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| |  |  |  | | --- | --- | --- | |  |  | **E** | |  |  |  | |  | A green and yellow logo  AI-generated content may be incorrect. | |  | | --- | | **TG/44/12 Rev.(proj.1)** | | **ORIGINAL:** English | | **DATE:** 2025-09-03 | | | **INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS** | | | |  | Geneva |  | |  |  |  | |  | DRAFT |  | |  | |  | | --- | |  | | **TOMATO** | |  | | |  | | --- | |  | | |  | | --- | | UPOV Code(s): SOLAN\_LYC; SOLAN\_LCH; SOLAN\_LPI | | |  | | |  | | |  |  | | --- | --- | | |  | | --- | | *Solanum lycopersicum* L.;  *Solanum lycopersicum* L. x  *Solanum cheesmaniae* (L. Ridley) Fosberg; *Solanum lycopersicum* L.x *Solanum pimpinellifolium* L. | | | |  | | |  | | --- | | \* | | |  |  |  | | |  | | --- | | **GUIDELINES** | |  | | **FOR THE CONDUCT OF TESTS** | |  | | **FOR DISTINCTNESS, UNIFORMITY AND STABILITY**  *prepared by an expert from the Netherlands (Kingdom of the)*  *to be considered by the*  *Technical Committee at its sixty-first session,*  *to be held Geneva from 2025-10-20 to 2025-10-21*  *Disclaimer: this document does not represent UPOV policies or guidance*  This document contains the following changes proposed by the Technical Working Party for Vegetables (TWV), at its fifty-ninth session[[1]](#footnote-1), presented in grey highlight:   1. Revision of methods of observations of characteristics 47 to 49 (based on change (c) below); 2. Addition of a new characteristic 58 *“*Resistance to *Passalora fulva* (Pf) - Race H”; 3. Revision of explanation Ad. 47 to 49 to add an alternative molecular marker method (using makers on I2) for characteristic 48 “Resistance to *Fusarium* *oxysporum* f. sp. *lycopersici* (Fol) - Race 1EU/2US” next to the bioassay; 4. Revision of explanation Ad. 51 “Resistance to *Passalora fulva* (Pf)” (based on change (b) above); 5. Addition of new characteristic 58 *“*Resistance to *Passalora fulva* (Pf) - Race H” to the Technical Questionnaire, Section 5., with option “not tested”. | | | | | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | |  | | --- | | Alternative names:\* | | | | | | | |  | | --- | |  | | | | | | | *Botanical name* | *English* | *French* | *German* | *Spanish* | | |  | | --- | | *Solanum lycopersicum* L. | | |  | | --- | | Cherry tomato, Tomato | | |  | | --- | | Tomate,  Tomate cerise | | |  | | --- | | Kirschtomate, Tomate | | |  | | --- | | Tomate, Tomatera, Tomatillo | | | |  | | --- | | *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg | | |  | | --- | |  | | |  | | --- | |  | | |  | | --- | |  | | |  | | --- | |  | | | |  | | --- | | *Solanum lycopersicum* L.x *Solanum pimpinellifolium* L., *Lycopersicon esculentum* Mill. x *Lycopersicon pimpinellifolium* L. | | |  | | --- | |  | | |  | | --- | |  | | |  | | --- | |  | | |  | | --- | |  | | | | | |
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| The purpose of these guidelines (“Test Guidelines”) is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions. | | |
|  | | |
| |  | | --- | | **ASSOCIATED DOCUMENTS** | | These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents. | | |  |  |  | | --- | --- | --- | | Other associated UPOV documents: | |  | | --- | | TG/294 | | | | | |

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| |  |  | | --- | --- | | TABLE OF CONTENTS | PAGE | |  |  | | |  |  |  | | --- | --- | --- | | 1. | SUBJECT OF THESE TEST GUIDELINES.......................................................................................................... | [3](#Section1) | |  |  |  | | 2. | MATERIAL REQUIRED......................................................................................................................................... | [3](#Section2) | |  |  |  | | 3. | METHOD OF EXAMINATION................................................................................................................................ | [3](#Section3) | |  |  |  | |  | |  |  |  | | --- | --- | --- | | 3.1 | Number of Growing Cycles........................................................................................................................ | [3](#Section3-1) | | 3.2 | Testing Place............................................................................................................................................. | [3](#Section3-2) | | 3.3 | Conditions for Conducting the Examination............................................................................................... | [3](#Section3-3) | | 3.4 | Test Design................................................................................................................................................ | [3](#Section3-4) | | 3.5 | Additional Tests......................................................................................................................................... | [4](#Section3-5) | | | |  |  |  | | 4. | ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY................................................................. | [4](#Section4) | |  |  |  | |  | |  |  |  | | --- | --- | --- | | 4.1 | Distinctness............................................................................................................................................... | [4](#Section4-1) | | 4.2 | Uniformity.................................................................................................................................................. | [5](#Section4-2) | | 4.3 | Stability...................................................................................................................................................... | [5](#Section4-3) | | | |  |  |  | | 5. | GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL................................................ | [5](#Section5) | |  |  |  | | 6. | INTRODUCTION TO THE TABLE OF CHARACTERISTICS................................................................................ | [6](#Section6) | |  |  |  | |  | |  |  |  | | --- | --- | --- | | 6.1 | Categories of Characteristics..................................................................................................................... | [6](#Section6-1) | | 6.2 | States of Expression and Corresponding Notes........................................................................................ | [6](#Section6-2) | | 6.3 | Types of Expression.................................................................................................................................. | [6](#Section6-3) | | 6.4 | Example Varieties...................................................................................................................................... | [6](#Section6-4) | | 6.5 | Legend....................................................................................................................................................... | [7](#Section6-5) | | | |  |  |  | | 7. | TABLE OF CHARACTERISTICS/TABLEAU DES CARACTÈRES/MERKMALSTABELLE/TABLA DE CARACTERES...................................................................................................................................................... | [8](#Section7) | |  |  |  | | 8. | EXPLANATIONS ON THE TABLE OF CHARACTERISTICS............................................................................... | [29](#Section8) | |  | |  |  |  | | --- | --- | --- | | 8.1 | Explanations covering several characteristics........................................................................................... | [29](#Section8-1) | | |  | | --- | | 8.2 | | Explanations for individual characteristics................................................................................................. | [29](#Section8-2) | | | |  |  |  | | 9. | LITERATURE......................................................................................................................................................... | [64](#Section9) | |  |  |  | | 10. | TECHNICAL QUESTIONNAIRE............................................................................................................................ | [66](#Section10) | |  |  |  | |  | |  | | --- | |  | |  | | | |

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| 1. | Subject of these Test Guidelines |
|  |  |
|  | |  | | --- | | These Test Guidelines apply to all varieties of *Solanum lycopersicum* L., *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosber and *Solanum lycopersicum* L.x *Solanum pimpinellifolium* L. (including rootstocks of these species).  For tomato rootstock varieties belonging to other species TG/294 applies. | |

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| 2. | Material Required |
|  |  |
| 2.1 | |  | | --- | | The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with. | |
|  |  |
| 2.2 | |  | | --- | | The material is to be supplied in the form of seed or plants. | |
|  |  |
| 2.3 | |  | | --- | | The minimum quantity of plant material, to be supplied by the applicant, should be: | |
|  |  |
|  | |  | | --- | | (a) seed-propagated varieties: 2,500 seeds  (b) vegetatively propagated varieties:  25 young plants | |
|  |  |
|  | In the case of seed, the seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. |
|  |  |
| 2.4 | |  | | --- | | The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease. | |
|  |  |
| 2.5 | |  | | --- | | The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given. | |

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| 3. | Method of Examination |
|  |  |
| *3.1* | *Number of Growing Cycles* |
|  |  |
| |  | | --- | | 3.1.1 | | The minimum duration of tests should normally be two independent growing cycles. |
|  |  |
| |  | | --- | | 3.1.2 | | The two independent growing cycles should be in the form of two separate plantings. |
|  |  |
| |  | | --- | | 3.1.3 | | The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test. |
|  |  |

|  |  |
| --- | --- |
| *3.2* | *Testing Place* |
|  |  |
|  | Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”. |
|  |  |
| *3.3* | *Conditions for Conducting the Examination* |
|  |  |
| |  | | --- | |  | | The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination. |
|  |  |

|  |  |
| --- | --- |
| *3.4* | *Test Design* |
|  |  |
| 3.4.1 | |  | | --- | | Each test should be designed to result in a total of at least 20 plants, which should be divided between at least 2 replicates. | |
|  |  |
| |  | | --- | | 3.4.2 | | |  | | --- | | The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle. | |
|  |  |

|  |  |
| --- | --- |
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| |  | | --- | |  |   *3.5* | *Additional Tests* |
|  |  |
|  | Additional tests, for examining relevant characteristics, may be established. |

|  |  |
| --- | --- |
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|  |  |
| 4. | Assessment of Distinctness, Uniformity and Stability |
|  |  |
| *4.1* | *Distinctness* |
|  |  |
| 4.1.1 | General Recommendations |
|  |  |
|  | It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines. |
|  |  |
| 4.1.2 | Consistent Differences |
|  |  |
|  | The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles. |
|  |  |
| 4.1.3 | Clear Differences |
|  |  |
|  | Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness. |
|  |  |
| 4.1.4 | |  | | --- | | Number of Plants or Parts of Plants to be Examined | |
|  |  |
|  | |  | | --- | | Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 10 plants or parts of plants taken from each of 10 plants and any other observations made on all plants in the test, disregarding any off-type plants. | |
|  |  |
| 4.1.5 | Method of Observation |
|  |  |
|  | The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the Table of Characteristics (see document TGP/9 “Examining Distinctness”, Section 4 “Observation of characteristics”): |

|  |  |
| --- | --- |
|  |  |
|  | |  | | --- | | MG: single measurement of a group of plants or parts of plants  MS: measurement of a number of individual plants or parts of plants  VG: visual assessment by a single observation of a group of plants or parts of plants  VS: visual assessment by observation of individual plants or parts of plants | |
|  |  |
|  | Type of observation: visual (V) or measurement (M) |
|  |  |
|  | “Visual” observation (V) is an observation made on the basis of the expert’s judgment. For the purposes of this document, “visual” observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc. |
|  |  |

|  |  |  |
| --- | --- | --- |
|  | |  | | --- | | Type of record: for a group of plants (G) or for single, individual plants (S) | |
|  |  |
|  | |  | | --- | | For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, “G” provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness. | |
|  |  |
|  | In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2. |
|  |  |
| *4.2* | *Uniformity* |
|  |  |
| 4.2.1 | It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines: |
|  |  |
| |  | | --- | | 4.2.2 | | |  | | --- | | These Test Guidelines have been developed for the examination of seed-propagated and vegetatively propagated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed. | |
|  |  |
| 4.2.3 | |  | | --- | | For the assessment of uniformity of self-pollinated varieties, single cross hybrids and vegetatively propagated varieties, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 20 plants, 1 off-type is allowed. | |
|  |  |
| *4.3* | *Stability* |
|  |  |
| 4.3.1 | In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable. |
|  |  |
| 4.3.2 | Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed or plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied. |

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| 5. | Grouping of Varieties and Organization of the Growing Trial |
|  |  |
| 5.1 | The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics. |
|  |  |
| 5.2 | Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together. |
|  |  |
| 5.3 | The following have been agreed as useful grouping characteristics: |
|  | |  |  |  | | --- | --- | --- | |  |  |  | | |  | | --- | | (a) | |  | |  | | --- | | Plant: growth type (characteristic 2) | | | |  | | --- | | (b) | |  | |  | | --- | | Leaf: type (characteristic 10) | | | |  | | --- | | (c) | |  | |  | | --- | | Pedicel: abscission layer (characteristic 18) | | | |  | | --- | | (d) | |  | |  | | --- | | Immature fruit: green shoulder (characteristic 20) | | | |  | | --- | | (e) | |  | |  | | --- | | Immature fruit: green stripes (characteristic 24) | | | |  | | --- | | (f) | |  | |  | | --- | | Immature fruit: anthocyanin coloration (characteristic 25) | | | |  | | --- | | (g) | |  | |  | | --- | | Fruit: size (characteristic 26) | | | |  | | --- | | (h) | |  | |  | | --- | | Fruit: shape in longitudinal section (characteristic 28) | | | |  | | --- | | (i) | |  | |  | | --- | | Fruit: number of locules (characteristic 36) | | | |  | | --- | | (j) | |  | |  | | --- | | Fruit: gel in locules (characteristic 37) | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | | (k) | |  | |  | | --- | | Fruit: color (characteristic 38) | | | |  | | --- | | (l) | |  | |  | | --- | | Resistance to *Meloidogyne incognita* (Mi) (characteristic 45) | | | |  | | --- | | (m) | |  | |  | | --- | | Resistance to *Verticillium* sp. (Va and Vd) - Race 0 (characteristic 46) | | | |  | | --- | | (n) | |  | |  | | --- | | Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 0EU/1US (Fol: 0EU/1US) (characteristic 47) | | | |  | | --- | | (o) | |  | |  | | --- | | Resistance to *Fusarium oxysporum* f. sp. *lycopersici* - Race 1EU/2US (Fol: 1EU/2US) (characteristic 48) | | | |  | | --- | | (p) | |  | |  | | --- | | Resistance to *Tomato mosaic virus* - Strain 0 (ToMV: 0) (characteristic 60) | | | |  | | --- | | (q) | |  | |  | | --- | | Resistance to *Tomato spotted wilt virus* - Pathotype 0 (TSWV: 0) (characteristic 69) | | | |  |  | | --- | --- | | |  | | --- | |  | | | | | |
| 5.4 | Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”. |

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| 6. | Introduction to the Table of Characteristics |
|  |  |
| *6.1* | *Categories of Characteristics* |
| 6.1.1 | Standard Test Guidelines Characteristics |
|  | Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances. |
| 6.1.2 | Asterisked Characteristics |
|  | Asterisked characteristics (denoted by \*) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate. |
| *6.2* | *States of Expression and Corresponding Notes* |
| 6.2.1 | States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description. |
| 6.2.2 | All relevant states of expression are presented in the characteristic. |
|  |  |
| 6.2.3 | Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”. |
| *6.3* | *Types of Expression* |
|  | An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction. |

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| *6.4* | *Example Varieties* |
|  | Where appropriate, example varieties are provided to clarify the states of expression of each characteristic. |

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| --- | --- |
| *6.5* | *Legend* |
|  |  |
| |  |  | English | | français | | deutsch | español | Example Varieties Exemples Beispielssorten Variedades ejemplo | Note/ Nota | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | **1** | | |  | | --- | | **2** | | |  | | --- | | **3** | | |  | | --- | | **4** | | |  | | --- | | **5** | | |  | | --- | | **6** | | |  | | --- | | **7** | | | | | |  |  | |  | | --- | | **Name of characteristics in English** | | | |  | | --- | | **Nom du caractère en français** | | | |  | | --- | | **Name des Merkmals auf Deutsch** | | |  | | --- | | **Nombre del carácter en español** | |  |  | |  |  | |  | | --- | | states of expression | | | |  | | --- | | types d’expression | | | |  | | --- | | Ausprägungsstufen | | |  | | --- | | tipos de expresión | | |  | | --- | |  | |  | |  |  |  |  |  |  |  |  |  |  | | |
| |  |  |  |  | | --- | --- | --- | --- | | 1 | Characteristic number | | | |  |  |  |  | | 2 | (\*) | Asterisked characteristic | – see Chapter 6.1.2 | |  |  |  |  | | 3 | Type of expression | | | |  | QL | Qualitative characteristic | – see Chapter 6.3 | |  | QN | Quantitative characteristic | – see Chapter 6.3 | |  | PQ | Pseudo-qualitative characteristic | – see Chapter 6.3 | |  |  |  |  | | 4 | Method of observation (and type of plot, if applicable) | | | |  | MG, MS, VG, VS | | – see Chapter 4.1.5 | |  |  |  |  | | 5 | |  | | --- | | (+) | | |  |  | | --- | --- | | |  | | --- | | See Explanations on the Table of Characteristics in Chapter 8.2 | | | | |  |  |  |  | | 6 | |  | | --- | | (a)-(c) | | |  |  | | --- | --- | | |  | | --- | | See Explanations on the Table of Characteristics in Chapter 8.1 | | | | |  |  |  |  | | 7 | |  | | --- | | Not applicable | | | | | |

