~~x~~ *~~Solanum cheesmaniae~~* ~~(L. Ridley) Fosberg~~ | | | ~~[…]~~ | |
|  |  | | |  | |
| 1.~~5~~ 4 Botanical name | *Solanum pimpinellifolium* L.x *Solanum habrochaites* S. Knapp & D.M. Spooner | | | […] | |
|  |  | | | |  |

## Proposed changes to notes and method of observation of characteristic 22 “Resistance to *Meloidogyne incognita* (Mi)” and explanation Ad. 22

*Current wording*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 22.  (\*) (+) | VG | Resistance to *Meloidogyne incognita* (Mi) | Résistance à *Meloidogyne incognita* (Mi) | Resistenz gegen *Meloidogyne incognita* (Mi) | Resistencia a *Meloidogyne incognita* (Mi) |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Bruce | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente |  | 2 |
|  |  | highly resistant | hautement résistant | hoch resistent | muy resistente | Emperador | 3 |

*proposed new wording*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 22.  (\*) (+) | ~~VG~~ VS | Resistance to *Meloidogyne incognita* (Mi) | Résistance à *Meloidogyne incognita* (Mi) | Resistenz gegen *Meloidogyne incognita* (Mi) | Resistencia a *Meloidogyne incognita* (Mi) |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Bruce | 1 |
|  |  | susceptible to intermediate resistant | sensible à résistant à un niveau intermédiaire | anfällig bis mittel resistent | susceptible a resistencia intermedia |  | 2 |
|  |  | intermediate ~~moderately~~ resistant | ~~moyennement~~ résistant à un niveau intermédiaire | ~~mäßig~~ mittel resistent | ~~moderadamente resistente~~ resistencia intermedia |  | ~~2~~ 3 |
|  |  | intermediate to highly resistant | résistant à un niveau intermédiaire à hautement résistant | mittel bis hoch resistent | resistencia intermedia a muy resistente |  | 4 |
|  |  | highly resistant | hautement résistant | hoch resistent | muy resistente | Emperador | ~~3~~ 5 |

*Current wording*

Ad. 22: Resistance to *Meloidogyne incognita* (Mi)

1. Pathogen *Meloidogyne incognita*   
3. Host species *Solanum lycopersicum*    
4. Source of inoculum Naktuinbouw (NL[[4]](#footnote-5)) or GEVES[[5]](#footnote-6) (FR)  
5. Isolate non-resistance breaking  
6. Establishment isolate identity use rootstock or tomato standards  
7. Establishment pathogenicity use susceptible rootstock or tomato standard   
8. Multiplication inoculum

8.1 Multiplication medium living plant  
8.2 Multiplication variety preferably resistant to powdery mildew  
8.3 Plant stage at inoculation see 10.3  
8.5 Inoculation method see 10.4  
8.6 Harvest of inoculum root systems are cut with scissors into pieces   
 of about 1 cm length  
8.7 Check of harvested inoculum visual check for presence of root knots  
8.8 Shelf life/viability inoculum 1 day  
9. Format of the test  
9.1 Number of plants per genotype 20 plants  
9.2 Number of replicates……………… 1 replicate

9.3 Control varieties   
Susceptible: Bruce and (*Solanum lycopersicum*) Clairvil, Casaque Rouge  
Moderately resistant : (*Solanum lycopersicum*) Madyta, Campeon, Madyta, Vinchy

Highly resistant: Emperador and (*Solanum lycopersicum*) “Anahu x Casaque Rouge”, Anahu, Anabel

9.4 Test design include standard varieties

9.5 Test facility greenhouse or climate room

9.6 Temperature not over 28° C

9.7 Light at least 12 h per day

10. Inoculation

10.1 Preparation inoculum small pieces of diseased root mixed with soil

mix soil and infested root pieces

10.2 Quantification inoculum soil: root ratio = 8:1, or depending on experience

10.3 Plant stage at inoculation seed, or cotyledons

10.4 Inoculation method plants are sown in infested soil or contamination of soil after sowing when plantlets are at cotyledon stage

10.7 Final observations 28 to 45 days after inoculation

11. Observations

11.1 Method root inspection

11.2 Observation scale Symptoms:

Galling, root malformation,

growth reduction, plant death

11.3 Validation of test evaluation of variety resistance should be calibrated with results of resistant and susceptible controls on standards

12. Interpretation of test results in comparison with control varieties

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

absent (susceptible)………… [1] growth strongly reduced, high gall count

intermediate   
 (moderately resistant)………… [2] medium growth reduction, medium gall count

present (highly resistant)……… [3] no growth reduction, no galls

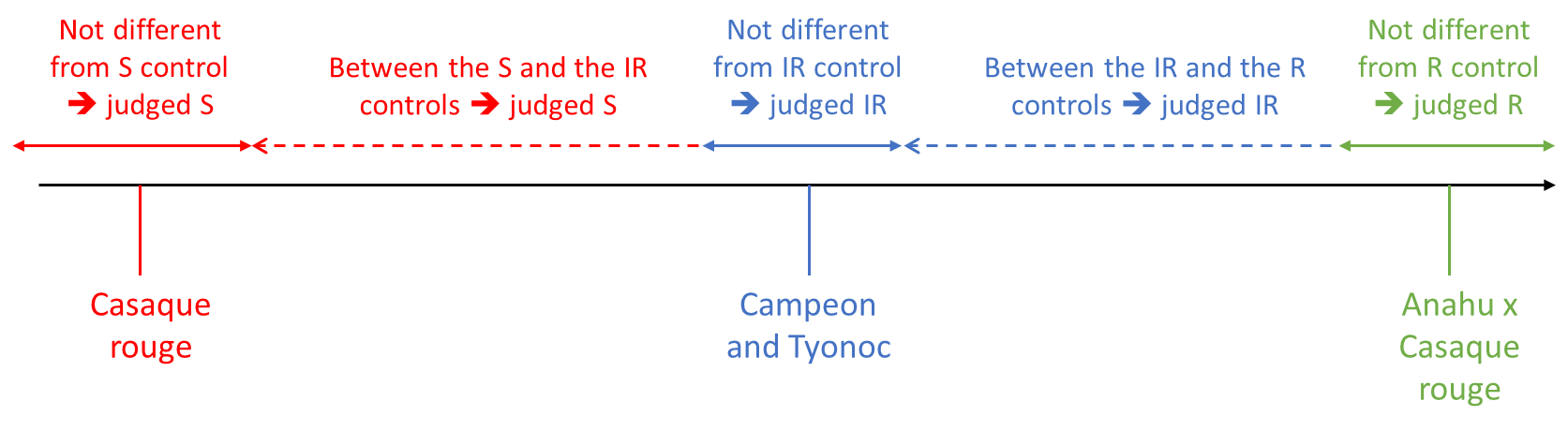
13. Critical control points:

Avoid rotting of roots; high temperature causes breakdown of resistance

*Proposed new wording*

Ad. 22: Resistance to *Meloidogyne incognita* (Mi)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Meloidogyne incognita* |
| 2. | Quarantine status | - |
| 3. | Host species | Tomato - *Solanum lycopersicum* |
| 4. | Source of inoculum | GEVES[[6]](#footnote-7) (FR) or INIA (ES)[[7]](#footnote-8) or Naktuinbouw (NL[[8]](#footnote-9)) |
| 5. | Isolate | non-resistance breaking |
| 6. | Establishment isolate identity | use tomato standards |
| 7 | Establishment pathogenicity | use susceptible rootstock or tomato standard |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | living plant |
| 8.2 | Multiplication variety | susceptible variety, preferably resistant to powdery mildew |
| 8.3 | Plant stage at inoculation | ~~see 10.3~~ 2nd leaf stage |
| 8.5 | Inoculation method | ~~see 10.4~~  deposit of piece of contaminated roots in soil (around 5-10g near each plant, to adapt depending on the population aggressivity) |
| 8.6 | Harvest of inoculum | 6 to 10 weeks after inoculation, root systems are cut with scissors into pieces of about 1 cm length |
| 8.7 | Check of harvested inoculum | visual check for presence of root knots and ripe egg masses |
| 8.8 | Shelf life/viability inoculum | 1 day |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | ~~20 plants~~  30 plants, plus at least 10 non-inoculated plants to observe if a possible lack of germination is due to nematode or not |
| 9.2 | Number of replicates | ~~1 replicate~~  at least 2, preferably 3 to allow statistical analysis |
| 9.3 | Control varieties | Susceptible: Bruce and (*Solanum lycopersicum*) ~~Clairvil,~~ Casaque Rouge  ~~Moderately~~ Intermediate resistant: (*Solanum lycopersicum*)  ~~Madyta,~~ Campeon, ~~Madyta, Vinchy~~, Tyonic  Highly resistant: Emperador and (*Solanum lycopersicum*) “Anahu x Casaque Rouge”~~, Anahu, Anabel~~ |
| 9.4 | Test design | ~~include standard varieties~~  3 replicates of 10 plants in different trays by variety, non-inoculated plants in a separate tray |
| 9.5 | Test facility | greenhouse or climate room |
| 9.6 | Temperature | ~~not over 28° C~~  20-26°C, the temperature may be adapted, depending on the aggressivity of the test, to obtain the expected response of the controls, but should not exceed 26°C. Higher temperatures will cause breakdown of resistance. |
| 9.7 | Light | at least 12 h per day |
| 10 | Inoculation |  |
| 10.1 | Preparation inoculum | small pieces of diseased roots mixed with soil  ~~mix soil and infested root pieces~~ |
| 10.2 | Quantification inoculum | ~~soil: root ratio = 8:1, or depending on experience~~  the ratio is depending of aggressiveness of test and lab’s conditions (e.g. between 30g to 60g of infested roots, for 100 plants in a tray of 45\*30 cm containing approximately 5.5 kg of substrate), galls should be homogeneously mixed with soil. |
| 10.3 | Plant stage at inoculation | seed~~, or cotyledons~~ |
| 10.4 | Inoculation method | ~~plants are sown in infested soil or contamination of soil after sowing when plantlets are at cotyledon stage~~  plants sown in soil contaminated with galls |
| 10.7 | End of test | 28 to 45 days after inoculation depending on test conditions (temperature, season) |
| 11. | Observations |  |
| 11.1 | Method | root inspection per plant |
| 11.2 | Observation scale |  |
| The germination percentage of non-inoculated plants of the same seed lot in the same experiment should be used to calculate the number of seeds that did not produce a plant due to the presence of the nematode, and add these to plants in class 4. | | |
| 11.3 | Validation of test | ~~evaluation of variety resistance should be calibrated with results of resistant and susceptible controls on standards~~  Validation on controls. Expected reactions of controls:  Susceptible control: most plants at classes 3 and 4.  Highly resistant: most plants at classes 0 and 1.  Intermediate resistant: clearly different from other controls with majority of plants around class 2. |
| 11.4 | Off-types | resistant varieties may have a few plants with a few galls |
| 12. | Interpretation of ~~test results in comparison with control varieties~~ data in terms of UPOV characteristic states | [1] Susceptible: variety very similar to susceptible control  [3] Intermediate resistant: variety very similar to intermediate resistant control  [5] Highly resistant: variety very similar to highly resistant control  If results are not clear, statistical analysis is advised.  If significantly different from the controls, a retest is advised to check if the result is stable.  If significantly different from resistant and intermediate resistant control (result between highly resistant and intermediate resistant controls), the variety is judged as intermediate resistant.  If significantly different from intermediate resistant and susceptible control (result between intermediate resistant and susceptible controls), the variety is judged as susceptible. |



|  |  |  |
| --- | --- | --- |
|  | ~~To consider that resistant varieties may have a few plants with falls. These are not considered as off-types.~~  ~~absent (susceptible)………… [1] growth strongly reduced, high gall count~~  ~~intermediate   (moderately resistant)………… [2] medium growth reduction, medium gall count~~  ~~present (highly resistant)……… [3] no growth reduction, no galls~~ | |
| 13. | Critical control points | ~~Avoid rotting of roots; high temperature causes breakdown of resistance~~  Avoid overwatering. This may result in rotting of roots.  In case of aggressive test, put seeds in a layer of non-contaminated soil or decrease the quantity of inoculum. |