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

|  |  | English | | français | | deutsch | español | Example Varieties Exemples Beispielssorten Variedades ejemplo | Note/ Nota |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1.** | **(\*)** | **QN** | **VS** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Seed-propagated varieties only: Seedling: anthocyanin coloration of hypocotyl** | | | |  | | --- | | **Variétés reproduites par voie sexuée seulement : Plantule : pigmentation anthocyanique de l'hypocotyle** | | | |  | | --- | | **Nur samenvermehrte Sorten: Sämling: Anthocyanfärbung des Hypokotyls** | | |  | | --- | | **Sólo variedades propagadas mediante semillas: Plántula: pigmentación antociánica del hipocótilo** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Colt, VTM215 | 1 |
|  |  | partially present | | partiellement présente | | teilweise vorhanden | parcialmente presente |  | 2 |
|  |  | totally present | | complètement présente | | vollständig vorhanden | totalmente presente | Daniela, Marmande VR | 3 |
| **2.** | **(\*)** | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Plant: growth type** | | | |  | | --- | | **Plante : type de croissance** | | | |  | | --- | | **Pflanze: Wuchstyp** | | |  | | --- | | **Planta: tipo de crecimiento** | |  |  |
|  |  | determinate | | déterminé | | begrenzt wachsend | determinado | Rio Grande, Siluet | 1 |
|  |  | indeterminate | | indéterminé | | unbegrenzt wachsend | indeterminado | Daniela, Florenteen, Marmande VR, Saint‑Pierre | 2 |
| **3.** | **(\*)** | **QN** | **MS/VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Only varieties with plant growth type determinate: Plant: number of inflorescences on main stem** | | | |  | | --- | | **Seulement les variétés à type de croissance déterminé : Plante : nombre d'inflorescences sur la tige principale** | | | |  | | --- | | **Nur Sorten mit Wuchstyp begrenzt wachsend: Pflanze: Anzahl Blütenstände am Haupttrieb** | | |  | | --- | | **Solo variedades con tipo de crecimiento determinado: Planta: número de inflorescencias en el tallo principal** | |  |  |
|  |  | very few | | très petit | | sehr gering | muy bajo | Cherry Falls | 1 |
|  |  | very few to few | | très petit à petit | | sehr gering bis gering | muy bajo a bajo | Monty | 2 |
|  |  | few | | petit | | gering | bajo | Simplex | 3 |
|  |  | few to medium | | petit à moyen | | gering bis mittel | bajo a medio |  | 4 |
|  |  | medium | | moyen | | mittel | media | Miceno | 5 |
|  |  | medium to many | | moyen à élevé | | mittel bis hoch | medio a alto |  | 6 |
|  |  | many | | élevé | | hoch | alto | Malkonet | 7 |
|  |  | many to very many | | élevé à très élevé | | hoch bis sehr hoch | alto a muy alto | Grownet | 8 |
|  |  | very many | | très élevé | | sehr hoch | muy alto |  | 9 |
| **4.** |  | **QN** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Stem: anthocyanin coloration** | | | |  | | --- | | **Tige : pigmentation anthocyanique** | | | |  | | --- | | **Stängel: Anthocyanfärbung** | | |  | | --- | | **Tallo: pigmentación antociánica** | |  |  |
|  |  | absent or very weak | | absente ou très faible | | fehlend oder sehr gering | ausente o muy débil | Rebelski | 1 |
|  |  | very weak to weak | | très faible à faible | | sehr gering bis gering | muy débil a débil |  | 2 |
|  |  | weak | | faible | | gering | débil | Montfavet 63-5 | 3 |
|  |  | weak to medium | | faible à moyenne | | gering bis mittel | débil a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Miniprio, Philovita | 5 |
|  |  | medium to strong | | moyenne à forte | | mittel bis stark | media a fuerte |  | 6 |
|  |  | strong | | forte | | stark | fuerte | Grinta | 7 |
|  |  | strong to very strong | | forte à très forte | | stark bis sehr stark | fuerte a muy fuerte |  | 8 |
|  |  | very strong | | très forte | | sehr stark | muy fuerte | Villax | 9 |
| **5.** |  | **QN** | **MS/VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Only varieties with plant growth type indeterminate: Stem: length of internode** | | | |  | | --- | | **Seulement les variétés à type de croissance indéterminé : Tige : longueur de l'entre-nœud** | | | |  | | --- | | **Nur Sorten mit Wuchstyp unbegrenzt wachsend: Stängel: Internodienlänge** | | |  | | --- | | **Solo variedades con tipo de crecimiento indeterminado: Tallo: longitud del entrenudo** | |  |  |
|  |  | very short | | très courte | | sehr kurz | muy corta |  | 1 |
|  |  | very short to short | | très courte à courte | | sehr kurz bis kurz | muy corta a corta |  | 2 |
|  |  | short | | courte | | kurz | corta | Primioso | 3 |
|  |  | short to medium | | courte à moyenne | | kurz bis mittel | corta a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Campari, Montfavet 63-5 | 5 |
|  |  | medium to long | | moyenne à longue | | mittel bis lang | media a larga |  | 6 |
|  |  | long | | longue | | lang | larga | Rebelski, Tomawak | 7 |
|  |  | long to very long | | longue à très longue | | lang bis sehr lang | larga a muy larga |  | 8 |
|  |  | very long | | très longue | | sehr lang | muy larga |  | 9 |
| **6.** | **(\*)** | **QN** | **MS/VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Only varieties with plant growth type indeterminate: Plant: height** | | | |  | | --- | | **Seulement les variétés à type de croissance indéterminé : Plante : hauteur** | | | |  | | --- | | **Nur Sorten mit Wuchstyp unbegrenzt wachsend: Pflanze: Höhe** | | |  | | --- | | **Solo variedades con tipo de crecimiento indeterminado: Planta: altura** | |  |  |
|  |  | very short | | très courte | | sehr niedrig | muy baja | Garderner's Delight, Maresme, Zadenna | 1 |
|  |  | very short to short | | très courte à courte | | sehr niedrig bis niedrig | muy baja a baja |  | 2 |
|  |  | short | | courte | | niedrig | baja | Delfine, Despina | 3 |
|  |  | short to medium | | courte à moyenne | | niedrig bis mittel | baja a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Brooklyn, Campari | 5 |
|  |  | medium to tall | | moyenne à haute | | mittel bis hoch | media a alta |  | 6 |
|  |  | tall | | haute | | hoch | alta | Climberley, Pitenza | 7 |
|  |  | tall to very tall | | haute à très haute | | hoch bis sehr hoch | alta a muy alta |  | 8 |
|  |  | very tall | | très haute | | sehr hoch | muy alta | Goldwin, Romindo | 9 |
| **7.** | **(\*)** | **QN** | **VG** | **(+)** | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: attitude** | | | |  | | --- | | **Feuille : port** | | | |  | | --- | | **Blatt: Haltung** | | |  | | --- | | **Hoja: porte** | |  |  |
|  |  | erect | | dressé | | aufrecht | erecto |  | 1 |
|  |  | erect to semi-erect | | dressé à demi-dressé | | aufrecht bis halbaufrecht | erecto a semierecto |  | 2 |
|  |  | semi-erect | | demi-dressé | | halbaufrecht | semierecto | Zadenna | 3 |
|  |  | semi-erect to horizontal | | demi-dressé à horizontal | | halbaufrecht bis waagerecht | semierecto a horizontal |  | 4 |
|  |  | horizontal | | horizontal | | waagerecht | horizontal | Brioso, Geronimo | 5 |
|  |  | horizontal to semi-drooping | | horizontal à demi-retombant | | waagerecht bis halbüberhängend | horizontal a semicolgante |  | 6 |
|  |  | semi-drooping | | demi-retombant | | halbüberhängend | semicolgante | Leonce, Montfavet 63-5, Upper | 7 |
|  |  | semi-drooping to drooping | | demi-retombant à retombant | | halbüberhängend bis überhängend | semicolgante a colgante |  | 8 |
|  |  | drooping | | retombant | | überhängend | colgante | Caboverde | 9 |
| **8.** |  | **QN** | **MS/VG** |  | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: length** | | | |  | | --- | | **Feuille : longueur** | | | |  | | --- | | **Blatt: Länge** | | |  | | --- | | **Hoja: longitud** | |  |  |
|  |  | very short | | très courte | | sehr kurz | muy corta |  | 1 |
|  |  | very short to short | | très courte à courte | | sehr kurz bis kurz | muy corta a corta |  | 2 |
|  |  | short | | courte | | kurz | corta | Red Robin | 3 |
|  |  | short to medium | | courte à moyenne | | kurz bis mittel | corta a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Mezcal, Rio Grande | 5 |
|  |  | medium to long | | moyenne à longue | | mittel bis lang | media a larga |  | 6 |
|  |  | long | | longue | | lang | larga | Geronimo, Montfavet 63-5 | 7 |
|  |  | long to very long | | longue à très longue | | lang bis sehr lang | larga a muy larga |  | 8 |
|  |  | very long | | très longue | | sehr lang | muy larga |  | 9 |
| **9.** |  | **QN** | **MS/VG** |  | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: width** | | | |  | | --- | | **Feuille : largeur** | | | |  | | --- | | **Blatt: Breite** | | |  | | --- | | **Hoja: anchura** | |  |  |
|  |  | very narrow | | très étroite | | sehr schmal | muy estrecha |  | 1 |
|  |  | very narrow to narrow | | très étroite à étroite | | sehr schmal bis schmal | muy estrecha a estrecha |  | 2 |
|  |  | narrow | | étroite | | schmal | estrecha | Red Robin | 3 |
|  |  | narrow to medium | | étroite à moyenne | | schmal bis mittel | estrecha a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Rio Grande | 5 |
|  |  | medium to broad | | moyenne à large | | mittel bis breit | media a ancha |  | 6 |
|  |  | broad | | large | | breit | ancha | Brioso, Saint‑Pierre | 7 |
|  |  | broad to very broad | | large à très large | | breit bis sehr breit | ancha muy ancha |  | 8 |
|  |  | very broad | | très large | | sehr breit | muy ancha |  | 9 |
| **10.** | **(\*)** | **QL** | **VG** | **(+)** | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: type** | | | |  | | --- | | **Feuille : type** | | | |  | | --- | | **Blatt: Typ** | | |  | | --- | | **Hoja: tipo** | |  |  |
|  |  | pinnate | | penné | | gefiedert | pinnado | Matina | 1 |
|  |  | bipinnate | | bipenné | | doppelt gefiedert | bipinnado | Daniela, Saint‑Pierre | 2 |
| **11.** |  | **QN** | **VG** | **(+)** | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: size of leaflets** | | | |  | | --- | | **Feuille : taille des folioles** | | | |  | | --- | | **Blatt: Größe der Blattfiedern** | | |  | | --- | | **Hoja: tamaño de los folíolos** | |  |  |
|  |  | very small | | très petite | | sehr klein | muy pequeño | Microtom | 1 |
|  |  | very small to small | | très petite à petite | | sehr klein bis klein | muy pequeño a pequeño |  | 2 |
|  |  | small | | petite | | klein | pequeño | Tiny Tim | 3 |
|  |  | small to medium | | petite à moyenne | | klein bis mittel | pequeño a medio |  | 4 |
|  |  | medium | | moyenne | | mittel | medio | Geronimo, Marmande VR | 5 |
|  |  | medium to large | | moyenne à grande | | mittel bis groß | medio a grande |  | 6 |
|  |  | large | | grande | | groß | grande | Daniela | 7 |
|  |  | large to very large | | grande à très grande | | groß bis sehr groß | grande a muy grande |  | 8 |
|  |  | very large | | très grande | | sehr groß | muy grande |  | 9 |
| **12.** | **(\*)** | **QN** | **VG** |  | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: intensity of green color** | | | |  | | --- | | **Feuille : intensité de la couleur verte** | | | |  | | --- | | **Blatt: Intensität der Grünfärbung** | | |  | | --- | | **Hoja: intensidad del color verde** | |  |  |
|  |  | very light | | très claire | | sehr hell | muy clara |  | 1 |
|  |  | very light to light | | très claire à claire | | sehr hell bis hell | muy clara a clara |  | 2 |
|  |  | light | | claire | | hell | clara | Rossol | 3 |
|  |  | light to medium | | claire à moyenne | | hell bis mittel | clara a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Rebelski | 5 |
|  |  | medium to dark | | moyenne à foncée | | mittel bis dunkel | media a oscura |  | 6 |
|  |  | dark | | foncée | | dunkel | oscura | Daniela, Red Robin | 7 |
|  |  | dark to very dark | | foncée à très foncée | | dunkel bis sehr dunkel | oscura a muy oscura |  | 8 |
|  |  | very dark | | très foncée | | sehr dunkel | muy oscura |  | 9 |
| **13.** |  | **QN** | **VG** | **(+)** | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: glossiness** | | | |  | | --- | | **Feuille : brillance** | | | |  | | --- | | **Blatt: Glanz** | | |  | | --- | | **Hoja: brillo** | |  |  |
|  |  | very weak | | très faible | | sehr gering | muy débil | Speedax | 1 |
|  |  | very weak to weak | | très faible à faible | | sehr gering bis gering | muy débil a débil |  | 2 |
|  |  | weak | | faible | | gering | débil | Daniela, Losna | 3 |
|  |  | weak to medium | | faible à moyenne | | gering bis mittel | débil a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Marmande VR | 5 |
|  |  | medium to strong | | moyenne à forte | | mittel bis stark | media a fuerte |  | 6 |
|  |  | strong | | forte | | stark | fuerte | Albis, Dulcemiel, Lutecia | 7 |
|  |  | strong to very strong | | forte à très forte | | stark bis sehr stark | fuerte a muy fuerte | Wasino | 8 |
|  |  | very strong | | très forte | | sehr stark | muy fuerte |  | 9 |
| **14.** |  | **QN** | **VG** | **(+)** | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: blistering** | | | |  | | --- | | **Feuille : cloqûre** | | | |  | | --- | | **Blatt: Blasigkeit** | | |  | | --- | | **Hoja: abullonado** | |  |  |
|  |  | very weak | | très faible | | sehr gering | muy débil |  | 1 |
|  |  | very weak to weak | | très faible à faible | | sehr gering bis gering | muy débil a débil |  | 2 |
|  |  | weak | | faible | | gering | débil | Daniela | 3 |
|  |  | weak to medium | | faible à moyenne | | gering bis mittel | débil a medio |  | 4 |
|  |  | medium | | moyenne | | mittel | medio | Marmande VR, Octavio, Syrio | 5 |
|  |  | medium to strong | | moyenne à forte | | mittel bis stark | medio a fuerte |  | 6 |
|  |  | strong | | forte | | stark | fuerte | Albis, Delfine, Paronset, Red Robin | 7 |
|  |  | strong to very strong | | forte à très forte | | stark bis sehr stark | fuerte a muy fuerte |  | 8 |
|  |  | very strong | | très forte | | sehr stark | muy fuerte |  | 9 |
| **15.** |  | **QN** | **VG** | **(+)** | **(a)** |  | | | |
|  |  | |  | | --- | | **Leaf: attitude of petiolule of leaflets in relation to petiole** | | | |  | | --- | | **Feuille : port du pétiolule des folioles par rapport au pétiole** | | | |  | | --- | | **Blatt: Stellung des Blattfiederstiels zum Blattstiel** | | |  | | --- | | **Hoja: porte del peciolulo de los foliolos en relación con el peciolo** | |  |  |
|  |  | erect | | dressé | | aufrecht | erecto | Volantis | 1 |
|  |  | erect to semi-erect | | dressé à demi-dressé | | aufrecht bis halbaufrecht | erecto a semierecto |  | 2 |
|  |  | semi-erect | | demi-dressé | | halbaufrecht | semierecto | Geronimo, Marmande VR | 3 |
|  |  | semi-erect to horizontal | | demi-dressé à horizontal | | halbaufrecht bis waagerecht | semierecto a horizontal |  | 4 |
|  |  | horizontal | | horizontal | | waagerecht | horizontal | Delisher | 5 |
| **16.** |  | **PQ** | **MS/VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Inflorescence: type** | | | |  | | --- | | **Inflorescence : type** | | | |  | | --- | | **Blütenstand: Typ** | | |  | | --- | | **Inflorescencia: tipo** | |  |  |
|  |  | mainly uniparous | | principalement unipare | | überwiegend unverzweigt | principalmente uníparos | Geronimo, Red Robin | 1 |
|  |  | equally uniparous and multiparous | | autant unipare que multipare | | gleichwertig verzweigt und unverzweigt | igualmente uníparas y multíparas | Harzfeuer | 2 |
|  |  | mainly multiparous | | principalement multipare | | überwiegend verzweigt | principalmente multíparas | Karelya | 3 |
|  |  | multiflora | | multiflore | | multiflora | multiflora | Mini Star, Sweedor | 4 |
| **17.** | **(\*)** | **QL** | **VG** |  |  |  | | | |
|  |  | |  | | --- | | **Flower: color** | | | |  | | --- | | **Fleur : couleur** | | | |  | | --- | | **Blüte: Farbe** | | |  | | --- | | **Flor: color** | |  |  |
|  |  | yellow | | jaune | | gelb | amarillo | Marmande VR, Santorange | 1 |
|  |  | orange | | orange | | orange | naranja | Mountain Vineyard, Orama | 2 |
| **18.** | **(\*)** | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Pedicel: abscission layer** | | | |  | | --- | | **Pédicelle : assise d’abscission** | | | |  | | --- | | **Blütenstiel: Bruchstelle** | | |  | | --- | | **Pedicelo: capa de abscisión** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Merlice, Rio Grande | 1 |
|  |  | present | | présente | | vorhanden | presente | Daniela, Grownet, Montfavet 63-5 | 9 |
| **19.** | **(\*)** | **QN** | **MS/VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Only varieties with pedicel abscission layer present: Pedicel: length** | | | |  | | --- | | **Seulement les variétés avec assise d’abscission du pédicelle présente : Pédicelle : longueur** | | | |  | | --- | | **Nur Sorten mit Blütenstiel: Bruchstellen vorhanden: Blütenstiel: Länge** | | |  | | --- | | **Solo variedades con capa de abscisión del pedicelo presente: Pedicelo: longitud** | |  |  |
|  |  | very short | | très courte | | sehr kurz | muy corta |  | 1 |
|  |  | very short to short | | très courte à courte | | sehr kurz bis kurz | muy corta a corta |  | 2 |
|  |  | short | | courte | | kurz | corta | Cerise, Ferline | 3 |
|  |  | short to medium | | courte à moyenne | | kurz bis mittel | corta a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Caboverde, Grownet | 5 |
|  |  | medium to long | | moyenne à longue | | mittel bis lang | media a larga |  | 6 |
|  |  | long | | longue | | lang | larga | Sir Elyan | 7 |
|  |  | long to very long | | longue à très longue | | lang bis sehr lang | larga a muy larga |  | 8 |
|  |  | very long | | très longue | | sehr lang | muy larga |  | 9 |
| **20.** | **(\*)** | **QL** | **VG** | **(+)** | **(b)** |  | | | |
|  |  | |  | | --- | | **Immature fruit: green shoulder** | | | |  | | --- | | **Fruit immature : collet vert** | | | |  | | --- | | **Unreife Frucht: grüne Schulter** | | |  | | --- | | **Fruto no maduro: hombro verde** | |  |  |
|  |  | absent | | absent | | fehlend | ausente | Geronimo | 1 |
|  |  | present | | présent | | vorhanden | presente | Daniela, Montfavet 63-5 | 9 |
| **21.** |  | **QN** | **VG** | **(+)** | **(b)** |  | | | |
|  |  | |  | | --- | | **Immature fruit: extent of green shoulder** | | | |  | | --- | | **Fruit immature : étendue du collet vert** | | | |  | | --- | | **Unreife Frucht: Ausdehnung der grünen Schulter** | | |  | | --- | | **Fruto no maduro: extensión del hombro verde** | |  |  |
|  |  | very small | | très petite | | sehr gering | muy pequeña | Daniela | 1 |
|  |  | very small to small | | très petite à petite | | sehr gering bis gering | muy pequeña a pequeña |  | 2 |
|  |  | small | | petite | | gering | pequeña | Shiren, Siluet | 3 |
|  |  | small to medium | | petite à moyenne | | gering bis mittel | pequeña a medio |  | 4 |
|  |  | medium | | moyenne | | mittel | medio | Marmalindo, Montfavet 63-5,  Red Robin | 5 |
|  |  | medium to large | | moyenne à grande | | mittel bis groß | medio a grande |  | 6 |
|  |  | large | | grande | | groß | grande | Cobra, Dulcemiel | 7 |
|  |  | large to very large | | grande à très grande | | groß bis sehr groß | grande a muy grande |  | 8 |
|  |  | very large | | très grande | | sehr groß | muy grande |  | 9 |
| **22.** |  | **QN** | **VG** | **(+)** | **(b)** |  | | | |
|  |  | |  | | --- | | **Immature fruit: intensity of green color of shoulder** | | | |  | | --- | | **Fruit immature : intensité de la couleur verte du collet** | | | |  | | --- | | **Unreife Frucht: Intensität der Grünfärbung der Schulter** | | |  | | --- | | **Fruto no maduro: intensidad del color verde del hombro** | |  |  |
|  |  | very light | | très claire | | sehr hell | muy clara |  | 1 |