## Proposed changes to Characteristics 23 “Resistance to *Verticillium* sp. (Va and Vd)”, 24.1 “Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) Race 0EU/1US” and characteristic 24.2 “Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) Race 1EU/2US”

### Deletion of asterisks

#### Current wording

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 23. (\*) (+) | VG | Resistance to *Verticillium* sp. (Va and Vd)  – Race 0 | Résistance à *Verticillium* sp. (Va et Vd)  – Pathotype 0 | Resistenz gegen *Verticillium* sp.  (Va und Vd)  – Pathotyp 0 | Resistencia a *Verticillium* sp. (Va y Vd)  – Raza 0 |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | Big Power | 9 |
| 24.  (+) |  | Resistance to  *Fusarium oxysporum* f. sp. *lycopersici* (Fol) | Résistance à *Fusarium oxysporum* f. sp. *lycopersici* (Fol) | Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* (Fol) | Resistencia a  *Fusarium oxysporum* f. sp. *lycopersici* (Fol) |  |  |
| 24.1 (\*) | VG | **– Race 0EU/1US** | **– Race 0EU/1US** | **– Pathotyp 0EU/1US** | **– Raza 0EU/1US** |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | Emperador | 9 |
| 24.2 (\*) | VG | **– Race 1EU/2US** | **– Race 1EU/2US** | **– Pathotyp 1EU/2US** | **– Raza 1EU/2US** |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | Emperador | 9 |
| 24.3 (\*) | VG | **– Race 2EU/3US** | **– Race 2EU/3US** | **– Pathotyp 2EU/3US** | **– Raza 2EU/3US** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Emperador | 1 |
|  |  | present | présente | vorhanden | presente | Colosus | 9 |

#### Proposed new wording

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 23. ~~(\*)~~ (+) | VG | Resistance to *Verticillium* sp. (Va and Vd)  – Race 0 | Résistance à *Verticillium* sp. (Va et Vd)  – Pathotype 0 | Resistenz gegen *Verticillium* sp.  (Va und Vd)  – Pathotyp 0 | Resistencia a *Verticillium* sp. (Va y Vd)  – Raza 0 |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | ~~Big Power~~ Bruce, Emperador, King Kong | 9 |
| 24.  (+) |  | Resistance to  *Fusarium oxysporum* f. sp. *lycopersici* (Fol) | Résistance à *Fusarium oxysporum* f. sp. *lycopersici* (Fol) | Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* (Fol) | Resistencia a  *Fusarium oxysporum* f. sp. *lycopersici* (Fol) |  |  |
| 24.1 ~~(\*)~~ | VG | **– Race 0EU/1US** | **– Race 0EU/1US** | **– Pathotyp 0EU/1US** | **– Raza 0EU/1US** |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | Emperador | 9 |
| 24.2 ~~(\*)~~ | VG | **– Race 1EU/2US** | **– Race 1EU/2US** | **– Pathotyp 1EU/2US** | **– Raza 1EU/2US** |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | Emperador | 9 |
| 24.3 (\*) | VG | **– Race 2EU/3US** | **– Race 2EU/3US** | **– Pathotyp 2EU/3US** | **– Raza 2EU/3US** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Emperador | 1 |
|  |  | present | présente | vorhanden | presente | Colosus | 9 |

### Deletion from grouping characteristics in Chapter 5.3.

#### Current wording

5.3 The following have been agreed as useful grouping characteristics:

(a) Fruit: green shoulder (characteristic 11)  
(b) Autonecrosis (characteristic 21)

(c) Resistance to *Meloidogyne incognita* (characteristic 22)

(d) Resistance to *Verticillium* sp. – Race 0 (characteristic 23)

(e) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* – Race 0EU/1US (characteristic 24.1)

(f) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* – Race 1EU/2US (characteristic 24.2)

(g) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* – Race 2EU/3US (characteristic 24.3)

#### Proposed new wording

5.3 The following have been agreed as useful grouping characteristics:

(a) Fruit: green shoulder (characteristic 11)  
(b) Autonecrosis (characteristic 21)

(c) Resistance to *Meloidogyne incognita* (characteristic 22)

~~(d) Resistance to~~ *~~Verticillium~~* ~~sp. – Race 0 (characteristic 23)~~

~~(e) Resistance to~~ *~~Fusarium oxysporum~~* ~~f. sp.~~ *~~lycopersici~~* ~~– Race 0EU/1US (characteristic 24.1)~~

~~(f) Resistance to~~ *~~Fusarium oxysporum~~* ~~f. sp.~~ *~~lycopersici~~* ~~– Race 1EU/2US (characteristic 24.2)~~

~~(g)~~ (d) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* – Race 2EU/3US (characteristic 24.3)