|  |  | very light to light | | très claire à claire | | sehr hell bis hell | muy clara a clara |  | 2 |
|  |  | light | | claire | | hell | clara | Daniela, Soltyno | 3 |
|  |  | light to medium | | claire à moyenne | | hell bis mittel | clara a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Montfavet 63-5, Santonio, Sunita | 5 |
|  |  | medium to dark | | moyenne à foncée | | mittel bis dunkel | media a oscura |  | 6 |
|  |  | dark | | foncée | | dunkel | oscura | Brito, Nugget | 7 |
|  |  | dark to very dark | | foncée à très foncée | | dunkel bis sehr dunkel | oscura a muy oscura |  | 8 |
|  |  | very dark | | très foncée | | sehr dunkel | muy oscura |  | 9 |
| **23.** | **(\*)** | **QN** | **VG** | **(+)** | **(b)** |  | | | |
|  |  | |  | | --- | | **Immature fruit: intensity of green color excluding shoulder** | | | |  | | --- | | **Fruit immature : intensité de la couleur verte à l'exclusion du collet** | | | |  | | --- | | **Unreife Frucht: Intensität der Grünfärbung ohne Schulter** | | |  | | --- | | **Fruto no maduro: intensidad del color verde excepto el hombro** | |  |  |
|  |  | very light | | très claire | | sehr hell | muy clara | Claree | 1 |
|  |  | very light to light | | très claire à claire | | sehr hell bis hell | muy clara a clara |  | 2 |
|  |  | light | | claire | | hell | clara | Daniela, Durinta, Trust | 3 |
|  |  | light to medium | | claire à moyenne | | hell bis mittel | clara a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Sunita, Tropical | 5 |
|  |  | medium to dark | | moyenne à foncée | | mittel bis dunkel | media a oscura |  | 6 |
|  |  | dark | | foncée | | dunkel | oscura | Centella, Chocomate, Uragano | 7 |
|  |  | dark to very dark | | foncée à très foncée | | dunkel bis sehr dunkel | oscura a muy oscura |  | 8 |
|  |  | very dark | | très foncée | | sehr dunkel | muy oscura | Momi, Verdi | 9 |
| **24.** | **(\*)** | **QL** | **VG** |  | **(b)** |  | | | |
|  |  | |  | | --- | | **Immature fruit: green stripes** | | | |  | | --- | | **Fruit immature : stries vertes** | | | |  | | --- | | **Unreife Frucht: grüne Streifen** | | |  | | --- | | **Fruto no maduro: rayas verdes** | |  |  |
|  |  | absent | | absentes | | fehlend | ausente | Daniela, Guanche, Jasminia | 1 |
|  |  | present | | présentes | | vorhanden | presente | Green Zebra, Tigerella | 9 |
| **25.** | **(\*)** | **QL** | **VG** |  | **(b)** |  | | | |
|  |  | |  | | --- | | **Immature fruit: anthocyanin coloration** | | | |  | | --- | | **Fruit immature : pigmentation anthocyanique** | | | |  | | --- | | **Unreife Frucht: Anthocyanfärbung** | | |  | | --- | | **Fruto no maduro: pigmentación antociánica** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Durinta | 1 |
|  |  | present | | présente | | vorhanden | presente | HN5003 | 9 |
| **26.** | **(\*)** | **QN** | **MS/VG** |  | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: size** | | | |  | | --- | | **Fruit : taille** | | | |  | | --- | | **Frucht: Größe** | | |  | | --- | | **Fruto: tamaño** | |  |  |
|  |  | very small | | très petite | | sehr klein | muy pequeño | Cerise, Sweet 100 | 1 |
|  |  | very small to small | | très petite à petite | | sehr klein bis klein | muy pequeño a pequeño | Dolcetini, Genio | 2 |
|  |  | small | | petite | | klein | pequeño | Brioso, Tankini | 3 |
|  |  | small to medium | | petite à moyenne | | klein bis mittel | pequeño a medio | Larimar, Progress | 4 |
|  |  | medium | | moyenne | | mittel | medio | Mezcal, Oceano | 5 |
|  |  | medium to large | | moyenne à grande | | mittel bis groß | medio a grande | Luminance, Rio Grande | 6 |
|  |  | large | | grande | | groß | grande | Carmello, Floradade | 7 |
|  |  | large to very large | | grande à très grande | | groß bis sehr groß | grande a muy grande | Florenteen, Grownet | 8 |
|  |  | very large | | très grande | | sehr groß | muy grande | Cupidissimo, Marsilia | 9 |
| **27.** | **(\*)** | **QN** | **MS/VG** |  | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: ratio length/diameter** | | | |  | | --- | | **Fruit : rapport longueur/diamètre** | | | |  | | --- | | **Frucht: Verhältnis Länge/Durchmesser** | | |  | | --- | | **Fruto: relación longitud/diámetro** | |  |  |
|  |  | very low | | très bas | | sehr klein | muy baja | Margold, Marmande VR | 1 |
|  |  | very low to low | | très bas à bas | | sehr klein bis klein | muy baja a baja | Lutecia, Shourouq | 2 |
|  |  | low | | bas | | klein | baja | Cupidissimo, Motto | 3 |
|  |  | low to medium | | bas à moyen | | klein bis mittel | baja a media | Kaponet, Laureen, Merlice | 4 |
|  |  | medium | | moyen | | mittel | media | Chocostar, Mezcal, Red Robin | 5 |
|  |  | medium to high | | moyen à élevé | | mittel bis groß | media a alta | Dulcini, Ibix | 6 |
|  |  | high | | élevé | | groß | alta | Oceano, Oribustar,  Rio Grande | 7 |
|  |  | high to very high | | élevé à très élevé | | groß bis sehr groß | alta a muy alta | Ibrax, Sir Elyan | 8 |
|  |  | very high | | très élevé | | sehr groß | muy alta | Bellandine, Capriccio, Elko | 9 |
| **28.** | **(\*)** | **PQ** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: shape in longitudinal section** | | | |  | | --- | | **Fruit: forme en section longitudinale** | | | |  | | --- | | **Frucht: Form im Längsschnitt** | | |  | | --- | | **Fruto: forma en sección longitudinal** | |  |  |
|  |  | flattened | | aplatie | | abgeflacht | aplanada | Margold, Marmande VR | 1 |
|  |  | oblate | | arrondie-aplatie | | breitrund | achatada | Cartesio, Gloriette, Merlice, Montfavet 63-5 | 2 |
|  |  | circular | | circulaire | | kreisförmig | circular | Cerise, Soussia | 3 |
|  |  | oblong | | oblongue | | rechteckig | oblonga | Landolino, Red Sky | 4 |
|  |  | cylindric | | cylindrique | | zylindrisch | cilíndrica | Hypeel 244, Sir Elyan | 5 |
|  |  | elliptic | | elliptique | | eingekerbt | elíptica | Obock | 6 |
|  |  | cordate | | cordiforme | | herzförmig | cordada | Cuor di Bue, Cupidissimo, Laureen, Valenciano | 7 |
|  |  | ovate | | ovale | | eiförmig | oval | Dualrow, Soto | 8 |
|  |  | obovate | | obovale | | verkehrt eiförmig | oboval | Duquesa, Estelle, Mezcal | 9 |
|  |  | pyriform | | piriforme | | birnenförmig | piriforme | Oceano, Olivenza, Operino | 10 |
|  |  | obcordate | | obcordiforme | | verkehrt herzförmig | obcordada | Cuore del Ponente, Ingrid | 11 |
| **29.** | **(\*)** | **QN** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: ribbing** | | | |  | | --- | | **Fruit : côtes** | | | |  | | --- | | **Frucht: Rippung** | | |  | | --- | | **Fruto: acostillado** | |  |  |
|  |  | absent or very weak | | absentes ou très faibles | | fehlend oder sehr gering | ausente o muy débil | Cerise, Conchita | 1 |
|  |  | very weak to weak | | très faibles à faibles | | sehr gering bis gering | muy débil a débil |  | 2 |
|  |  | weak | | faibles | | gering | débil | Baikonur, Guanche | 3 |
|  |  | weak to medium | | faibles à moyennes | | gering bis mittel | débil a medio |  | 4 |
|  |  | medium | | moyennes | | mittel | medio | Montfavet 63-5, Shourouq | 5 |
|  |  | medium to strong | | moyennes à fortes | | mittel bis stark | medio a fuerte |  | 6 |
|  |  | strong | | fortes | | stark | fuerte | Marmalindo,  Marmande VR, Marsilia | 7 |
|  |  | strong to very strong | | fortes à très fortes | | stark bis sehr stark | fuerte a muy fuerte |  | 8 |
|  |  | very strong | | très fortes | | sehr stark | muy fuerte | Ingrid, Marsalato | 9 |
| **30.** |  | **QN** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: depression at pedicel end** | | | |  | | --- | | **Fruit : dépression à l’attache du pédicelle** | | | |  | | --- | | **Frucht: Einsenkung am Blütenstielende** | | |  | | --- | | **Fruto: depresión en el extremo del pedicelo** | |  |  |
|  |  | absent or very weak | | absente ou très faible | | fehlend oder sehr gering | ausente o muy débil | Mirante, Sweet Baby | 1 |
|  |  | very weak to weak | | très faible à faible | | sehr gering bis gering | muy débil a débil |  | 2 |
|  |  | weak | | faible | | gering | débil | Bodega, Lebron, Melody | 3 |
|  |  | weak to medium | | faible à moyenne | | gering bis mittel | débil a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Fandango, Hibisco, Jasminia, Saint‑Pierre | 5 |
|  |  | medium to strong | | moyenne à forte | | mittel bis stark | media a fuerte |  | 6 |
|  |  | strong | | forte | | stark | fuerte | Igido, Losna,  Marmande VR | 7 |
|  |  | strong to very strong | | forte à très forte | | stark bis sehr stark | fuerte a muy fuerte |  | 8 |
|  |  | very strong | | très forte | | sehr stark | muy fuerte |  | 9 |
| **31.** |  | **QN** | **MS/VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: size of pedicel scar** | | | |  | | --- | | **Fruit : taille de la cicatrice du pédicelle** | | | |  | | --- | | **Frucht: Größe des Blütenstielansatzes** | | |  | | --- | | **Fruto: tamaño de la cicatriz del pedicelo** | |  |  |
|  |  | very small | | très petite | | sehr klein | muy pequeño | Cerise, Sweet Baby | 1 |
|  |  | very small to small | | très petite à petite | | sehr klein bis klein | muy pequeño a pequeño |  | 2 |
|  |  | small | | petite | | klein | pequeño | Cherrubino, Tukami | 3 |
|  |  | small to medium | | petite à moyenne | | klein bis mittel | pequeño a medio |  | 4 |
|  |  | medium | | moyenne | | mittel | medio | Bodega, Hibisco, Montfavet 63-5 | 5 |
|  |  | medium to large | | moyenne à grande | | mittel bis groß | medio a grande |  | 6 |
|  |  | large | | grande | | groß | grande | Fandango, Gloriette, Jasminia | 7 |
|  |  | large to very large | | grande à très grande | | groß bis sehr groß | grande a muy grande |  | 8 |
|  |  | very large | | très grande | | sehr groß | muy grande | Baikonur, Ensemble, Marmande VR | 9 |
| **32.** |  | **QN** | **MS/VG** |  | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: size of blossom scar** | | | |  | | --- | | **Fruit : taille de la cicatrice pistillaire** | | | |  | | --- | | **Frucht: Größe des Blütenansatzes** | | |  | | --- | | **Fruto tamaño de la cicatriz pistilar** | |  |  |
|  |  | very small | | très petite | | sehr klein | muy pequeño | Cerise, Conchita, Mirante | 1 |
|  |  | very small to small | | très petite à petite | | sehr klein bis klein | muy pequeño a pequeño |  | 2 |
|  |  | small | | petite | | klein | pequeño | Ensemble, Lilos, Montfavet 63-5 | 3 |
|  |  | small to medium | | petite à moyenne | | klein bis mittel | pequeño a medio |  | 4 |
|  |  | medium | | moyenne | | mittel | medio | Pink Bisou | 5 |
|  |  | medium to large | | moyenne à grande | | mittel bis groß | medio a grande |  | 6 |
|  |  | large | | grande | | groß | grande | Esmira, Marinda, Marmande VR, Saint‑Pierre | 7 |
|  |  | large to very large | | grande à très grande | | groß bis sehr groß | grande a muy grande |  | 8 |
|  |  | very large | | très grande | | sehr groß | muy grande | Marsalato, Marsilia | 9 |
| **33.** |  | **QN** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: shape at blossom end** | | | |  | | --- | | **Fruit : forme au sommet** | | | |  | | --- | | **Frucht: Form am Blütenende** | | |  | | --- | | **Fruto: forma del extremo distal** | |  |  |
|  |  | indented | | déprimée | | eingesenkt | hundida | Marmande VR | 1 |
|  |  | indented to flat | | déprimée à aplatie | | eingesenkt bis flach | hundida a plana | Framboo, Linnea | 2 |
|  |  | flat | | aplatie | | flach | plana | Montfavet 63-5, Realeza, Viniccio | 3 |
|  |  | flat to pointed | | aplatie à pointue | | flach bis zugespitzt | plana a puntiaguda | Batistuta | 4 |
|  |  | pointed | | pointue | | zugespitzt | puntiaguda | Roma VF, Talentum | 5 |
| **34.** |  | **QN** | **MS/VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: diameter of core in cross section in relation to total diameter** | | | |  | | --- | | **Fruit : diamètre du cœur en coupe transversale par rapport au diamètre total** | | | |  | | --- | | **Frucht: Herzdurchmesser im Querschnitt im Verhältnis zum Gesamtdurchmesser** | | |  | | --- | | **Fruto: diámetro del corazón en corte transversal en relación con el diámetro total** | |  |  |
|  |  | very small | | très petit | | sehr klein | muy pequeño | Cerise | 1 |
|  |  | very small to small | | très petit à petit | | sehr klein bis klein | muy pequeño a pequeño |  | 2 |
|  |  | small | | petit | | klein | pequeño | Dolcevita, Takumi | 3 |
|  |  | small to medium | | petit à moyen | | klein bis mittel | pequeño a medio |  | 4 |
|  |  | medium | | moyen | | mittel | medio | Losna, Montfavet 63-5, Tastery | 5 |
|  |  | medium to large | | moyen à grand | | mittel bis groß | medio a grande |  | 6 |
|  |  | large | | grand | | groß | grande | Commodo, Paradigma | 7 |
|  |  | large to very large | | grand à très grand | | groß bis sehr groß | grande a muy grande |  | 8 |
|  |  | very large | | très grand | | sehr groß | muy grande | Baikonur, Marmande VR, Valenciano | 9 |
| **35.** |  | **QN** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: thickness of pericarp** | | | |  | | --- | | **Fruit : épaisseur du péricarpe** | | | |  | | --- | | **Frucht: Dicke des Perikarps** | | |  | | --- | | **Fruto: grosor del pericarpio** | |  |  |
|  |  | very thin | | très mince | | sehr dünn | muy delgado | Cerise | 1 |
|  |  | very thin to thin | | très mince à mince | | sehr dünn bis dünn | muy delgado a delgado |  | 2 |
|  |  | thin | | mince | | dünn | delgado | Astuto, Conchita, Marmande VR | 3 |
|  |  | thin to medium | | mince à moyenne | | dünn bis mittel | delgado a medio |  | 4 |
|  |  | medium | | moyenne | | mittel | medio | Jayran, Montfavet 63-5, Refosco | 5 |
|  |  | medium to thick | | moyenne à épaisse | | mittel bis dick | medio a grueso |  | 6 |
|  |  | thick | | épaisse | | dick | grueso | Losna, Reconquista | 7 |
|  |  | thick to very thick | | épaisse à très épaisse | | dick bis sehr dick | grueso a muy grueso |  | 8 |
|  |  | very thick | | très épaisse | | sehr dick | muy grueso | Delibes, Floyd, Myriade, Orinade | 9 |
| **36.** | **(\*)** | **QN** | **MS/VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: number of locules** | | | |  | | --- | | **Fruit : nombre de loges** | | | |  | | --- | | **Frucht: Anzahl Kammern** | | |  | | --- | | **Fruto: número de lóculos** | |  |  |
|  |  | only two | | seulement deux | | nur zwei | sólo dos | Creativo, San Marzano 2, Tropical | 1 |
|  |  | two and three | | deux et trois | | zwei und drei | dos y tres | Bomfado, Orinade | 2 |
|  |  | three and four | | trois et quatre | | drei und vier | tres y cuatro | Durinta, Montfavet 63-5 | 3 |
|  |  | four, five or six | | quatre, cinq ou six | | vier, fünf oder sechs | cuatro, cinco o seis | Rovente, Tosmar, Tradiro | 4 |
|  |  | more than six | | plus de six | | mehr als sechs | más de seis | Bronson, Chocostar, Marmande VR | 5 |
| **37.** | **(\*)** | **QL** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: gel in locules** | | | |  | | --- | | **Fruit: gel dans les loges** | | | |  | | --- | | **Frucht: Gallerte in Kammern** | | |  | | --- | | **Fruto: gel en los lóculos** | |  |  |
|  |  | absent | | absent | | fehlend | ausente | Allflesh 1120, Nun 03560 | 1 |
|  |  | present | | présent | | vorhanden | presente | Daniela, Rio Grande | 9 |
| **38.** | **(\*)** | **PQ** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: color** | | | |  | | --- | | **Fruit : couleur** | | | |  | | --- | | **Frucht: Farbe** | | |  | | --- | | **Fruto: color** | |  |  |
|  |  | yellowish white | | blanc jaunâtre | | gelblichweiß | blanco amarillento | Cream Sausage | 1 |
|  |  | yellow | | jaune | | gelb | amarillo | Babylor, Mimosa | 2 |
|  |  | orange | | orange | | orange | naranja | Operino, Oranjestar | 3 |
|  |  | pink | | rose | | rosa | rosa | Framboo, Pink Wand, Tomimaru Muchoo | 4 |
|  |  | red | | rouge | | rot | rojo | Daniela, Ferline, Montfavet 63-5, Saint‑Pierre, Umaca | 5 |
|  |  | brown | | marron | | braun | marrón | Chocostar, Marbruni | 6 |
|  |  | green | | vert | | grün | verde | Green Grape, Green Zebra | 7 |
| **39.** |  | **PQ** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: color of flesh** | | | |  | | --- | | **Fruit : couleur de la chair** | | | |  | | --- | | **Frucht: Fleischfarbe** | | |  | | --- | | **Fruto: color de la pulpa** | |  |  |
|  |  | yellowish white | | blanc jaunâtre | | gelblichweiß | blanco amarillento | Cream Sausage | 1 |
|  |  | yellow | | jaune | | gelb | amarillo | Babylor, Mimosa | 2 |
|  |  | orange | | orange | | orange | naranja | Operino, Oranjestar | 3 |
|  |  | pink | | rose | | rosa | rosa | Framboo, Pink Wand | 4 |
|  |  | red | | rouge | | rot | rojo | Daniela, Ferline, Montfavet 63-5, Saint‑Pierre, Tomimaru Muchoo, Umaca | 5 |
|  |  | brown | | marron | | braun | marrón | Chocostar, Marbruni | 6 |
|  |  | green | | vert | | grün | verde | Green Grape, Green Zebra | 7 |
| **40.** |  | **QN** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: glossiness of skin** | | | |  | | --- | | **Fruit : brillance de la peau** | | | |  | | --- | | **Frucht: Glanz der Schale** | | |  | | --- | | **Fruto: brillo de la epidermis** | |  |  |
|  |  | weak | | faible | | gering | débil | Focale, Josefina, Sylvana | 1 |
|  |  | medium | | moyenne | | mittel | medio | Ventero | 2 |
|  |  | strong | | forte | | stark | fuerte | Daltoma, Mecano | 3 |
| **41.** | **(\*)** | **QL** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: color of epidermis** | | | |  | | --- | | **Fruit : couleur de l'épiderme** | | | |  | | --- | | **Frucht: Farbe der Epidermis** | | |  | | --- | | **Fruto: color de la epidermis** | |  |  |
|  |  | colorless | | incolore | | farblos | incoloro | Black Opal, Fruits,  House Momotaro, Marvori | 1 |
|  |  | yellow | | jaune | | gelb | amarillo | Brown Berry, Daniela | 2 |
| **42.** | **(\*)** | **QN** | **VG** | **(+)** | **(c)** |  | | | |
|  |  | |  | | --- | | **Fruit: firmness** | | | |  | | --- | | **Fruit : fermeté** | | | |  | | --- | | **Frucht: Festigkeit** | | |  | | --- | | **Fruto: firmeza** | |  |  |
|  |  | very soft | | très molle | | sehr weich | muy blanda | Marmande VR | 1 |
|  |  | very soft to soft | | très molle à molle | | sehr weich bis weich | muy blanda a blanda |  | 2 |
|  |  | soft | | molle | | weich | blanda | Marinda, Marsalato | 3 |
|  |  | soft to medium | | molle à moyenne | | weich bis mittel | blanda a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Rosannita, Sunita | 5 |
|  |  | medium to firm | | moyenne à ferme | | mittel bis fest | media a firme |  | 6 |
|  |  | firm | | ferme | | fest | firme | Losna, Octavio, Tradiro | 7 |
|  |  | firm to very firm | | ferme à très ferme | | fim bis sehr fest | firme a muy firme |  | 8 |
|  |  | very firm | | très ferme | | sehr fest | muy firme | Brito, Daniela, Larimar, Lolek | 9 |
| **43.** |  | **QN** | **MG/MS** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Time of flowering** | | | |  | | --- | | **Époque de floraison** | | | |  | | --- | | **Zeitpunkt der Blüte** | | |  | | --- | | **Época de floración** | |  |  |
|  |  | very early | | très précoce | | sehr früh | muy temprana | Pyremello, Trambellino | 1 |
|  |  | very early to early | | très précoce à précoce | | sehr früh bis früh | muy temprana a temprana | Creativo, Tropical | 2 |
|  |  | early | | précoce | | früh | temprana | Delizia, Lemonade, Zorayda | 3 |
|  |  | early to medium | | précoce à moyenne | | früh bis mittel | temprana a media | Cindel, Goldwin, Organza | 4 |
|  |  | medium | | moyenne | | mittel | media | Delisher, Losna, Montfavet 63-5, Sonico | 5 |
|  |  | medium to late | | moyenne à tardive | | mittel bis spät | media a tardía | Orama, Soltyno | 6 |