## Proposed changes to the explanation Ad. 24 “Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol)”

*Current wording*

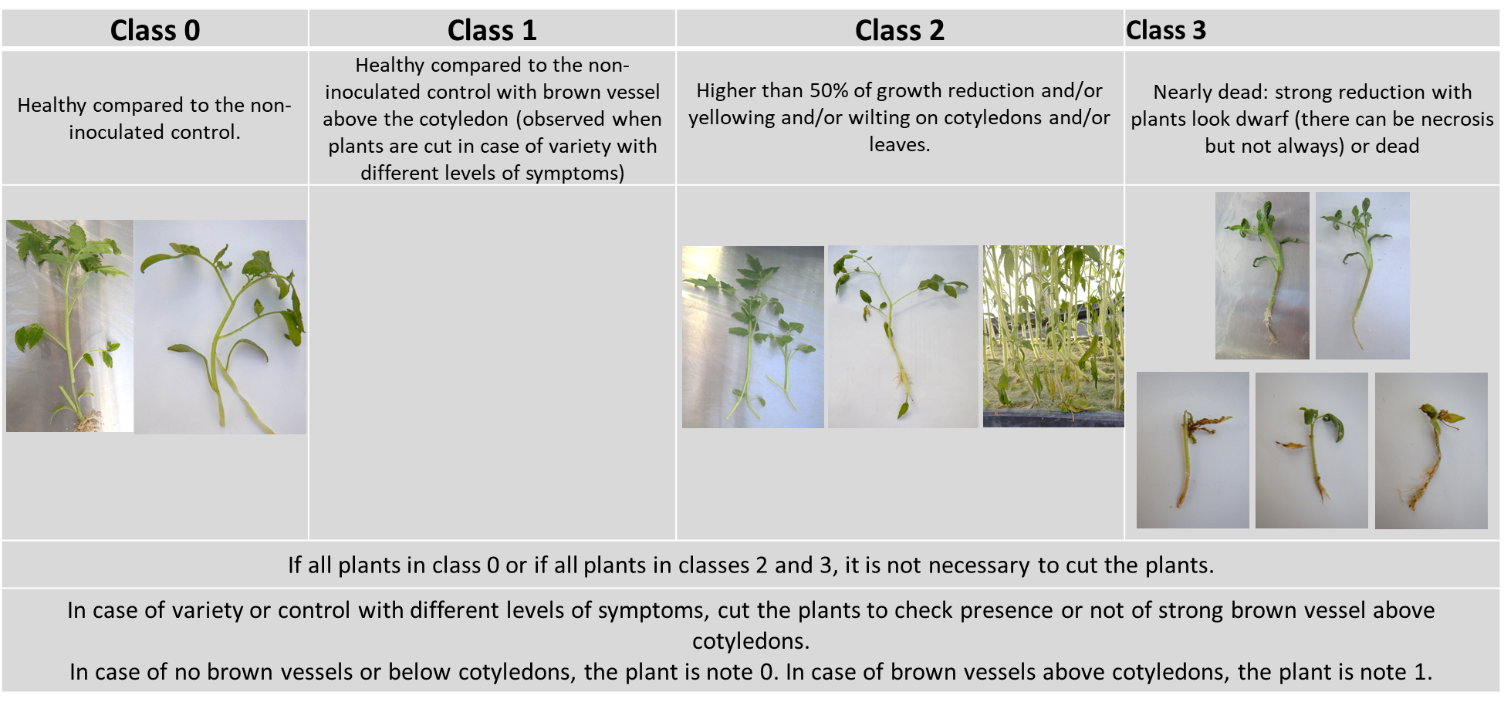
Ad. 24: Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Fusarium oxysporum* f. sp. *lycopersici* |
| 3. | Host species | *Solanum lycopersicum* |
| 4. | Source of inoculum | Naktuinbouw[[9]](#footnote-10) (NL), GEVES[[10]](#footnote-11) (FR) or INIA[[11]](#footnote-12) (ES) |
| 5. | Isolate | race 0EU/1US(e.g. strains Orange 71 or PRI 20698 or Fol 071)  race 1EU/2US(e.g. strains 4152 or PRI40698 or RAF 70)  race 2EU/3US (e.g. strain Fol029) |
| 6. | Establishment isolate identity | use differential varieties (see ISF website: http://www.worldseed.org) |
| 7. | Establishment pathogenicity | on susceptible tomato varieties |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Potato Dextrose Agar, Medium “S” of Messiaen |
| 8.4 | Inoculation medium | water for scraping agar plates or Czapek-Dox culture medium (7 d-old aerated culture) |
| 8.6 | Harvest of inoculum | filter through double muslin cloth |
| 8.7 | Check of harvested inoculum | spore count; adjust to 106 per ml |
| 8.8 | Shelflife/viability inoculum | 4-8 h, keep cool to prevent spore germination |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.2 | Number of replicates | 1 replicate |
| 9.3.1 | Control varieties for the test with race 0EU/1US |  |
|  | Susceptible | (*Solanum lycopersicum*) Marmande, Marmande verte, Resal |
|  | Resistant | Emperador, Colosus and (*Solanum lycopersicum*) “Marporum x Marmande verte”, Motelle, Gourmet, Mohawk, Ranco, Tradiro |
| 9.3.2 | Control varieties for the test with race 1EU/2US |  |
|  | Susceptible | (*Solanum lycopersicum*) Marmande verte, Cherry Belle, Roma, Marporum, Ranco |
|  | Resistant | Emperador, Colosus and (*Solanum lycopersicum*) Tradiro, Odisea, “Motelle x Marmande verte” |
| 9.3.3 | Control varieties for the test with  race 2EU/3US |  |
|  | Susceptible | Emperador and (*Solanum lycopersicum*) Marmande verte, Motelle, Marporum |
|  | Resistant | Colosus and (*Solanum lycopersicum*) Tributes, Murdoch, “Marmande verte x Florida” |
| 9.4 | Test design | >20 plants; e.g. 35 seeds for 24 plants, including 2 blanks |
| 9.5 | Test facility | glasshouse or climate room |
| 9.6 | Temperature | 24-28°C (severe test, with mild isolate)  20-24°C (mild test, with severe isolate) |
| 9.7 | Light | 12 hours per day or longer |
| 9.8 | Season | all seasons |
| 9.9 | Special measures | slightly acidic peat soil is optimal;  keep soil humid but avoid water stress |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | aerated Messiaen or PDA or Agar Medium S of Messiaen or Czapek Dox culture or scraping of plates |
| 10.2 | Quantification inoculum | spore count, adjust to 106 spores per ml, lower concentration for a very aggressive isolate |
| 10.3 | Plant stage at inoculation | 10-18 d, cotyledon to first leaf |
| 10.4 | Inoculation method | roots and hypocotyls are immersed in spore suspension for 5‑15 min; trimming of roots is an option |
| 10.7 | Final observations | 14-21 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | symptoms:  growth retardation, wilting, yellowing,  vessel browning extending above cotyledon |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls. |
| 12. | Interpretation of test results in comparison with control varieties |  |
|  | absent [1] | severe symptoms |
|  | present [9] | mild or no symptoms |
| 13. | Critical control points | Test results may vary slightly in inoculum pressure due to differences in isolate, spore concentration, soil humidity and temperature. |

*Proposed new wording*

Ad. 24: Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Fusarium oxysporum* f. sp. *lycopersici* |
| 3. | Host species | *Solanum lycopersicum* |
| 4. | Source of inoculum | Naktuinbouw[[12]](#footnote-13) (NL), GEVES[[13]](#footnote-14) (FR) or INIA[[14]](#footnote-15) (ES) |
| 5. | Isolate | race 0EU/1US(e.g. strains Orange 71 or PRI 20698 or Fol 071)  race 1EU/2US(e.g. strains 4152 or PRI40698 or RAF 70)  race 2EU/3US (e.g. strain Fol029) |
| 6. | Establishment isolate identity | use differential varieties (see ISF website: http://www.worldseed.org) |
| 7. | Establishment pathogenicity | on susceptible tomato varieties |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Potato Dextrose Agar, Medium “S” of Messiaen |
| 8.4 | Inoculation medium | water for scraping agar plates or Czapek-Dox culture medium (7 d-old aerated culture) |
| 8.6 | Harvest of inoculum | filter through double muslin cloth |
| 8.7 | Check of harvested inoculum | spore count; adjust to 106 per ml |
| 8.8 | Shelflife/viability inoculum | 4-8 h, keep cool to prevent spore germination |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.2 | Number of replicates | 1 replicate |
| 9.3.1 | Control varieties for the test with race 0EU/1US |  |
|  | Susceptible | (*Solanum lycopersicum*) Marmande, Marmande verte, Resal |
|  | Resistant | Emperador, Colosus and (*Solanum lycopersicum*) “Marporum x Marmande verte”, Motelle, Gourmet, Mohawk, Ranco, Tradiro |
| 9.3.2 | Control varieties for the test with race 1EU/2US |  |
|  | Susceptible | (*Solanum lycopersicum*) Marmande verte, Cherry Belle, Roma, Marporum, Ranco |
|  | Resistant | Emperador, Colosus and (*Solanum lycopersicum*) Tradiro, Odisea, “Motelle x Marmande verte” |
| 9.3.3 | Control varieties for the test with  race 2EU/3US |  |
|  | Susceptible | Emperador and (*Solanum lycopersicum*) Marmande verte, Motelle, Marporum. Susceptible rootstocks are generally less susceptible than susceptible *Solanum lycopersicum* varieties. The susceptible rootstock variety Emperador must be included as control. |
|  | Resistant | Colosus and (*Solanum lycopersicum*) Tributes, Murdoch, “Marmande verte x Florida” |
| 9.4 | Test design | >20 plants; e.g. 35 seeds for 24 plants, including 2 blanks |
| 9.5 | Test facility | glasshouse or climate room |
| 9.6 | Temperature | 24-28°C (severe test, with mild isolate)  20-24°C (mild test, with severe isolate) |
| 9.7 | Light | 12 hours per day or longer |
| 9.8 | Season | all seasons |
| 9.9 | Special measures | slightly acidic peat soil is optimal;  keep soil humid but avoid water stress |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | aerated Messiaen or PDA or Agar Medium S of Messiaen or Czapek Dox culture or scraping of plates |
| 10.2 | Quantification inoculum | spore count, adjust to 106 spores per ml, lower concentration for a very aggressive isolate |
| 10.3 | Plant stage at inoculation | 10-18 d, cotyledon to first leaf |
| 10.4 | Inoculation method | roots and hypocotyls are immersed in spore suspension for 5‑15 min; trimming of roots is an option |
| 10.7 | Final observations | 14-21 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | symptoms:  growth retardation, wilting, yellowing,  vessel browning extending above cotyledon |



|  |  |  |
| --- | --- | --- |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls. |
| 12. | Interpretation of ~~test results in comparison with control varieties~~data in terms of UPOV characteristic states |  |
|  | absent [1] | severe symptoms |
|  | present [9] | mild or no symptoms |
| 13. | Critical control points | Test results may vary slightly in inoculum pressure due to differences in isolate, spore concentration, soil humidity and temperature. |

## Correction of title of characteristic 26 “Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)” and changes to explanation Ad. 26

### Current wording

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 26.  (+) |  | Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*) | Résistance à *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*) | Resistenz gegen *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*) | Resistencia a *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*) |  |  |
| 26.1 | VG | – Race 0 | – Pathotype 0 | – Pathotyp 0 | – Raza 0 |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Bruce | 9 |
| 26.2 | VG | – Group A | – Groupe A | – Gruppe A | – Grupo A |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Big Power | 9 |
| 26.3 | VG | – Group B | – Groupe B | – Gruppe B | – Grupo B |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Bruce | 9 |
| 26.4 | VG | – Group C | – Groupe C | – Gruppe C | – Grupo C |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | Big Power | 9 |
| 26.5 | VG | – Group D | – Groupe D | – Gruppe D | – Grupo D |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Bruce | 9 |
| 26.6 | VG | – Group E | – Groupe E | – Gruppe E | – Grupo E |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Bruce, King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Big Power | 9 |