|  |  | late | | tardive | | spät | tardía | Octydia, Raymos, Saint‑Pierre, Sylvana | 7 |
|  |  | late to very late | | tardive à très tardive | | spät bis sehr spät | tardía a muy tardía | Nissos, Paronset | 8 |
|  |  | very late | | très tardive | | sehr spät | muy tardía | Atago, Brito, Wafira | 9 |
| **44.** | **(\*)** | **QN** | **MG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Time of maturity** | | | |  | | --- | | **Époque de maturité** | | | |  | | --- | | **Zeitpunkt der Reife** | | |  | | --- | | **Época de madurez** | |  |  |
|  |  | very early | | très précoce | | sehr früh | muy temprana | Goldwin, Pyremello, Sweet Baby, Trambellino | 1 |
|  |  | very early to early | | très précoce à précoce | | sehr früh bis früh | muy temprana a temprana | Delisher | 2 |
|  |  | early | | précoce | | früh | temprana | Lemonade, Shiren, Zorayda | 3 |
|  |  | early to medium | | précoce à moyenne | | früh bis mittel | temprana a media |  | 4 |
|  |  | medium | | moyenne | | mittel | media | Delizia, Losna, Sonico | 5 |
|  |  | medium to late | | moyenne à tardive | | mittel bis spät | media a tardía |  | 6 |
|  |  | late | | tardive | | spät | tardía | Mariana, Saneh | 7 |
|  |  | late to very late | | tardive à très tardive | | spät bis sehr spät | tardía a muy tardía |  | 8 |
|  |  | very late | | très tardive | | sehr spät | muy tardía | Atago, Brito, Daniela, Raymos, Wafira | 9 |
| **45.** |  | **QN** | **MS/VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Meloidogyne incognita* (Mi)** | | | |  | | --- | | **Résistance à *Meloidogyne incognita* (Mi)** | | | |  | | --- | | **Resistenz gegen *Meloidogyne incognita* (Mi)** | | |  | | --- | | **Resistencia a *Meloidogyne incognita* (Mi)** | |  |  |
|  |  | absent or low | | absente ou faible | | fehlend oder gering | ausente o baja | Casaque Rouge | 1 |
|  |  | medium | | moyenne | | mittel | media | Campeon, Tyonic | 2 |
|  |  | high | | élevée | | hoch | alta | Anahu,  Anahu x Casaque Rouge | 3 |
| **46.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Verticillium* sp.  (Va and Vd) - Race 0** | | | |  | | --- | | **Résistance à *Verticillium* sp.  (Va et Vd) - Race 0** | | | |  | | --- | | **Resistenz gegen *Verticillium* sp.  (Va und Vd) -  Pathotyp 0** | | |  | | --- | | **Resistencia a *Verticillium* sp.  (Va y Vd) - Raza 0** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Marmande verte, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Marmande VR, Monalbo | 9 |
| **47.** |  | **QL** | **VG/VS** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *lycopersici*  - Race 0EU/1US  (Fol: 0EU/1US)** | | | |  | | --- | | **Résistance à *Fusarium oxysporum* f. sp. *lycopersici*  - Race 0EU/1US  (Fol: 0EU/1US)** | | | |  | | --- | | **Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* -  Pathotyp 0EU/1US (Fol: 0EU/1US)** | | |  | | --- | | **Resistencia a *Fusarium oxysporum* f. sp. *lycopersici*  – Raza 0EU/1US  (Fol: 0EU/1US)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Marmande verte, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Anabel, Marporum, Marsol | 9 |
| **48.** |  | **QL** | **MS/VG/VS** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *lycopersici*  - Race 1EU/2US  (Fol: 1EU/2US)** | | | |  | | --- | | **Résistance à *Fusarium oxysporum* f. sp. *lycopersici* - Race 1EU/2US  (Fol: 1EU/2US)** | | | |  | | --- | | **Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici* -  Pathotyp 1EU/2US (Fol: 1EU/2US)** | | |  | | --- | | **Resistencia a *Fusarium oxysporum* f. sp. *lycopersici* -  Raza 1EU/2US  (Fol: 1EU/2US)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Marmande verte, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Motelle | 9 |
| **49.** |  | **QL** | **VG/VS** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *lycopersici*  - Race 2EU/3US  (Fol: 2EU/3US)** | | | |  | | --- | | **Résistance à *Fusarium oxysporum* f. sp. *lycopersici*  - Race 2EU/3US  (Fol: 2EU/3US)** | | | |  | | --- | | **Resistenz gegen *Fusarium oxysporum* f. sp. *lycopersici*  - Pathotyp 2EU/3US (Fol: 2EU/3US)** | | |  | | --- | | **Resistencia a *Fusarium oxysporum* f. sp. *lycopersici*  - Raza 2EU/3US  (Fol: 2EU/3US)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Marmande verte, Motelle | 1 |
|  |  | present | | présente | | vorhanden | presente | Alliance, Ivanhoé | 9 |
| **50.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)** | | | |  | | --- | | **Résistance à *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)** | | | |  | | --- | | **Resistenz gegen *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)** | | |  | | --- | | **Resistencia a *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Moneymaker, Motelle | 1 |
|  |  | present | | présente | | vorhanden | presente | Momor | 9 |
| **51.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race 0** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race 0** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp 0** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza 0** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Antique, Pink Treat, Retinto, Sprigel, Triatlon | 9 |
| **52.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race A** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race A** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp A** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza A** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker, Retinto | 1 |
|  |  | present | | présente | | vorhanden | presente | Antique, Pink Treat, Sprigel, Triatlon | 9 |
| **53.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race B** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race B** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp B** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza B** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker, Pink Treat | 1 |
|  |  | present | | présente | | vorhanden | presente | Antique, Retinto, Sprigel, Triatlon | 9 |
| **54.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race C** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race C** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp C** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza C** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker, Pink Treat, Retinto | 1 |
|  |  | present | | présente | | vorhanden | presente | Antique, Sprigel, Triatlon | 9 |
| **55.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race D** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race D** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp D** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza D** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker, Triatlon | 1 |
|  |  | present | | présente | | vorhanden | presente | Antique, Pink Treat, Retinto, Sprigel | 9 |
| **56.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race E** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf) - Race E** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf) - Pathotyp E** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf) - Raza E** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Antique, Sprigel | 9 |
| **57.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race F** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race F** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp F** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza F** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Chelino, Completo | 9 |
| **58.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race H** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race H** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp H** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza H** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Sprigel | 1 |
|  |  | present | | présente | | vorhanden | presente | Chelino, Completo | 9 |
| **59.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Passalora fulva* (Pf)  - Race J** | | | |  | | --- | | **Résistance à *Passalora fulva* (Pf)  - Race J** | | | |  | | --- | | **Resistenz gegen *Passalora fulva* (Pf)  - Pathotyp J** | | |  | | --- | | **Resistencia a *Passalora fulva* (Pf)  - Raza J** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Chelino, Completo | 1 |
|  |  | present | | présente | | vorhanden | presente | Mogami | 9 |
| **60.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Tomato mosaic virus*  - Strain 0 (ToMV: 0)** | | | |  | | --- | | **Résistance au virus de la mosaïque de la tomate  - Souche 0 (ToMV: 0)** | | | |  | | --- | | **Resistenz gegen das Tomatenmosaikvirus  - Pathotyp 0 (ToMV: 0)** | | |  | | --- | | **Resistencia al virus del mosaico del tomate  - Cepa 0 (ToMV: 0)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Mobaci, Mocimor, Momor, Moperou | 9 |
| **61.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Tomato mosaic virus*  - Strain 1 (ToMV: 1)** | | | |  | | --- | | **Résistance au virus de la mosaïque de la tomate  - Souche 1 (ToMV: 1)** | | | |  | | --- | | **Resistenz gegen das Tomatenmosaikvirus  - Pathotyp 1 (ToMV: 1)** | | |  | | --- | | **Resistencia al virus del mosaico del tomate  - Cepa 1 (ToMV: 1)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Mobaci, Monalbo, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Mocimor, Momor, Moperou | 9 |
| **62.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Tomato mosaic virus*  - Strain 2 (ToMV: 2)** | | | |  | | --- | | **Résistance au virus de la mosaïque de la tomate  - Souche 2 (ToMV: 2)** | | | |  | | --- | | **Resistenz gegen das Tomatenmosaikvirus  - Pathotyp 2 (ToMV: 2)** | | |  | | --- | | **Resistencia al virus del mosaico del tomate  - Cepa 2 (ToMV: 2)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker, Moperou | 1 |
|  |  | present | | présente | | vorhanden | presente | Mobaci, Mocimor, Momor | 9 |
| **63.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Phytophthora infestans* (Pi)** | | | |  | | --- | | **Résistance à *Phytophthora infestans* (Pi)** | | | |  | | --- | | **Resistenz gegen *Phytophthora infestans* (Pi)** | | |  | | --- | | **Resistencia a *Phytophthora infestans* (Pi)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Moneymaker, Saint‑Pierre | 1 |
|  |  | present | | présente | | vorhanden | presente | Phantasia, Sixtina | 9 |
| **64.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Pseudopyrenochaeta lycopersici)* (ex *Pyrenochaeta lycopersici* (Pl)** | | | |  | | --- | | **Résistance à *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici*) (Pl)** | | | |  | | --- | | **Resistenz gegen *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici*) (Pl)** | | |  | | --- | | **Resistencia a *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici*) (Pl)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Marmande verte | 1 |
|  |  | present | | présente | | vorhanden | presente | Garance | 9 |
| **65.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Stemphylium* spp. (Ss)** | | | |  | | --- | | **Résistance à *Stemphylium* spp. (Ss)** | | | |  | | --- | | **Resistenz gegen *Stemphylium* spp. (Ss)** | | |  | | --- | | **Resistencia a *Stemphylium* spp. (Ss)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo | 1 |
|  |  | present | | présente | | vorhanden | presente | Motelle | 9 |
| **66.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Pseudomonas syringae* pv. *tomato* (Pst)** | | | |  | | --- | | **Résistance à *Pseudomonas syringae* pv. *tomato* (Pst)** | | | |  | | --- | | **Resistenz gegen *Pseudomonas syringae* pv. *tomato* (Pst)** | | |  | | --- | | **Resistencia a *Pseudomonas syringae* pv. *tomato* (Pst)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Monalbo, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Fuzzer | 9 |
| **67.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Ralstonia solanacearum*  – Race 1 (Rs: 1)** | | | |  | | --- | | **Résistance à *Ralstonia solanacearum*  - Race 1 (Rs: 1)** | | | |  | | --- | | **Resistenz gegen *Ralstonia solanacearum*  – Pathotyp 1 (Rs: 1)** | | |  | | --- | | **Resistencia a *Ralstonia solanacearum*  – Raza 1 (Rs: 1)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Floradel | 1 |
|  |  | present | | présente | | vorhanden | presente | Caraïbo | 9 |
| **68.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Tomato yellow leaf curl virus* (TYLCV)** | | | |  | | --- | | **Résistance au virus des feuilles jaunes en cuillère de la tomate (TYLCV)** | | | |  | | --- | | **Resistenz gegen gelbes Tomatenblattrollvirus (TYLCV)** | | |  | | --- | | **Resistencia al virus del rizado amarillo de la hoja del tomate (TYLCV)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Marmande, Moneymaker | 1 |
|  |  | present | | présente | | vorhanden | presente | Delyca, Montenegro | 9 |
| **69.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Tomato spotted wilt virus*  - Pathotype 0  (TSWV: 0)** | | | |  | | --- | | **Résistance au virus de la tache bronzée de la tomate  - Pathotype 0  (TSWV: 0)** | | | |  | | --- | | **Resistenz gegen das Tomatenbronzen-fleckenvirus  - Pathotyp 0 (TSWV: 0)** | | |  | | --- | | **Resistencia al virus del bronceado del tomate  - Raza 0 (TSWV: 0)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Moneymaker, Montfavet 63-5,  Mountain Magic | 1 |
|  |  | present | | présente | | vorhanden | presente | Bodar, Mospomor | 9 |
| **70.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Leveillula taurica* (Lt)** | | | |  | | --- | | **Résistance à *Leveillula taurica* (Lt)** | | | |  | | --- | | **Resistenz gegen *Leveillula taurica* (Lt)** | | |  | | --- | | **Resistencia a *Leveillula taurica* (Lt)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Montfavet 63-5 | 1 |
|  |  | present | | présente | | vorhanden | presente | Radiance | 9 |
| **71.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)*(Pn) (ex On)** | | | |  | | --- | | **Résistance à *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)*(Pn) (ex On)** | | | |  | | --- | | **Resistenz gegen *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)* (Pn) (ex On)** | | |  | | --- | | **Resistencia a *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)*(Pn) (ex On)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Montfavet 63-5 | 1 |
|  |  | present | | présente | | vorhanden | presente | Romiro | 9 |
| **72.** |  | **QL** | **VG** | **(+)** |  |  | | | |
|  |  | |  | | --- | | **Resistance to *Tomato torrado virus* (ToTV)** | | | |  | | --- | | **Résistance au virus torrado de la tomate (ToTV)** | | | |  | | --- | | **Resistenz gegen *Tomato torrado virus* (ToTV)** | | |  | | --- | | **Resistencia al virus del torrado del tomate (ToTV)** | |  |  |
|  |  | absent | | absente | | fehlend | ausente | Daniela | 1 |
|  |  | present | | présente | | vorhanden | presente | Matias | 9 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  | | --- | --- | --- | --- | | 8. | Explanations on the Table of Characteristics | | | |  | | | | | *8.1* | *Explanations covering several characteristics* | | | |  | |  | | --- | |  | | | | |  |  |  |  | |  | Characteristics containing the following key in the Table of Characteristics should be examined as indicated below: | | | |  | | | | | |  | | --- | | (a) | | |  | | --- | | In the case of indeterminate varieties, observations should be made after a fruit set on at least five trusses and before ripening of the second truss.  In the case of determinate varieties, all observations should be made after a fruit set on the second truss. Observations should be made in the middle third of the plant, before leaves senesce. | | | | |  |  |  |  | | |  | | --- | | (b) | | |  | | --- | | Observations should be made on fully developed immature fruits. | | | | |  |  |  |  | | |  | | --- | | (c) | | |  | | --- | | Observations should be made on mature fruits from the second or higher truss, avoiding first and last mature fruit on the truss. | | | | |  |  |  |  | |
| |  |  | | --- | --- | |  | | | |  | | --- | | *8.2* | | *Explanations for individual characteristics* | |  | | | |  | | --- | | Ad. 1: Seed-propagated varieties only: Seedling: anthocyanin coloration of hypocotyl  Observations should be made on the hypocotyl, before development of the first leaves.  In heterozygous genotypes, anthocyanin coloration of hypocotyl may segregate. If the segregation occurs in the predicted manner, the variety should be classified as partly present. Presence of anthocyanin is caused by one dominant allele. | | | | |  | | --- | | Ad. 2: Plant: growth type  Determinate (1):  The number of trusses is limited and differs between varieties. The number of leaves or internodes between inflorescences is irregular within a plant and varies from one to three. The stem ends with an inflorescence and no lateral shoots are produced.  Indeterminate (2):  As a rule, the number of leaves or internodes between inflorescences is three. After every group of three leaves, three buds are developed: the terminal bud is transformed into an inflorescence and stem elongation continues from one of the lateral buds. There is continuous growing with repetition of this growth pattern.  Sometimes only two leaves or internodes might be observed between inflorescences in some parts of plants (e.g. varieties originating from ‘Daniela’). | | | | |  | | --- | | Ad. 3: Only varieties with plant growth type determinate: Plant: number of inflorescences on main stem  Observations can only be made if side shoots have been removed in the growing trial. | | | | |  | | --- | | Ad. 4: Stem: anthocyanin coloration  Indeterminate growth type varieties: observations should be made around flowering of the third or fourth truss, on the upper third of the plant.  Determinated growth type varieties: observation should be made before the main stem stops growing, showing then truss/leaf division, on the upper third of the plant.  Ad. 5: Only varieties with plant growth type indeterminate: Stem: length of internode  Observation should be made at one time for the whole trial, e.g after a fruit set on approximately 5 nodes.  The total length of the stem should be observed/measured between the first and fourth truss. When this observation/measure is divided by the number of internodes in between, an indication of the length of the internode is given. | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | |  | | --- | |  | | | |  | | --- | | Ad. 6: Only varieties with plant growth type indeterminate: Plant: height  Observations should be made at one time for the whole trial: 60 days after planting, or after a fruit set on approximately 5 nodes, or when the first variety in the trial has reached the wire in the green house or the top of the stake. | | | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Ad. 7: Leaf: attitude  The attitude of the middle third part of the leaves with respect to the main stem should be observed. The line in the picture indicates the angle between the stem and leaf (middle third of leaf).   |  |  | | --- | --- | | Kenmerk6-1 |  | | 3 | 5 | | semi-erect | horizontal |  |  |  | | --- | --- | |  |  | | 7 | 9 | | semi-drooping | drooping | | | |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Ad. 10: Leaf: type  Pinnate leaf: primary leaflets do not bear secondary leaflets.  Bipinnate leaf: primary leaflets are pinnate and bear secondary leaflets​.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | Kenmerk10-1 | 葉の欠刻 | | 1 | 2 | | pinnate | bipinnate | | | | | |  | | --- | | Ad. 11: Leaf: size of leaflets  Observations should be made in the middle of the leaf. | | | |  | | --- | | Ad. 13: Leaf: glossiness  Observations should be made on leaves from the middle of the plant. | | |