### Proposed new wording

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 26.  (+) |  | Resistance to *~~Fulvia~~ Passalora fulva* (~~Ff~~ Pf) ~~(ex~~ *~~Cladosporium fulvum~~*~~)~~ (ex *Fulvia fulva*) | Résistance à *~~Fulvia~~ Passalora fulva* (~~Ff~~ Pf) ~~(ex~~ *~~Cladosporium fulvum~~*~~)~~ (ex *Fulvia fulva*) | Resistenz gegen *~~Fulvia~~ Passalora fulva* (~~Ff~~ Pf) ~~(ex~~ *~~Cladosporium fulvum~~*~~)~~ (ex *Fulvia fulva*) | Resistencia a *~~Fulvia~~ Passalora fulva* (~~Ff~~ Pf) ~~(ex~~ *~~Cladosporium fulvum~~*~~)~~ (ex *Fulvia fulva*) |  |  |
| 26.1 | VG | – Race 0 | – Pathotype 0 | – Pathotyp 0 | – Raza 0 |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Bruce | 9 |
| 26.2 | VG | – Group A | – Groupe A | – Gruppe A | – Grupo A |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | ~~Big Power~~ Vitalfort | 9 |
| 26.3 | VG | – Group B | – Groupe B | – Gruppe B | – Grupo B |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Bruce | 9 |
| 26.4 | VG | – Group C | – Groupe C | – Gruppe C | – Grupo C |  |  |
| **QL** |  | absent | absente | fehlend | ausente |  | 1 |
|  |  | present | présente | vorhanden | presente | ~~Big Power~~ Vitalfort | 9 |
| 26.5 | VG | – Group D | – Groupe D | – Gruppe D | – Grupo D |  |  |
| **QL** |  | absent | absente | fehlend | ausente | King Kong | 1 |
|  |  | present | présente | vorhanden | presente | Bruce | 9 |
| 26.6 | VG | – Group E | – Groupe E | – Gruppe E | – Grupo E |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Bruce, King Kong | 1 |
|  |  | present | présente | vorhanden | presente | ~~Big Power~~ Vitalfort | 9 |

*Current wording*

Ad. 26: Resistance to *Fulvia fulva* (Ff) (ex *Cladosporium fulvum*)

1. Pathogen *Fulvia fulva* (ex *Cladosporium fulvum)*

3. Host species *Solanum lycopersicum*

4. Source of inoculum Naktuinbouw[[15]](#footnote-16) (NL) or GEVES[[16]](#footnote-17) (FR)

5. Isolate Race group 0, A, B, C, D, and E

6. Establishment isolate identity with genetically defined differentials from GEVES (FR)

A breaks Cf-2, B Cf-4, C Cf-2&4, D Cf-5, E Cf-2&4&5

7. Establishment pathogenicity symptoms on susceptible tomato

8. Multiplication inoculum

8.1 Multiplication medium Potato Dextrose Agar or Malt Agar or a synthetic medium

8.8 Shelf life/viability inoculum 4 hours, keep cool

9. Format of the test

9.1 Number of plants per genotype more than 20 plants

9.2 Number of replicates……………… 1 replicate

9.3 Control varieties

Susceptible: King Kong and (*Solanum lycopersicum*) Monalbo, Moneymaker

Resistant for race 0: Bruce and (*Solanum lycopersicum*) Angela, Estrella, Sonatine,

Sonato, Vemone, Vagabond, IVT 1149, Vagabond × IVT 1149,

IVT 1154

Resistant for race group A: Big Power and (*Solanum lycopersicum*) Angela, Estrella, Sonatine,

Sonato

Resistant for race group B: Bruce and (*Solanum lycopersicum*) Angela, Estrella, Sonatine,

Sonato, Vemone

Resistant for race group C: Big Power and (*Solanum lycopersicum*) Angela, Estrella, Sonatine

Resistant for race group D: Bruce and (*Solanum lycopersicum*) Estrella, Sonatine, Vemone

Resistant for race group E: Big Power and (*Solanum lycopersicum*) Sonatine, Jadviga, Rhianna,

IVT 1154

9.5 Test facility glasshouse or climate room

9.6 Temperature day: 22° C, night: 20° or day: 25°C, night 20°C

9.7 Light 12 hours or longer

9.9 Special measures depending on facility and weather, there may be a need to

raise the humidity

e.g. humidity tent closed 3-4 days after inoculation

and after this, 66% until 80% closed during day, until end

10. Inoculation

10.1 Preparation inoculum prepare evenly colonized plates, e.g. 1 for 36 plants;

remove spores from plate by scraping with water with Tween20;

filter through double muslin cloth

10.2 Quantification inoculum count spores; adjust to 105 spores per ml or more

10.3 Plant stage at inoculation 19-20 d (incl. 12 d at 24°), 2-3 leaves

10.4 Inoculation method spray on dry leaves

10.7 Final observations 14 days after inoculation

11. Observations

11.1 Method visual inspection of abaxial side of inoculated leaves

11.2 Observation scale Symptom: velvety, white spots

11.3 Validation of test evaluation of variety resistance should be calibrated with results of resistant and susceptible controls

12. Interpretation of test results in comparison with control varieties

absent ………………………… [1] symptoms

present ………………………… [9] no symptoms

Excessively high humidity may cause rugged brown spots on all leaves. These are not to be considered as off-types.

13. Critical control points:

Ff spores have a variable size and morphology. Small spores are also viable.

Fungal plates will gradually become sterile after 6-10 weeks. Store good culture at -80°C.

For practical purposes, it is not possible to keep plants longer than 14 days inside a tent.

*Proposed new wording*

Ad. 26: Resistance to *~~Fulvia~~ Passalora fulva* (~~Ff~~ Pf) ~~(ex~~ *~~Cladosporium fulvum~~*~~)~~(ex *Fulvia fulva*)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *~~Fulvia~~ Passalora fulva* ~~(ex~~ *~~Cladosporium fulvum~~*~~)~~ |
| 3. | Host species | *Solanum lycopersicum* |
| 4. | Source of inoculum | Naktuinbouw[[17]](#footnote-18) (NL) or GEVES[[18]](#footnote-19) (FR) |
| 5. | Isolate | Race group 0, A, B, C, D, and E |
| 6. | Establishment isolate identity | with genetically defined differentials from GEVES (FR)  A breaks Cf-2, B Cf-4, C Cf-2&4, D Cf-5, E Cf-2&4&5 |
| 7. | Establishment pathogenicity | symptoms on susceptible tomato |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Potato Dextrose Agar or Malt Agar or a synthetic medium |
| 8.8 | Shelflife/viability inoculum | 4 hours, keep cool |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | more than 20 plants |
| 9.2 | Number of replicates | 1 replicate |
| 9.3 | Control varieties |  |
|  | Susceptible | King Kong, ~~and~~ (*Solanum lycopersicum*) Monalbo, Moneymaker |
|  | Resistant for race 0: | Bruce, ~~and~~ (*Solanum lycopersicum*) ~~Angela, Estrella, Sonatine,~~  ~~Sonato, Vemone,~~ Vagabond, ~~IVT 1149~~, Vagabond × IVT 1149, IVT 1154, Purdue |
|  | Resistant for race group A: | ~~Big Power~~ Vitalfort, ~~and~~ (*Solanum lycopersicum*) ~~Angela, Estrella, Sonatine~~, Sonato, Purdue, IVT 1154, IVT 1149 |
|  | Resistant for race group B: | Bruce, ~~and~~ (*Solanum lycopersicum*) ~~Angela, Estrella, Sonatine,~~ ~~Sonato, Vemone~~ Vétomold, IVT 1149, IVT 1154 |
|  | Resistant for race group C: | ~~Big Power~~ Vitalfort, ~~and~~ (*Solanum lycopersicum*) ~~Angela, Estrella, Sonatine~~ IVT 1154, IVT 1149 |
|  | Resistant for race group D: | Bruce, ~~and~~ (*Solanum lycopersicum*) ~~Estrella, Sonatine, Vemone~~ Vétomold, IVT 1154 |
|  | Resistant for race group E: | ~~Big Power~~ Vitalfort, ~~and~~ (*Solanum lycopersicum*) ~~Sonatine, Jadviga, Rhianna~~, IVT 1154 |
| 9.5 | Test facility | glasshouse or climate room |
| 9.6 | Temperature | day: 22° C, night: 20° or day: 25°C, night 20°C |
| 9.7 | Light | 12 hours or longer |
| 9.9 | Special measures | depending on facility and weather, there may be a need to raise the humidity  e.g. humidity tent fully closed 3-4 days after inoculation and after that partly closed (66% until 80%, 24h per day), until end |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | prepare evenly colonized plates, e.g. 1 for 36 plants;  remove spores from plate by scraping with water with Tween20;  filter through double muslin cloth |
| 10.2 | Quantification inoculum | count spores; adjust to 105 spores per ml or more |
| 10.3 | Plant stage at inoculation | 19-20 d (incl. 12 d at 24°), 2-3 leaves |
| 10.4 | Inoculation method | spray on dry leaves |
| 10.7 | Final observations | 14 days after inoculation; when susceptible control does not show clear symptoms the test may be prolonged until for example 18 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual inspection of abaxial side of inoculated leaves |
| 11.2 | Observation scale | Symptom: velvety, white spots |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 12. | Interpretation of ~~test results in comparison with control varieties~~data in terms of UPOV characteristic states |  |
|  | [1] absent | symptoms |
|  | [9] present | no symptoms |
| 13. | Critical control points | ~~Ff~~ Pf spores have a variable size and morphology. Small spores are also viable.  Fungal plates will gradually become sterile after 6-10 weeks and repeated subculturing. Do not subculture more often than strictly necessary for multiplication. Store good culture at -80°C.  ~~For practical purposes, it is not possible to keep plants longer than 14 days inside a tent.~~ Excessively high humidity may cause rugged brown spots on all leaves. These are not to be considered as off-types. |

## Chapter 10: Technical Questionnaire:

### Section 5: Addition of all diseases resistances to Section TQ 5 with an option “not tested” for characteristics without (\*)

#### Current wording

| TECHNICAL QUESTIONNAIRE | | | Page {x} of {y} | Reference Number: | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | |  |  | | | | | |
| 5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds). | | | | | | | | |
|  | | Characteristics | | | | Example Varieties | | Note |
|  | […] | | | |  | |  | |
| **5.5 (22)** | **Resistance to *Meloidogyne incognita* (Mi)** | | | |  | |  | |
|  | susceptible | | | | Bruce | | 1[ ] | |
|  | moderately resistant | | | |  | | 2[ ] | |
|  | highly resistant | | | | Emperador | | 3[ ] | |
| **5.6 (23)** | **Resistance to *Verticillium* sp*.* (Va and Vd) *-* Race 0** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Big Power | | 9[ ] | |
| **5.7 (24)** | **Resistance to *Fusarium oxysporum* f. sp*. lycopersici* (Fol)** | | | |  | |  | |
| **5.8 (24.1)** | **Race 0EU/1US** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
| **5.9 (24.2)** | **Race 1EU/2US** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
| **5.10 (24.3)** | **Race 2EU/3US** | | | |  | |  | |
|  | absent | | | | Emperador | | 1[ ] | |
|  | present | | | | Colosus | | 9[ ] | |
| **5.11 (25)** | **Resistance to** ***Fusarium oxysporum* f. sp*. radicis-lycopersici* (Forl)** | | | |  | |  | |
|  | absent | | | | Kemerit | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |