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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | |  |  |  |  |  | | --- | --- | --- | --- | --- | | Ad. 14: Leaf: blistering  Observations should be made on leaves from the middle of the plant.  Caution is advised regarding the confusion between blistering and creasing.  Blistering is the difference in height of the surface of the leaf between the veins.  Creasing is independent from the veins.   |  |  | | --- | --- | | X:\Team RKO Groente\Proeven\5. Gewassen\tomaat\nieuwe UPOV richtlijn draft 2009 extra info, foto's\kenmerk 14 gebbob.jpg | X:\Team RKO Groente\Proeven\5. Gewassen\tomaat\nieuwe UPOV richtlijn draft 2009 extra info, foto's\kenmerk 14 zoom plooid.jpg | | blistering | creasing | | | | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Ad. 15: Leaf: attitude of petiolule of leaflet in relation to petiole   |  |  |  | | --- | --- | --- | |  | Leaflet  Petiolule  Petiole |  | | 1 | 3 | 5 | | erect | semi-erect | horizontal | | | |

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| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Ad. 20: Immature fruit: green shoulder  Due to potential environmental effects, example varieties should be included in the trial.  ​   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | |  |  | | --- | --- | | wordml://94.png | wordml://95.png | | 1 | 9 | | absent | present | | | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Ad. 21: Immature fruit: extent of green shoulder  Due to potential environmental effects, example varieties should be included in the trial.    3: small (1/4)  5: medium (1/3)  7: large (1/2)  ​   |  |  |  |  | | --- | --- | --- | --- | |  |  |  |  | | 1 | 3 | 5 | 7 | | very small | small | medium | large | | | | |  | | --- | | Ad. 22: Immature fruit: intensity of green color of shoulder  Intensity of green color of shoulder and intensity of green color excluding shoulder have to be observed on the same scale. This means that the note for intensity of green color of shoulder should be higher than the note for intensity of green color excluding shoulder, or in exceptional cases the same if the difference in intensity is very small. Due to potential environmental effects, example varieties should be included in the trial. | | | |  | | --- | | Ad. 23: Immature fruit: intensity of green color excluding shoulder  See Ad. 22 | | |

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| |  |  | | --- | --- | | |  | | --- | | Ad. 43: Time of flowering  The date of flowering is reached when 50% of plants have the third flower on the second truss open. | | | |  | | --- | | Ad. 44: Time of maturity  Time of maturity is reached when the first fruit on the second truss is fully ripe on 50 % of plants. | | |

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

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| --- | --- | --- |
| 1. | Pathogen | Meloidogyne incognita |
| 2. | Quarantine status | - |
| 3. | Host species | Tomato - Solanum lycopersicum |
| 4. | Source of inoculum | GEVES[[2]](#footnote-2) (FR) or INIA - CSIC[[3]](#footnote-3) (ES) or Naktuinbouw[[4]](#footnote-4) (NL) |
| 5. | Isolate | non-resistance breaking |
| 6. | Establishment isolate identity | use tomato standards |
| 7. | Establishment pathogenicity | use susceptible rootstock or tomato standard |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | living plant |
| 8.2 | Multiplication variety | susceptible variety, preferably resistant to powdery mildew |
| 8.3 | Plant stage at inoculation | 2nd leaf stage |
| 8.5 | Inoculation method | deposit of piece of contaminated roots in soil (around 5-10g near each plant, to adapt depending of the population aggressivity) |
| 8.6 | Harvest of inoculum | 6 to 10 weeks after inoculation, root systems are cut with scissors into pieces of about 1 cm length |
| 8.7 | Check of harvested inoculum | visual check for presence of root knots and ripe egg masses |
| 8.8 | Shelflife/viability inoculum | 1 day |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 30 plants, plus at least 10 non-inoculated plants to observe if a possible lack of germination is due to nematode or not It is recommended to sow more seeds to be sure to get enough plants. |
| 9.2 | Number of replicates | at least 2, preferably 3 replicates |
| 9.3 | Control varieties | ISF definitions: [[5]](#footnote-5) |
|  | Susceptible | Casaque Rouge |
|  | Intermediate resistant (IR) | Campeon and Tyonic |
|  | Highly resistant (HR) | Arletta, Anahu, Anahu x Casaque Rouge |
| 9.4 | Test design | 3 replicates of 10 plants in different trays by variety, non-inoculated plants in a separate tray |
| 9.5 | Test facility | greenhouse or climate room |
| 9.6 | Temperature | 20-26°C, the temperature must be adapted depending on the aggressivity of the test to obtain expected response of controls but should not be above 26°C. Higher temperatures will cause breakdown of resistance. |
| 9.7 | Light | at least 12 h per day |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | small pieces of diseased roots mixed with soil |
| 10.2 | Quantification inoculum | the ratio is depending of aggressiveness of test and lab’s conditions (e.g. between 30 g to 60 g of infested roots, for 100 plants in a tray of 45\*30 cm containing approximately 5.5 kg of substrate), galls should be homogeneously mixed with soil. |
| 10.3 | Plant stage at inoculation | seed |
| 10.4 | Inoculation method | seeds sown in soil contaminated with galls |
| 10.7 | Final observations | 28 to 45 days after inoculation depending on test conditions (temperature, season) |
| 11. | Observations |  |
| 11.1 | Method | root inspection |
| 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 nematodes, and add these to plants in class 4. | | |
| 11.3 | Validation of test | Validation on controls. Expected reactions of controls: Susceptible control: - most plants at classes 3 and 4, - at most 2 plants can be observed at class 2 Intermediate resistant control: - clearly different from other controls, - with majority of plants around class 2. Highly resistant control: - most plants at classes 0 and 1, - at most 2 plants can be observed at class 2 |
| 11.4 | Off-types | Highly resistant varieties may have a few plants with a few galls |
| 12. | Interpretation of data in terms of UPOV characteristic states | Resistance to Meloidogyne incognita (Mi): [1] absent or low: distribution of plants in the classes comparable with the susceptible controls. [2] medium: distribution of plants in the classes comparable with the intermediate resistant controls. [3] high: distribution of plants in the classes comparable with the highly resistant controls. |
| 13. | Critical control points | Avoid overwatering. This may result in rotting of roots. In case of aggressive test, put seeds in a layer of non-contaminated soil or decrease the quantity of inoculum. |

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

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| 1. | Pathogen | Verticillium sp. (see note below) |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | Naktuinbouw[[6]](#footnote-6) (NL) and GEVES[[7]](#footnote-7) (FR) |
| 5. | Isolate | Race 0 (e.g. isolate Toreilles 4-1-4-1) |
| 6. | Establishment isolate identity | use differential varieties, see ISF website: https://www.worldseed.org |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Potato Dextrose Agar, Agar Medium “S” of Messiaen |
| 8.4 | Inoculation medium | water (for scraping agar plates) or Czapek Dox broth (3-7 d-old aerated culture at 20-25°C, in darkness) |
| 8.6 | Harvest of inoculum | filter through double muslin cloth |
| 8.7 | Check of harvested inoculum | spore count; adjust to 106 per ml |
| 8.8 | Shelf life/viability inoculum | 1 day at 4°C |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants, and at least 2 non-inoculated plants |
| 9.3 | Control varieties |  |
|  | Susceptible | Flix, Marmande verte, Moneymaker, Santonio |
|  | Resistant | Monalbo, Marmande VR, “Monalbo x Marmande verte”, Daniela, Elias |
| 9.5 | Test facility | greenhouse or climate room |
| 9.6 | Temperature | optimal 20-25°C, 20-22°C after inoculation |
| 9.7 | Light | 12 h or longer |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | aerated, liquid culture (8.4) |
| 10.2 | Quantification inoculum | count spores, adjust to 106 per ml |
| 10.3 | Plant stage at inoculation | cotyledon to 3rd leaf |
| 10.4 | Inoculation method | roots are immersed for 4 to 15 min in spore suspension |
| 10.5 | First observation | 14 days after inoculation |
| 10.7 | Final observations | 21 to 33 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | growth retardation, wilting, chlorosis, and vessel browning |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        severe symptoms present [9]        no or mild symptoms |
| 13. | Critical control points | All symptoms may be present in resistant varieties, but the severity will be distinctly less than in susceptible varieties. Usually resistant varieties will show significantly less growth retardation than susceptible varieties. Observation of vessel browning is important for diagnosis. Usually, vessel browning will not extend to the 1st leaf in resistant varieties. Many hybrid varieties are heterozygous and appear to have mild symptoms in the biotest. Note: Resistance to V. dahliae based in the Ve gene is also effective to V. albo-atrum. Isolates of both fungal species may be used to evaluate the UPOV characteristic “Resistance to V. dahliae” or V. albo-atrum as long as the isolate belongs to the non-Ve breaking race 0. Resistance-breaking isolates have been described in both species. |

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

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

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

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

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

1. Bio-assay

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Fusarium oxysporum f. sp. lycopersici |
| 3. | Host species | Solanum lycopersicum L. |
| 4. | Source of inoculum | GEVES[[8]](#footnote-8) (FR), INIA - CSIC[[9]](#footnote-9) (ES) or Naktuinbouw[[10]](#footnote-10) (NL) |
| 5. | Isolate | e.g. Reference strain validated in an interlaboratory test[[11]](#footnote-11). Race 0EU/1US (e.g. isolate Orange 71 or PRI 20698 or Fol 071), race 1EU/2US (e.g. isolate 4152, PRI40698 or RAF 70) and race 2EU/3US |
| 6. | Establishment isolate identity | use differential varieties, see ISF website: https://www.worldseed.org |
| 7. | Establishment pathogenicity | on susceptible tomato varieties |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Potato Dextrose Agar or Medium “S” of Messiaen or Czapek-Dox |
| 8.4 | Inoculation medium | water for scraping agar plates or Czapek-Dox culture medium (7 d-old aerated culture) |
| 8.6 | Harvest of inoculum | filter through double muslin cloth |
| 8.7 | Check of harvested inoculum | see 10.2 |
| 8.8 | Shelflife/viability inoculum | 4-8 h, keep cool to prevent spore germination |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants plus at least 5 non-inoculated plants |
| 9.2 | Number of replicates | plants have to be divided into at least 2 replicates |
| 9.3 | Control varieties |  |
| 9.3.1 | Control varieties for the test with race 0EU/1US | Susceptible: Marmande, Marmande verte, Resal, Moneymaker Resistant: Marporum, Larissa, “Marporum x Marmande verte”, Motelle, Gourmet; and Riesling as additional resistant control for medium level |
| 9.3.2 | Control varieties for the test with race 1EU/2US | Susceptible: Marmande verte, Cherry Belle, Roma, Marporum, Ranco, Moneymaker Resistant: Tradiro, Motelle, “Motelle x Marmande verte”; and Agostino as additional resistant control for medium level |
| 9.3.3 | Control varieties for the test with race 2EU/3US | Susceptible: Marmande verte, Motelle, Marporum Resistant: Alliance, Florida, Murdoch, “Marmande verte x Florida” |
| 9.5 | Test facility | glasshouse or climate room |
| 9.6 | Temperature | 24-28°C (severe test, with mild isolate), 20-24°C (mild test, with severe isolate) |
| 9.7 | Light | 12 hours per day or longer |
| 9.8 | Season | all seasons |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | 3-5 days in aerated liquid cultures like PDB, Czapek Dox or S of Messiaen or scraping of plates of 10 days cultures on agar medium. |
| 10.2 | Quantification inoculum | spore count, adjust to 106 spores per ml, in case of very aggressive isolate inoculum concentration can be decreased |
| 10.3 | Plant stage at inoculation | 10-18 d, cotyledon to first leaf |
| 10.4 | Inoculation method | plants at the inoculation stage are harvested carefully, roots and hypocotyls are immersed in spore suspension for 5-15 min; trimming of roots is an option, and transplanted in trays |
| 10.7 | Final observations | 14-21 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale |  |
|  | | |
| 11.3 | Validation of test | Validation on controls. Expected response of controls: Susceptible control:   most plants in class 2 and 3, max.10% of plants class  0 and 1 Resistant control:   most plants in class 0 and 1, max. 10% of plants class 2 and 3. Controls with medium level of resistance can show a higher number of plants in class 2 and 3. |
| 12. | Interpretation of data in terms of UPOV characteristic states | [1] absent: Average symptom level higher than in the medium-resistant control [9] present: Average symptom level not different from the medium-resistant control or the high-resistant control |