*Proposed new wording*

| TECHNICAL QUESTIONNAIRE | | | Page {x} of {y} | Reference Number: | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | |  |  | | | | | |
| 5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds). | | | | | | | | |
|  | | Characteristics | | | | Example Varieties | | Note |
|  | […] | | | |  | |  | |
| **5.5 (22)** | **Resistance to *Meloidogyne incognita* (Mi)** | | | |  | |  | |
|  | susceptible | | | | Bruce | | 1[ ] | |
|  | susceptible to intermediate resistant | | | |  | | 2 [ ] | |
|  | intermediate ~~moderately~~ resistant | | | |  | | ~~2~~ 3 [ ] | |
|  | intermediate to highly resistant | | | |  | | 4 [ ] | |
|  | highly resistant | | | | Emperador | | ~~3~~ 5 [ ] | |
| **5.6 (23)** | **Resistance to *Verticillium* sp*.* (Va and Vd) *-* Race 0** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | ~~Big Power~~ Bruce, Emperador, King Kong | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.7 (24)** | **Resistance to *Fusarium oxysporum* f. sp*. lycopersici* (Fol)** | | | |  | |  | |
| **5.8 (24.1)** | **Race 0EU/1US** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.9 (24.2)** | **Race 1EU/2US** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.10 (24.3)** | **Race 2EU/3US** | | | |  | |  | |
|  | absent | | | | Emperador | | 1[ ] | |
|  | present | | | | Colosus | | 9[ ] | |
| **5.11 (25)** | **Resistance to** ***Fusarium oxysporum* f. sp*. radicis-lycopersici* (Forl)** | | | |  | |  | |
|  | absent | | | | Kemerit | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | Characteristics | | | | Example Varieties | | Note | |
| **5.12 (26.1)** | **Resistance to *Passalora fulva* (Pf) (ex *Fulvia fulva*) – Race 0** | | | |  | |  | |
|  | absent | | | | King Kong | | 1[ ] | |
|  | present | | | | Bruce | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.13 (26.2)** | **Resistance to *Passalora fulva* (Pf) (ex *Fulvia fulva*) – Group A** | | | |  | |  | |
|  | absent | | | | King Kong | | 1[ ] | |
|  | present | | | | Vitalfort | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.14 (26.3)** | **Resistance to *Passalora fulva* (Pf) (ex *Fulvia fulva*) – Group B** | | | |  | |  | |
|  | absent | | | | King Kong | | 1[ ] | |
|  | present | | | | Bruce | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.15 (26.4)** | **Resistance to *Passalora fulva* (Pf) (ex *Fulvia fulva*) – Group C** | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Vitalfort | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.16 (26.5)** | **Resistance to *Passalora fulva* (Pf) (ex *Fulvia fulva*) – Group D** | | | |  | |  | |
|  | absent | | | | King Kong | | 1[ ] | |
|  | present | | | | Bruce | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.17 (26.6)** | **Resistance to *Passalora fulva* (Pf) (ex *Fulvia fulva*) – Group E** | | | |  | |  | |
|  | absent | | | | Bruce, King Kong | | 1[ ] | |
|  | present | | | | Vitalfort | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
|  | Characteristics | | | | Example Varieties | | Note | |
| **5.18 (27.1)** | Resistance to Tomato mosaic virus (ToMV) – Strain 0 | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.19 (27.2)** | Resistance to Tomato mosaic virus (ToMV) – Strain 1 | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.20 (27.3)** | Resistance to Tomato mosaic virus (ToMV) – Strain 2 | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
|  |  | | | |  | |  | |
| **5.21 (28)** | Resistance to *Pyrenochaeta lycopersici* (Pl) | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Emperador | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.22 (29)** | Resistance to *Stemphylium* spp. (Ss) | | | |  | |  | |
|  | absent | | | | Big Power | | 1[ ] | |
|  | present | | | | Body | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.23 (30)** | Resistance to Tomato yellow leaf curl virus (TYLCV) | | | |  | |  | |
|  | absent | | | | Big Power | | 1[ ] | |
|  | present | | | |  | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
|  | Characteristics | | | | Example Varieties | | Note | |
| **5.24 (31)** | Resistance to Tomato spotted wilt virus (TSWV) | | | |  | |  | |
|  | absent | | | | Emperador | | 1[ ] | |
|  | present | | | | Enpower | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |
| **5.25 (32)** | Resistance to *Oidium neolycopersici* (On) | | | |  | |  | |
|  | absent | | | |  | | 1[ ] | |
|  | present | | | | Multifort | | 9[ ] | |
|  | not tested | | | |  | | [ ] | |

[End of document]

1. hosted by Turkey and organized by electronic means, from May 3 to 7, 2021 [↑](#footnote-ref-2)
2. \* 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.] [↑](#footnote-ref-3)
3. \* 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.] [↑](#footnote-ref-4)
4. Naktuinbouw: resistentie@naktuinbouw.nl [↑](#footnote-ref-5)
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15. Naktuinbouw: resistentie@naktuinbouw.nl [↑](#footnote-ref-16)
16. Geves: matref@geves.fr [↑](#footnote-ref-17)
17. Naktuinbouw: resistentie@naktuinbouw.nl [↑](#footnote-ref-18)
18. Geves: matref@geves.fr [↑](#footnote-ref-19)