1. DNA marker test

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

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

|  |  |  |
| --- | --- | --- |
| 1. | Characteristic | *Fusarium oxysporum* f.sp. l*ycopersici* Fol: 1(EU)/2(US) |
| 2. | Genes and alleles | *I-2* |
| 2.1 | Targeted gene(s) | Resistance Gene *I-2* Accession no. AF118127  Susceptible gene/ homologs *i-2* I-2C1 (accession no. AF004878),  I-2C2 accession no. AF004879),  I-2C3 (accession no. AF004880) |
| Arens et al., (2009). |
| Susceptible gene/ homologs i-2 I-2C1 (accession no. AF004878),  I-2C2 accession no. AF004879),  I-2C3 (accession no. AF004880) |
| 2.3 | Allele corresponding to expression state 9 | Resistance Gene I-2 Accession no. AF118127 |
| Arens et al., (2009) |
| 3. | Primers (and probes) |  |
| 3.1 | Primers to detect both alleles | Forward Primer: 5’-AATGATGAGAGRGTGAAGAAWCA-3’  Reverse Primer: 5’-TCTTTCCCTTCAAACTTTCCTTCA-3’ |
| 3.2 | Probes to detect both alleles | Recommended probes are MGB probes (Applied biosystems) or XS probes (Biolegio) the Tm of the XS probes must be ordered at 68°C.  Susceptible i2 probe: 5’-6FAM\*-TTGACAGCTTGGTTTTGT-BHQ1-3’  Resistance I2 probe: 5’-TEXASRED\*-TTTGAAAGCGTGGTATTGC-BHQ2-3‘  \*Fluorophores and quenchers can be modified according to compatibility with the filters on the real-time PCR machine. |
| 4. | Format of the test |  |
| 4.1 | Number of plants per genotype | 20 plants (individual DNA extraction and PCR for each plant) |
| 4.2 | Control varieties |  |
| 4.3 | Process controls | Negative control (H2O), positive controle (sample containing the expected alleles) |
| 5. | Preparations |  |
| 5.1 | Preparation DNA | Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol (for example commercial kit for plant DNA extraction, or lab prepared reagents) |
| 5.2 | Preparation PCR | Pipette each DNA sample and a commercial real-time PCR mastermix into individual wells. Analyze the samples in a real-time PCR machine capable of reading the fluorophores of all the probes, with reaction conditions suitable for the mastermix used. For this test the Quanta PerfeCta Multiplex qPCR Toughmix is commonly used. |
| 5.3 | Example PCR mastermix |  |
|  | |  |  |  |  | | --- | --- | --- | --- | |  | **Initial concentration** | **Volume/ reaction (µL)** | **Final concentration** | | PerfeCta Multiplex qPCR Toughmix | 5x | 4 | 1X | | Forward Primer | 10µm | 0.75 | 375nM | | Reverse Primer | 10µm | 0.75 | 375nM | | Probe-Fus-i2-sus | 10µm | 0.3 | 150nM | | Probe-Fus-I2-res | 10µm | 1.3 | 650nM | | H2O | - | 9.9 | - | | *subtotal* |  | *17* | - | | DNA |  | 3 | - | | **Total** |  | **20** | - | |  |  |  |  | | |
| 6. | Technique of the method |  |
| 6.1 | Particular conditions | PCR conditions:  1. Initial denaturation step at 94°C for 2-10 minutes (mastermix dependent)  2. 40 cycles at 94°C for 15 sec, 60°C 1 min. Every cycle ends with plate reading  3. Analysis of Ct values for each probe is done to identify positive (+) reactions at Ct<35, or negative reactions (no Ct value). Reactions with Ct values 35-40 should be repeated. Analysis can also be done with a genotyping end point fluorescence reading. |
|
| 7. | Observations |  |
|
| 7.1 | Validity of the results | •Check for typical exponential amplification curves for each sample, as expected for normal specific amplification.  •Non-specific amplification is possible in a PCR reaction. Check the results for the presence of non-exponential curves and/or curves just above the threshold. These curves should be assessed as negative.  •Check if the control samples are as expected (negative control: no signal; positive controls: shows expected signals for the fluorophores). |
| 8. | Interpretation of the test results | •In case the DNA marker test result does not confirm the declaration in the Technical Questionnaire, a field trial or bio-assay should be performed  • Ct values are determined using a set threshold (single threshold) of 200 RFU for each of the fluorescence labels,. this value may need to be adapted to each machine.  •For low or high Ct values the DNA concentration should be checked. If the DNA concentration is low, high Ct values are expected. For samples with a high DNA concentration, low Ct values are expected. If two fluorophores are present, both fluorophores will show the high or the low Ct value. |
| 8.1 | Decision Matrix: | |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Signal specific Fluorophore\*** | |  |  | | |  | | | Fam Susceptible  i-2\*\* | Texas Red Resistance I-2 \*\* | **Molecular Interpretation** | | **Conclusion regarding resistance to Fol: 1(EU)/2(US)** | **Control variety** | | | + | - | i-2/i-2 | | Absent\*\*\* | Marmande Verte | | | + | +\*\*\*\* | I-2/i-2 | | Present | Motelle x Marmande Verte | | | - | + | I-2/I-2 | | Present | Tradiro | | | - | - | Invalid result. Repeat assay or bio-assay should be performed. | |  |  | | | | |
| \* + signal is above the threshold and curves are as expected; - signal is not above the threshold or curves are non-exponential.  \*\*Fluorophores can be modified according to compatibility with the filters on the real-time PCR machine.  \*\*\* Susceptible, or possibly resistant on another mechanism like gene I3  \*\*\*\*Ct value should not be more than +3Ct after the Ct value of the susceptible i-2 fluorophore otherwise the marker is considered as absent. | | |
| 9. | Validation of the method | A conclusion of presence/absence of resistance should be made for each variety based on the results of the 20 individual plant genotypes. A tolerance of 1 individual out of type plant can be made, otherwise the variety should be identified as heterogenous if contradictory results are obtained for a variety.  This protocol was validated by a ring-test with three different laboratories (Interlaboratory Comparative Test Report, INVITE 2023). If a different protocol is used, the laboratory must validate its method in comparison to the reference method to show that the alternative protocol gives the same results. |
|  | Contact Examination Office | Naktuinbouw |

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Fusarium oxysporum f. sp. radicis-lycopersici |
| 2. | Quarantine status |  |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | Naktuinbouw[[12]](#footnote-12) (NL) and GEVES[[13]](#footnote-13) (FR) |
| 5. | Isolate | - |
| 7. | Establishment pathogenicity | symptoms on susceptible tomato |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Potato Dextrose Agar, or Medium agar “S” of Messiaen |
| 8.4 | Inoculation medium | Water for scraping agar plates or Czapek-Dox (7 d-old aerated culture) |
| 8.6 | Harvest of inoculum | filter through double muslin cloth |
| 8.7 | Check of harvested inoculum | spore count; adjust to 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 | Not applicable |
| 9.3 | Control varieties |  |
|  | Susceptible | Motelle, Moneymaker |
|  | Resistant | Momor, “Momor x Motelle” |
|  | Remark | “Momor x Motelle” has slightly weaker resistance than Momor |
| 9.4 | Test design | >20 plants; e.g. 35 seeds for 24 plants, including 2 non-inoculated controls |
| 9.5 | Test facility | glasshouse or climate room |
| 9.6 | Temperature | 24-28°C (severe test, with mild isolate) 17-24°C (mild test, with severe isolate) |
| 9.7 | Light | at least 12 hours per day |
| 9.8 | Season | all seasons |
| 9.9 | Special measures | slightly acidic peat soil is optimal; keep soil humid but avoid water stress |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | aerated culture or scraping of plates |
| 10.2 | Quantification inoculum | spore count, adjust to 106 spores per ml |
| 10.3 | Plant stage at inoculation | 12-18 d, cotyledon to third leaf |
| 10.4 | Inoculation method | roots and hypocotyls are immersed in spore suspension for 5-15 min |
| 10.7 | Final observations | 10-21 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual; a few plants are lifted at the end of the test |
| 11.2 | Observation scale | Symptoms: Plant death Growth retardation caused by root degradation Root degradation Necrotic pinpoints and necrotic lesions on stems |
| 11.3 | Validation of test | Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 11.4 | Off-types |  |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        symptoms present [9]        no symptoms |
| 13. | Critical control points | Temperature should never exceed 27°C during the test period. Isolates may lose pathogenicity after repeated subculturing. Isolates should not be subcultured more than two times. |

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

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | |  | | --- | | Ad. 52: Resistance to *Passalora fulva* (Pf) - Race A  See Ad. 51 | | | |  | | --- | | Ad. 53: Resistance to *Passalora fulva* (Pf) - Race B  See Ad. 51 | | | |  | | --- | | Ad. 54: Resistance to *Passalora fulva* (Pf) - Race C  See Ad. 51 | | | |  | | --- | | Ad. 55: Resistance to *Passalora fulva* (Pf) - Race D  See Ad. 51 | | | |  | | --- | | Ad. 56: Resistance to *Passalora fulva* (Pf) - Race E  See Ad. 51 | | | |  | | --- | | Ad. 57: Resistance to *Passalora fulva* (Pf) - Race F  See Ad. 51  Ad. 58: Resistance to *Passalora fulva* (Pf) - Race H  See Ad. 51 | | | |  | | --- | | Ad. 59: Resistance to *Passalora fulva* (Pf) - Race J  See Ad. 51 | | |

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

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Tomato mosaic virus |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | Naktuinbouw[[16]](#footnote-16) (NL) or GEVES[[17]](#footnote-17) (FR) or INIA - CSIC[[18]](#footnote-18) (ES, strain 0) |
| 5. | Isolate | Strain 0, (e.g. isolate INRA Avignon 6-5-1-1), strain 1 and strain 2 |
| 6. | Establishment isolate identity | genetically defined tomato standards Mobaci (Tm1), Moperou (Tm2), Momor (Tm22) Use diffential varieties, see ISF website :  https:// www.woldseed.org |
| 7. | Establishment pathogenicity | on susceptible plant |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | living plant |
| 8.2 | Multiplication variety | e.g. Moneymaker, Marmande |
| 8.7 | Check of harvested inoculum | option: on Nicotiana tabacum “Xanthi”, check lesions after 2 days |
| 8.8 | Shelf life/viability inoculum | fresh>1 day, desiccated>1year |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.3 | Control varieties |  |
|  | Susceptible | Marmande, Monalbo, Moneymaker |
|  | Resistant to ToMV: 0 and 2 | Mobaci |
|  | Resistant to ToMV: 0 and 1 | Moperou |
|  | Resistant to ToMV: 0, 1 and 2 | “Monalbo x Momor” (with necrosis), Gourmet, Mocimor, Momor |
| 9.4 | Test design | blank treatment with PBS and carborundum or similar buffer |
| 9.5 | Test facility | glasshouse or climate room |
| 9.6 | Temperature | 24 to 26°C |
| 9.7 | Light | 12 hours or longer |
| 9.8 | Season | symptoms are more pronounced in summer |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | 1 g leaf with symptoms with 10 ml PBS or similar buffer Homogenize, add carborundum to buffer (1 g/30 ml) |
| 10.4 | Inoculation method | gentle rubbing |
| 10.6 | Second observation | cotyledons or 2 leaves |
| 10.7 | Final observations | 11-21 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | symptoms of susceptibility: mosaic in top, leaf malformation symptoms of resistance (based on hypersensitivity): local necrosis, top necrosis, systemic necrosis |
| 11.3 | Validation of test | Evaluation of variety resistance should be calibrated with results of resistant and susceptible controls   Remark: in some heterozygous varieties a variable proportion of plants may have severe systemic necrosis or some necrotic spots while the other plants have no symptoms. This proportion may vary between experiments. |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        symptoms of susceptibility present [9]        no symptoms, or symptoms of hypersensitive                   resistance |
| 13. | Critical control points | Temperature and light may influence the development of necrosis. More light means more necrosis. At temperatures above 26°C the resistance may break down. Resistant heterozygous varieties may have symptomless plants and plants with severe necrosis; in spite of apparent segregation the sample may be evaluated as uniform for resistance.   Remark: Strain INRA Avignon 6-5-1-1 is recommended for ToMV: 0. This strain causes a striking yellow Aucuba mosaic. |

            (ii)        DNA marker test

Resistance to ToMV is often based on resistance gene Tm2 (allele Tm2 or Tm22). The presence of the allele for resistance Tm2 and Tm22 and/or susceptible allele tm2 can be detected by the co-dominant markers as described in Arens et al (2010). Two methods are available, conventional PCR and Taqman PCR. Specific aspects:  
   
            (a)        Conventional PCR

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Tomato mosaic virus |
| 2. | Functional gene | Tm2/22 (with two alleles for resistance Tm2 and Tm22 and one allele for susceptibility tm2) |
| 3. | Primers |  |
| 3.1 | Assay 1 to check resistant allele Tm2 or Tm22 | Outer primer TMV-2286F: 5’GGGTATACTGGGAGTGTCCAATTC3’ Outer primer TMV-2658R: 5’CCGTGCACGTTACTTCAGACAA3’ Tm22 SNP2494F:  5’CTCATCAAGCTTACTCTAGCCTACTTTAGT3’ Tm2 SNP2493R: 5’CTGCCAGTATATAACGGTCTACCG3’ |
| 3.2 | Assay 2 to check susceptible or resistant allele | Outer primer TM2-748F:5’CGGTCTGGGGAAAACAACTCT3’ Outer primer TM2-1256R:5’CTAGCGGTATACCTCCACATCTCC3’ TM2-SNP901misR: 5’GCAGGTTGTCCTCCAAATTTTCCATC3’ TM2-SNP901misF: 5’CAAATTGGACTGACGGAACAGAAAGTT3’ |
| 4. | Format of the test |  |
| 4.1 | Number of plants per genotype | at least 20 plants |
| 4.2 | Control varieties | homozygous susceptible allele tm2 present: Mobaci, Monalbo, Moneymaker Homozygous resistant allele Tm2 present: Moperou Homozygous resistant allele Tm22 present: Mocimor, Momor |
| 5. | Preparation of DNA | Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol. Pipette each DNA sample and the PCR mix (primers, dNTP’s and Taq polymerase) into individual wells for assay 1 and assay 2. |
| 6. | PCR conditions | 1. Initial denaturation step at 94°C for 3 minutes 2. 35 cycles at 94°C for 1 minute, 56°C for 1 minute, 72°C for 2 minutes 3. Final extension step of 72°C for 10 minutes   Visualize PCR product on 1-2% agarose gel. |
| 7. | Observations |  |
| 7.1 | Observation scale |  |
| Assay 1 A: Control fragment (416bp) and Tm2 fragment (255bp) B: Control fragment (416bp) and Tm22fragment (214bp) C: Control fragment (416bp)  http://www.wipo.int/birt/images/2995/tom_57_assay1.png    Assay 2 D: Control fragment (509bp), tm2 fragment (S-allele; 381bp) and Tm2 or Tm22 fragment (R-allele; 185bp) E: Control fragment (509bp) and Tm2 or Tm22 fragment (R-allele; 185bp) F: Control fragment (509bp) and tm2 fragment (S-allele; 381bp) http://www.wipo.int/birt/images/2995/tom_57_assay2.png | | |
| 7.2 | Validation of test | Control varieties should give the expected results. |
| 8. | Interpretation of data in terms of UPOV characteristic states | the presence of the alleles tm2, Tm2, Tm22 lead to different interpretation for characteristics 56, 57 and 58, see table.   In case the DNA marker test result does not confirm the declaration in the TQ, a bio-assay should be performed to observe whether the resistance is absent or present for the variety (possibly based on another resistance gene, e.g. gene Tm1). |
| |  |  |  |  | | --- | --- | --- | --- | | Test result DNA marker test | tm2/tm2 | Tm2/tm2 or Tm2/Tm2 | Tm22/tm2 or Tm22/Tm22 or Tm22/Tm2 | |  |  | (less frequent) | (more frequent) | | 56 Strain 0 | [1] absent | [9] resistant | [9] resistant | | 57 Strain 1 | [1] absent | [9] resistant | [9] resistant | | 58 Strain 2 | [1] absent | [1] absent | [9] resistant | | | |

 

(b) Taqman PCR

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Tomato mosaic virus |
| 2. | Functional gene | Tm2/22 (with two alleles for resistance Tm2 and Tm22 and one allele for susceptibility tm2) |
| 3. | Primers | TOMV RES Forward: 5’-CTCAATCATTTCCTCCAAATCTC-’  TOMV RES Reverse: 5’-GGGAAATGTCTTAAGTACTGCCA-3’ TOMV SUS Forward: 5’-GAAGCATTCCCTCCAAATATT-3’ TOMV SUS Reverse: 5’-GGTAATGTCTTAAGCACTGCCAG-3’ TOMV Probe Res TM22: 5’-Texas Red-CTACTTTAGTGTAGACCGT-BHQ2-3’ TOMV Probe Res TM2: 5’-Atto 532-CAACTTTACGGTAGACC-BHQ1-3’ TOMV Probe SUS: 5’-6FAM-TGCTTTATGGTAGACAGT-BHQ1-3’ The probes are MGB probes or XS probes, designed with a temperature of 65°C. |
| 4. | Format of the test |  |
| 4.1 | Number of plants per genotype | at least 20 plants |
| 4.2 | Control varieties | homozygous susceptible allele tm2 present: Mobaci, Monalbo, Moneymaker Homozygous resistant allele Tm2 present: Moperou Homozygous resistant allele Tm22 present: Mocimor, Momor |
| 5. | Preparation of DNA | Harvest per individual plant a part of a young leaf. Isolate total DNA with a standard DNA isolation protocol. Pipette each DNA sample and a commercial real-time PCR mastermix (primers, probes) into individual wells. Analyse the samples in a real-time PCR machine capable of reading the fluorophores of all the probes, with reaction conditions suitable for the mastermix used. |
| 6. | PCR conditions | 1. Initial denaturation step at 94°C for 2-10 minutes (mastermix dependent) 2. 40 cycles at 94°C for 15 sec, 60°C 1 min. Every cycle ends with plate reading |
| 7. | Observations |  |
| 7.1 | Observation scale | |  |  |  | | --- | --- | --- | | Probe | Ct/Cq | Interpretation | | TOMV Probe Res TM22 | <35 | resistance allele Tm22 present | | N/A | resistance allele Tm22 absent | | TOMV Probe Res TM2 | <35 | resistance allele Tm2 present | | N/A | resistance allele Tm2 absent | | TOMV Probe SUS | <35 | Susceptible allele tm2 present | | N/A | Susceptible allele tm2 absent | |
| 7.2 | Validation of test | Control varieties should give the expected results. In case of Ct/Cq 35-40: repeat the test. |
| 8. | Interpretation of data in terms of UPOV characteristic states | the presence of the alleles tm2, Tm2, Tm22 lead to different interpretation for characteristics 56, 57 and 58, see table.   In case the DNA marker test result does not confirm the declaration in the TQ, a bio-assay should be performed to observe whether the resistance is absent or present for the variety (possibly based on another resistance gene, e.g. gene Tm1). |
| |  |  |  |  | | --- | --- | --- | --- | | Test result DNA marker test | tm2/tm2 | Tm2/tm2 or Tm2/Tm2 | Tm22/tm2 or Tm22/Tm22 or Tm22/Tm2 | |  |  | (less frequent) | (more frequent) | | 56 Strain 0 | [1] absent | [9] resistant | [9] resistant | | 57 Strain 1 | [1] absent | [9] resistant | [9] resistant | | 58 Strain 2 | [1] absent | [1] absent | [9] resistant | | | |

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

See Ad. 60

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

See Ad. 60

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Phytophthora infestans* |
| 3. | Host species | *Solanum lycopersicum* |
| 5. | Isolate | highly pathogenic on tomato |
| 6. | Establishment isolate identity | biotest |
| 7. | Establishment pathogenicity | biotest |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | V8 Agar or PDA or Malt Agar medium |
| 8.2 | Multiplication variety | susceptible tomato variety |
| 8.3 | Plant stage at inoculation | 4 weeks |
| 8.4 | Inoculation medium | water |
| 8.5 | Inoculation method | spraying |
| 8.6 | Harvest of inoculum | wash spores from wetted plates |
| 8.7 | Check of harvested inoculum | count spores |
| 8.8 | Shelflife/viability inoculum | 4 h after chilling at 8-10°C |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.3 | Control varieties |  |
|  | Susceptible | Moneymaker, Saint-Pierre |
|  | Resistant | Phantasia, Sixtina |
| 9.5 | Test facility | glasshouse |
| 9.6 | Temperature | 18°C |
| 9.7 | Light | after inoculation darkness during 24 h, thereafter 10 h darkness per 24 h |
| 9.9 | Special measures | humidity tent during four days after inoculation |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | wash spores from sporulating leaves, chill at 8-10°C chilling will induce zoospore release   remark: Use fresh spores from repeated infection cycles on tomato plants during 3 weeks before inoculation |
| 10.2 | Quantification inoculum | count sporangiospores; adjust to 104 spores per ml |
| 10.3 | Plant stage at inoculation | 10 leaves developed (6 to 7 weeks) |
| 10.4 | Inoculation method | spraying |
| 10.7 | Final observations | 5-7 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | Symptoms: water-soaked lesions, yellowing, and death |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls   heterozygous varieties may have a slightly lower level of expression of resistance |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        severe symptoms present [9]        no or mild symptoms |
| 13. | Critical control points | resistance is only well-expressed in the adult plant |

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

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

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Stemphylium spp. e.g. Stemphylium solani (see note below) |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | GEVES[[20]](#footnote-20) (FR) |
| 7. | Establishment pathogenicity | biotest |
| 8.1 | Multiplication medium | PDA (12 hours per day under near-ultraviolet light to induce sporulation) or V8-Agar |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.3 | Control varieties |  |
|  | Susceptible | Monalbo |
|  | Resistant | Motelle, “Motelle x Monalbo” (border) |
| 9.5 | Test facility | greenhouse or climate cell |
| 9.6 | Temperature | 24°C |
| 9.7 | Light | 12 hours minimum |
| 9.9 | Special measures | incubation in tunnel with 100% relative humidity or humidity tent closed 5 days after inoculation, after this, 80% RH until end. |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | sporulating plates (8.1) are scraped and air-dried overnight. The next day plates are soaked and stirred for 30 min in a beaker with demineralized water, or sporulating plates are scraped with water with Tween20. The resulting suspension is sieved through a double layer of muslin. |
| 10.2 | Quantification inoculum | 5x103 to 5x105 spores per ml |
| 10.3 | Plant stage at inoculation | 20-22 days (three expanded leaves) |
| 10.4 | Inoculation method | spraying |
| 10.7 | Final observations | 4-10 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | 0. no symptoms 1. some very rare lesions plus yellowing onleaves, and no symptoms on cotyledons 2. some lesions on leaves and cotyledons 3. many lesions on leaves, and cotyledons attached 4. coalescence of lesions, and cotyledons falling 5. total drying of the first two or the first three leaves, and cotyledons fallen |
| 11.3 | Validation of test | Symptoms on Motelle x Monalbo should be a little bit stronger than on Motelle. Symptoms on Monalbo should be much stronger than on Motelle. |
| 12. | Interpretation of data in terms of UPOV characteristic states | Resistance absent [1]   strong symptoms Resistance present [9]   weak symptoms or no symptoms  When the resistance level is just below the lower border of resistance, the test should be repeated one or two times before a final decision is taken |
| 13. | Critical control points | Individuel isolates may differ stightly in pathogenicity. Some isolates of Stemphylium cannot be classified easily as either Stemphylium solani or a related species. These Stemphylium isolates may still be useful for identifying resistance to Stemphylium solani. |

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Pseudomonas syringae pv. tomato |
| 2. | Quarantine status | - |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | GEVES[[21]](#footnote-21) (FR) |
| 5. | Isolate | - |
| 7. | Establishment pathogenicity | biotest |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | e.g. King’s B agar medium, darkness |
| 8.2 | Multiplication variety | susceptible variety |
| 8.4 | Inoculation medium | water |
| 8.8 | Shelflife/viability inoculum | plates become old after 10 days |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.2 | Number of replicates | Not applicable |
| 9.3 | Control varieties |  |
|  | Susceptible | Monalbo, Moneymaker |
|  | Resistant | Ontario 7710, “Monalbo x Ontario 7710”, Fuzzer |
| 9.5 | Test facility | greenhouse or growth chamber |
| 9.6 | Temperature | day: 22° C, night: 16° C or 20°C |
| 9.7 | Light | 12 hours |
| 9.9 | Special measures | humidity tent needed for 3 days or longer |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | wash off spores from plate and addv a drop of surfactant to the bacterial suspension. Plate should be less than 2-4 days old. |
| 10.2 | Quantification inoculum | OD 0.1 or less, supported by dilution plating. Density 106 colony forming units per ml |
| 10.3 | Plant stage at inoculation | three leaves expanded (20-22 days) |
| 10.4 | Inoculation method | spraying a bacterial suspension on leaves |
| 10.7 | Final observations | 8 days after inoculation or longer |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | bacterial speck, greasy in appearance with marginal chlorosis pinpoint lesions can be observed on resistant plants < 1.0 mm |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        bacterial speck present [9]        no symptoms or pinpoint lesions |
| 13. | Critical control points | Strains may lose virulence in storage |

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Ralstonia solanacearum – Race 1 |
| 2. | Regulatory status | See EPPO Global database: <https://gd.eppo.int> |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | - |
| 5. | Isolate | Race 1 (Race 1 has a wide host range, including tomato. Race 3 has a narrow host range, also including tomato.) |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | Yeast Peptone Glucose (YPG) Agar or PYDAC Special conditions: 25-30°C (Race 3 usually needs 20-23°C) |
| 8.5 | Inoculation method | 2 ml of inoculum placed at the foot of each plantlet prior to transplanting |
| 8.8 | Shelf life/viability inoculum | suspension in sterile distilled water at 15°C (<1 year) |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.3 | Control varieties |  |
|  | Susceptible | Floradel |
|  | Resistant | Caraïbo |
| 9.5 | Test facility | climate room |
| 9.6 | Temperature | day: 26-30°C; night: 25°C |
| 9.7 | Light | 10 - 12 hours |
| 9.9 | Special measures | high humidity |
| 10. | Inoculation |  |
| 10.2 | Quantification inoculum | 107colony forming units per ml |
| 10.3 | Plant stage at inoculation | 3 to 4 well-developed leaves (3 weeks) |
| 10.7 | Final observations | 3 weeks after inoculation |
| 11. | Observations | in intermediate resistant varieties, bacteria could be present in the lower part of the plant |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        symptoms present [9]        no symptoms, or less than resistant standard |

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

1. agroinoculation method

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Tomato yellow leaf curl virus (TYLCV) |
| 2. | Regulatory status | See EPPO Global Database: <https://gd.eppo.int> |
| 3. | Host species | Solanum lycopersicum |
| 4. | Source of inoculum | Dr. Eduardo R. Bejarano, Plant Genetics Laboratory, HMS UMA-CSIC[[22]](#footnote-22) |
| 5. | Isolate | Alm:Pep:99, strain IL |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | YEP/Kanamycin. |
| 8.3 | Plant stage at inoculation | 3-4 leaf |
| 8.4 | Inoculation medium | YEP |
| 8.5 | Inoculation method | Stem puncture agroinfiltration. Plant agroinoculation is carried out using Agrobacterium tumefaciens transformed with plasmids containing the infectious clones (Morilla, et al. 2005. Phytopathology 95: 1089-1097) |
| 8.8 | Shelf life/viability inoculum | A. tumefaciens stocks are maintained frozen at -80ºC in 15-20% glycerol for long term storage. Cultures to be stored are typically started from a single colony and grown in 5 ml YEP +2.5 µl kanamycin (100mg/ml) during 48 h at 28ºC. |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.2 | Number of replicates | 2 |
| 9.3 | Control varieties |  |
|  | Susceptible | Moneymaker, Marmande |
|  | Resistant | Delyca, Montenegro |
| 9.5 | Test facility | Glasshouse or climatic chamber with permission to confined use of LMO/GMO |
| 9.6 | Temperature | 23-25°C |
| 9.7 | Light | 16 h |
| 9.9 | Special measures | The transformed *Agrobacterium tumefaciens* is a living modified organism (LMO; or genetically modified organism (GMO)) for which further regulations may apply. |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | Streak the surface of the frozen A. tumefaciens stock tube and submerge in 5ml YEP+2.5 µl kanamycin (100mg/ml) during 48 h at 28°C. Shaking is needed. Take 100 µl and place them into 100 ml YEP and 50 µl kanamycin (100mg/ml). Shake 48 h at 28ºC. Centrifuge the saturated culture for 20 min at 3500 rpm and discard supernatant |
| 10.2 | Quantification inoculum | Dissolve in sterile deionize water to a final OD600 of 1. |
| 10.3 | Plant stage at inoculation | 3-4th leaf |
| 10.4 | Inoculation method | Take up into a 1 ml syringe with a 27-gauge needle and few drops (about 20 µl of the culture) were deposited on 10-15 puncture wounds made with the needle into the stem of test tomato plants. Maintain on ice while inoculating plants. |
| 10.5 | First observation | 20 days post inoculation (dpi) |
| 10.6 | Second observation | 30 dpi |
| 10.7 | Final observations | 45 dpi |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | Symptoms: leaf yellowing and curling |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 11.4 | Off-types |  |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        severe symptoms present [9]        no symptoms |
| 13. | Critical control points | TYLCV is endemic in many tropical and subtropical areas and has a quarantine status in many countries with a temperate climate. TYLCV-IL is the strain most widely spread worldwide. With this strain, symptoms do not appear in varieties with Ty-1 and Ty-2. Some TYLCV resistant varieties may be susceptible to the closely related virus Tomato yellow leaf curl Sardinia virus (TYLCSV). |

            (ii)        White fly inoculation method

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

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

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

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

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

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

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

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

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

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Oidium neolycopersici* |
| 2. | Quarantine status | - |
| 3. | Host species | *Solanum lycopersicum* |
| 5. | Isolate | see remark under 13 |
| 7. | Establishment pathogenicity | biotest |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | plant |
| 8.3 | Plant stage at inoculation | 24°C during the day; 18°C during the night |
| 8.4 | Inoculation medium | water |
| 8.5 | Inoculation method | see 10.4 |
| 8.6 | Harvest of inoculum | by washing off |
| 8.7 | Check of harvested inoculum | check for contaminants under microscope |
| 8.8 | Shelf life/viability inoculum | 1-2 hours |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | at least 20 plants |
| 9.2 | Number of replicates | Not applicable |
| 9.3 | Control varieties |  |
|  | Susceptible | Momor, Montfavet 63-5 |
|  | Resistant | Romiro, PI 247087 |
| 9.5 | Test facility | glasshouse |
| 9.6 | Temperature | 20°C or 18/24°C |
| 9.7 | Light | 12 hours |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | collect spores in water |
| 10.2 | Quantification inoculum | 104 conidia/ml |
| 10.3 | Plant stage at inoculation | 3 weeks |
| 10.4 | Inoculation method | by spraying on leaves or dredging of leaves |
| 10.7 | Final observations | 7-18 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale | 0. no sporulation 1. necrotic points and sometimes locally restricted sporulation 2. moderate sporulation 3. abundant sporulation |
| 11.3 | Validation of test | evaluation of variety resistance should be calibrated with results of resistant and susceptible controls |
| 12. | Interpretation of data in terms of UPOV characteristic states | absent  [1]        Moderate or abundant sporulation present [9]        No or restricted sporulation |
| 13. | Critical control points | Resistance-breaking isolates should be avoided. Resistance to *O. neolycopersici* is usually race-specific. However, as long as a differential series of tomato genotypes with well-defined resistances is lacking, it will remain hard to conclude that different races of *O. neolycopersici* exist. |

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

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

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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | |  |  |  | | --- | --- | --- | | |  |  | | --- | --- | | 9. | Literature | | |  |  |  | | --- | | Ano, G., Brand, R., Causse, M., Chauvet, M., Damidaux, R., Laterrot, H., Philouze, J., Plages, J.N., Rousselle, 2006: La Tomate, in Histoire et amélioration de cinquante plantes cultivées au XXème siècle. Coordinatrice C. Doré, Collection « Savoir faire », Editions INRA Quae. Paris, FR, 840 pp.  Arens P., Mansilla C., Deinum D., Cavellini L., Moretti A., Rolland S., van der Schoot H., Calvache D., Ponz F., Collonnier C., Mathis R., Smilde D., Caranta C,; Vosman B., 2010: Development and evaluation of robust molecular markers linked to disease resistance in tomato for distinctness, uniformity and stability testing. Theoretical and applied genetics 120(3). pp. 655-64  Bai, Y. 2004: The genetics and mechanisms of resistance to tomato powdery mildew (Oidium neolycopersici) in Lycopersicon species. Thesis Wageningen University. NL, 103 pp.  Barbieri, M., et al., 2010: Introgressions of resistance to two Mediterranean virus species causing tomato yellow leaf curl into a valuable traditional tomato variety. Journal of Plant Pathology 92(2). pp.485-493  Brand, R., 2000: Evolution des variétés de Tomate au cours du siècle, dans ‘La Tomate : pour un produit de qualité’, Edition Ctifl, C85105 (ouvrage collectif). FR, pp. 97-105  Denby, L.G., Wooliams, G.E., 1962: The Development of Verticillium Resistant Strains of Established Tomato Varieties. Canadian Journal Plant Science 42. CA, pp. 681-685  Dianese, E.C. et al, 2010: Development of a locus-specific, co-dominant SCAR marker for assisted-selection of the Sw-5 (Topovirus resistance) gene cluster in a wide range of tomato accessions. Molecular Breeding, 25(1). pp. 133-142  Garcia, S., et al., 2009: Resistance driven selection of begomoviruses associated with the TYLCV. Virus research 146. pp. 66-72  Garland, S., Sharman, M., Persley, D. and McGrath, D., 2005: The development of an improved PCR-based marker system for Sw-5, an important TSWV resistance gene of tomato. Australian Journal of Agricultural Research, 56 (3). pp 285-289  Gordillo, L.F. and Stevens, M.R., 2008: Screening two Lycopersicon peruvianum collections for resistance to Tomato spotted wilt virus. Plant Disease 92(5). pp. 694-704  Hubbeling, N., 1978: Breakdown of resistance to the Cf-5 gene in tomato by another new race of Fulvia fulva. Mededelingen van de Faculteit Landbouwwetenschappen Universiteit Gent 42/2.  International Seed Federation (ISF): Trade Issues, Phytosanitary Matters, Pathogen coding, Strain Denomination, Differential sets. https://www.worldseed.org/our-work/plant-health/overview/  Laterrot, H., 1973: Sélection de variétés de Tomate résistantes aux Meloidogyne. OEPP/EPPO Bulletin 3(1). pp. 89-92  Laterrot, H., 1972: Sélection de tomates résistantes à Fusarium oxysporum f. sp. lycopersici. Phytopathologia Mediterranea, 11(3), Firenze, IT, pp. 154-158  Laterrot, H., 1981: La lutte génétique contre la Cladosporiose de la Tomate en France. P.H.M. Revue Horticole, No. 214. Montpellier, FR, pp. 27-30  Laterrot, H., 1973: Résistance de la Tomate au virus de la Mosaïque du Tabac. Difficultés rencontrées pour la sélection de variétés résistantes. Ann. Amelior. Plantes, 23 (49). pp. 287-313  Laterrot, H., 1990: Situation de la lutte génétique contre les parasites de la Tomate dans les pays méditerranéens. P.H.M. Revue Horticole, No. 303. Montpellier, FR  Laterrot, H., 1975: Sélection pour la résistance au Mildiou, Phytophthora infestans MONT. DE BARY chez la Tomate, Ann. Amelior. Plantes, 25 (2). pp.129-149  Laterrot, H., 1982: L’argenture de la Tomate. P.H.M. Revue Horticole, No. 225. Montpellier, FR. pp. 21/22  Laterrot, H., 1983: La lutte génétique contre la maladie des racines liégeuses de la Tomate, P.H.M. Revue Horticole, No. 238. Montpellier, FR. pp. 23-26  Laterrot, H., Blancard, D., 1983: Criblage d’une série de lignées et d’hybrides F1 de Tomate pour la résistance à la Stemphyliose, Phytopathologia Mediterranea, 22. Firenze, IT. pp. 188-193  Laterrot, H., Blancard, D., 1986: Les Stemphylia rencontrés sur la Tomate, Phytopathologia Mediterranea, 25. Firenze, IT. pp.140-144  Martin, G. B., Frary, A., Wu, T., Brommonschenkel, S., Chunwongse, J., Earle, E.D., Tanksley, S.D., 1994: A member of the tomato Pto family confers sensitivity to fenthion resulting in rapid cell death. The Plant Cell, 6. pp. 1543-1552  Morilla, et al., 2005: Phytopathology 95: 1089-1097  Smilde, W.D., Peters, D., 2007: Pathotyping TSWV in pepper and tomato. In: K. Niemirowicz-Szczytt (ed.), Progress in Research on Capsicum and Eggplant, Proceedings of Eucarpia Meeting. Warszawa, PL. pp. 231-236 | | |

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| |  |  | | --- | --- | | 10. | Technical Questionnaire | |
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| |  |  | | --- | --- | |  | Application date: (not to be filled in by the applicant) | | TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights | | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | | 1. | Subject of the Technical Questionnaire | | | | |  |  |  |  |  | |  | |  | | --- | | 1.1.1 | | Botanical name | |  | | --- | | *Solanum lycopersicum* L. | | |  | | --- | | [  ] | | |  |  |  |  |  | |  | |  | | --- | | 1.1.2 | | Common name | |  | | --- | | Cherry tomato, Tomato | |  | |  |  |  | |  | | --- | |  | |  | |  |  |  |  |  | |  | |  | | --- | | 1.2.1 | | Botanical name | |  | | --- | | *Solanum lycopersicum* L. x *Solanum cheesmaniae* (L. Ridley) Fosberg | | |  | | --- | | [  ] | | |  |  |  |  |  | |  | |  | | --- | | 1.2.2 | | Common name |  |  | |  |  |  | |  | | --- | |  | |  | |  |  |  |  |  | |  | |  | | --- | | 1.3.1 | | Botanical name | |  | | --- | | *Solanum lycopersicum* L.x *Solanum pimpinellifolium* L. | | |  | | --- | | [  ] | | |  |  |  |  |  | |  | |  | | --- | | 1.3.2 | | Common name |  |  | |  |  |  | |  | | --- | |  | |  | |  |  |  |  |  | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | | 2. | Applicant | | | | |  |  |  |  |  | |  | Name | |  |  | |  |  |  |  |  | |  | Address | |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  |  | |  | Telephone No. | |  |  | |  |  |  |  |  | |  | Fax No. | |  |  | |  |  |  |  |  | |  | E-mail address | |  |  | |  |  |  |  |  | |  | Breeder (if different from | |  |  | |  | applicant) | |  |  | |  |  |  |  |  | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | | 3. | Proposed denomination and breeder's reference | | | | |  |  |  |  |  | |  | Proposed denomination | |  |  | |  | (if available) | |  |  | |  |  |  |  |  | |  | Breeder's reference | |  |  | |  |  |  |  |  | |

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | TECHNICAL QUESTIONNAIRE | | | Page {x} of {y} | Reference Number: | |  | | | | | | |  | | --- | | #4. | | Information on the breeding scheme and propagation of the variety | | | | |  |  |  | | | |  | 4.1 | Breeding scheme | | | |  | Variety resulting from: | | | | |  | |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | | 4.1.1 | | |  | | --- | | Crossing | |  | | |  | | --- | | (a) | | |  | | --- | | controlled cross | | [ ] | | |  | | --- | | (b) | | |  | | --- | | partially known cross | | [ ] | | |  | | --- | | (c) | | |  | | --- | | unknown cross | | [ ] | |  |  | | | |  | | --- | | 4.1.2 | | |  | | --- | | Mutation  (please state parent variety) | | [ ] | |  |  | | |  |  | | | |  | | --- | | 4.1.3 | | |  | | --- | | Discovery and development  (please state where and when discovered and how developed) | | [ ] | |  |  | | |  |  | | | |  | | --- | | 4.1.4 | | Other (Please provide details) | [ ] | |  |  | | |  |  | | | | | | |

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| |  |  |  | | --- | --- | --- | |  |  |  | |  | 4.2 | Method of propagating the variety | |  | |  |  |  | | --- | --- | --- | | |  | | --- | | 4.2.1 | | |  | | --- | | Seed-propagated varieties | |  | | |  | | --- | | (a) | | |  | | --- | | Self-pollination | | [ ] | | |  | | --- | | (b) | | |  | | --- | | Hybrid | | [ ] | | |  | | --- | | (c) | | |  | | --- | | Inbred line | | [ ] | | |  | | --- | | (d) | | |  | | --- | | Other (please provide details) | | [ ] | |  |  |  | |  |  |  | |  |  |  | | |  | | --- | | 4.2.2 | | |  | | --- | | Vegetative propagation | |  | | |  | | --- | | (a) | | |  | | --- | | Cuttings | | [ ] | | |  | | --- | | (b) | | |  | | --- | | *In vitro* propagation | | [ ] | | |  | | --- | | (c) | | |  | | --- | | Other (state method) | | [ ] | |  |  |  | |  |  |  | |  |  |  | | |  | | --- | | 4.2.3 | | Other (Please provide details) | [ ] | |  |  |  | |  |  |  | |  |  |  | | | |  | |  |  | | --- | --- | | |  | | --- | |  | | | | |

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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 |
| --- | --- | --- | --- |
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| |  | | --- | | **5.1** |  |  | | --- | | **(2)** | | |  | | --- | | **Plant: growth type** | |  |  |
|  | |  | | --- | | determinate | | |  | | --- | | Rio Grande, Siluet | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | indeterminate | | |  | | --- | | Daniela, Florenteen, Marmande VR, Saint‑Pierre | | |  | | --- | | 2 [   ] | |
|  |  |  |  |
|  |  |  |  |
| |  | | --- | | **5.2** |  |  | | --- | | **(6)** | | |  | | --- | | **Only varieties with plant growth type indeterminate: Plant: height** | |  |  |
|  | |  | | --- | | very short | | |  | | --- | | Garderner's Delight, Maresme, Zadenna | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | very short to short | | |  | | --- | |  | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | short | | |  | | --- | | Delfine, Despina | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | short to medium | | |  | | --- | |  | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Brooklyn, Campari | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | medium to tall | | |  | | --- | |  | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | tall | | |  | | --- | | Climberley, Pitenza | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | tall to very tall | | |  | | --- | |  | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | very tall | | |  | | --- | | Goldwin, Romindo | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.3** |  |  | | --- | | **(10)** | | |  | | --- | | **Leaf: type** | |  |  |
|  | |  | | --- | | pinnate | | |  | | --- | | Matina | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | bipinnate | | |  | | --- | | Daniela, Saint‑Pierre | | |  | | --- | | 2 [   ] | |
|  |  |  |  |
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| |  | | --- | | **5.4** |  |  | | --- | | **(12)** | | |  | | --- | | **Leaf: intensity of green color** | |  |  |
|  | |  | | --- | | very light | | |  | | --- | |  | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | very light to light | | |  | | --- | |  | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | light | | |  | | --- | | Rossol | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | light to medium | | |  | | --- | |  | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Rebelski | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | medium to dark | | |  | | --- | |  | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | dark | | |  | | --- | | Daniela, Red Robin | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | dark to very dark | | |  | | --- | |  | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | very dark | | |  | | --- | |  | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.5** |  |  | | --- | | **(18)** | | |  | | --- | | **Pedicel: abscission layer** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Merlice, Rio Grande | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Daniela, Grownet, Montfavet 63-5 | | |  | | --- | | 9 [   ] | |
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|  | Characteristics | Example Varieties | Note |
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| |  | | --- | | **5.6** |  |  | | --- | | **(20)** | | |  | | --- | | **Immature fruit: green shoulder** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Geronimo | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Daniela, Montfavet 63-5 | | |  | | --- | | 9 [   ] | |
|  |  |  |  |
|  |  |  |  |
| |  | | --- | | **5.7** |  |  | | --- | | **(24)** | | |  | | --- | | **Immature fruit: green stripes** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Daniela, Guanche, Jasminia | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Green Zebra, Tigerella | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.8** |  |  | | --- | | **(25)** | | |  | | --- | | **Immature fruit: anthocyanin coloration** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Durinta | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | HN5003 | | |  | | --- | | 9 [   ] | |
|  |  |  |  |
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| |  | | --- | | **5.9** |  |  | | --- | | **(26)** | | |  | | --- | | **Fruit: size** | |  |  |
|  | |  | | --- | | very small | | |  | | --- | | Cerise, Sweet 100 | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | very small to small | | |  | | --- | | Dolcetini, Genio | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | small | | |  | | --- | | Brioso, Tankini | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | small to medium | | |  | | --- | | Larimar, Progress | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Mezcal, Oceano | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | medium to large | | |  | | --- | | Luminance, Rio Grande | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | large | | |  | | --- | | Carmello, Floradade | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | large to very large | | |  | | --- | | Florenteen, Grownet | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | very large | | |  | | --- | | Cupidissimo, Marsilia | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.10** |  |  | | --- | | **(28)** | | |  | | --- | | **Fruit: shape in longitudinal section** | |  |  |
|  | |  | | --- | | flattened | | |  | | --- | | Margold, Marmande VR | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | oblate | | |  | | --- | | Cartesio, Gloriette, Merlice, Montfavet 63-5 | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | circular | | |  | | --- | | Cerise, Soussia | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | oblong | | |  | | --- | | Landolino, Red Sky | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | cylindric | | |  | | --- | | Hypeel 244, Sir Elyan | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | elliptic | | |  | | --- | | Obock | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | cordate | | |  | | --- | | Cuor di Bue, Cupidissimo, Laureen, Valenciano | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | ovate | | |  | | --- | | Dualrow, Soto | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | obovate | | |  | | --- | | Duquesa, Estelle, Mezcal | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | pyriform | | |  | | --- | | Oceano, Olivenza, Operino | | |  | | --- | | 10 [   ] | |
|  | |  | | --- | | obcordate | | |  | | --- | | Cuore del Ponente, Ingrid | | |  | | --- | | 11 [   ] | |
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| |  | | --- | | **5.11** |  |  | | --- | | **(29)** | | |  | | --- | | **Fruit: ribbing** | |  |  |
|  | |  | | --- | | absent or very weak | | |  | | --- | | Cerise, Conchita | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | very weak to weak | | |  | | --- | |  | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | weak | | |  | | --- | | Baikonur, Guanche | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | weak to medium | | |  | | --- | |  | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Montfavet 63-5, Shourouq | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | medium to strong | | |  | | --- | |  | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | strong | | |  | | --- | | Marmalindo, Marmande VR, Marsilia | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | strong to very strong | | |  | | --- | |  | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | very strong | | |  | | --- | | Ingrid, Marsalato | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.12** |  |  | | --- | | **(36)** | | |  | | --- | | **Fruit: number of locules** | |  |  |
|  | |  | | --- | | only two | | |  | | --- | | Creativo, San Marzano 2, Tropical | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | two and three | | |  | | --- | | Bomfado, Orinade | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | three and four | | |  | | --- | | Durinta, Montfavet 63-5 | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | four, five or six | | |  | | --- | | Rovente, Tosmar, Tradiro | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | more than six | | |  | | --- | | Bronson, Chocostar, Marmande VR | | |  | | --- | | 5 [   ] | |
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| |  | | --- | | **5.13** |  |  | | --- | | **(37)** | | |  | | --- | | **Fruit: gel in locules** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Allflesh 1120, Nun 03560 | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Daniela, Rio Grande | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.14** |  |  | | --- | | **(38)** | | |  | | --- | | **Fruit: color** | |  |  |
|  | |  | | --- | | yellowish white | | |  | | --- | | Cream Sausage | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | yellow | | |  | | --- | | Babylor, Mimosa | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | orange | | |  | | --- | | Operino, Oranjestar | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | pink | | |  | | --- | | Framboo, Pink Wand, Tomimaru Muchoo | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | red | | |  | | --- | | Daniela, Ferline, Montfavet 63-5, Saint‑Pierre, Umaca | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | brown | | |  | | --- | | Chocostar, Marbruni | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | green | | |  | | --- | | Green Grape, Green Zebra | | |  | | --- | | 7 [   ] | |
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| |  | | --- | | **5.15** |  |  | | --- | | **(42)** | | |  | | --- | | **Fruit: firmness** | |  |  |
|  | |  | | --- | | very soft | | |  | | --- | | Marmande VR | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | very soft to soft | | |  | | --- | |  | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | soft | | |  | | --- | | Marinda, Marsalato | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | soft to medium | | |  | | --- | |  | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Rosannita, Sunita | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | medium to firm | | |  | | --- | |  | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | firm | | |  | | --- | | Losna, Octavio, Tradiro | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | firm to very firm | | |  | | --- | |  | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | very firm | | |  | | --- | | Brito, Daniela, Larimar, Lolek | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.16** |  |  | | --- | | **(44)** | | |  | | --- | | **Time of maturity** | |  |  |
|  | |  | | --- | | very early | | |  | | --- | | Goldwin, Pyremello, Sweet Baby, Trambellino | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | very early to early | | |  | | --- | | Delisher | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | early | | |  | | --- | | Lemonade, Shiren, Zorayda | | |  | | --- | | 3 [   ] | |
|  | |  | | --- | | early to medium | | |  | | --- | |  | | |  | | --- | | 4 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Delizia, Losna, Sonico | | |  | | --- | | 5 [   ] | |
|  | |  | | --- | | medium to late | | |  | | --- | |  | | |  | | --- | | 6 [   ] | |
|  | |  | | --- | | late | | |  | | --- | | Mariana, Saneh | | |  | | --- | | 7 [   ] | |
|  | |  | | --- | | late to very late | | |  | | --- | |  | | |  | | --- | | 8 [   ] | |
|  | |  | | --- | | very late | | |  | | --- | | Atago, Brito, Daniela, Raymos, Wafira | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.17** |  |  | | --- | | **(45)** | | |  | | --- | | **Resistance to *Meloidogyne incognita* (Mi)** | |  |  |
|  | |  | | --- | | absent or low | | |  | | --- | | Casaque Rouge | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | medium | | |  | | --- | | Campeon, Tyonic | | |  | | --- | | 2 [   ] | |
|  | |  | | --- | | high | | |  | | --- | | Anahu, Anahu x Casaque Rouge | | |  | | --- | | 3 [   ] | |
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| |  | | --- | | **5.18** |  |  | | --- | | **(46)** | | |  | | --- | | **Resistance to *Verticillium* sp. (Va and Vd) - Race 0** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Marmande verte, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Marmande VR, Monalbo | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.19** |  |  | | --- | | **(47)** | | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *lycopersici*  - Race 0EU/1US (Fol: 0EU/1US)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Marmande verte, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Anabel, Marporum, Marsol | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.20** |  |  | | --- | | **(48)** | | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *lycopersici*  - Race 1EU/2US (Fol: 1EU/2US)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Marmande verte, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Motelle | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.21** |  |  | | --- | | **(49)** | | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *lycopersici*  - Race 2EU/3US (Fol: 2EU/3US)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Marmande verte, Motelle | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Alliance, Ivanhoé | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.22** |  |  | | --- | | **(50)** | | |  | | --- | | **Resistance to *Fusarium oxysporum* f. sp. *radicis-lycopersici* (For)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Moneymaker, Motelle | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Momor | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.23** |  |  | | --- | | **(51)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race 0** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Antique, Pink Treat, Retinto, Sprigel, Triatlon | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.24** |  |  | | --- | | **(52)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race A** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker, Retinto | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Antique, Pink Treat, Sprigel, Triatlon | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.25** |  |  | | --- | | **(53)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race B** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker, Pink Treat | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Antique, Retinto, Sprigel, Triatlon | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.26** |  |  | | --- | | **(54)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race C** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker, Pink Treat, Retinto | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Antique, Sprigel, Triatlon | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.27** |  |  | | --- | | **(55)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race D** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker, Triatlon | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Antique, Pink Treat, Retinto, Sprigel | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.28** |  |  | | --- | | **(56)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race E** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Antique, Sprigel | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.29** |  |  | | --- | | **(57)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race F** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Chelino, Completo | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| **5.30 (58)** | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race H** | |  |  |
|  | |  | | --- | | absent | | Sprigel | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | Chelino, Completo | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
| |  | | --- | | **5.31** |  |  | | --- | | **(59)** | | |  | | --- | | **Resistance to *Passalora fulva* (Pf) - Race J** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Chelino, Completo | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Mogami | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.32** |  |  | | --- | | **(60)** | | |  | | --- | | **Resistance to *Tomato mosaic virus* - Strain 0 (ToMV: 0)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Mobaci, Mocimor, Momor, Moperou | | |  | | --- | | 9 [   ] | |
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| |  | | --- | | **5.33** |  |  | | --- | | **(61)** | | |  | | --- | | **Resistance to *Tomato mosaic virus* - Strain 1 (ToMV: 1)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Mobaci, Monalbo, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Mocimor, Momor, Moperou | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.34** |  |  | | --- | | **(62)** | | |  | | --- | | **Resistance to *Tomato mosaic virus* - Strain 2 (ToMV: 2)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker, Moperou | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Mobaci, Mocimor, Momor | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.35** |  |  | | --- | | **(63)** | | |  | | --- | | **Resistance to *Phytophthora infestans* (Pi)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Moneymaker, Saint‑Pierre | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Phantasia, Sixtina | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.36** |  |  | | --- | | **(64)** | | |  | | --- | | **Resistance to *Pseudopyrenochaeta lycopersici* (ex *Pyrenochaeta lycopersici)* (Pl)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Marmande verte | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Garance | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.37** |  |  | | --- | | **(65)** | | |  | | --- | | **Resistance to *Stemphylium* spp. (Ss)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Motelle | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.38** |  |  | | --- | | **(66)** | | |  | | --- | | **Resistance to *Pseudomonas syringae* pv. *tomato* (Pst)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Monalbo, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Fuzzer | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.39** |  |  | | --- | | **(67)** | | |  | | --- | | **Resistance to *Ralstonia solanacearum* – Race 1 (Rs: 1)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Floradel | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Caraïbo | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  | | --- | | **5.40** |  |  | | --- | | **(68)** | | |  | | --- | | **Resistance to *Tomato yellow leaf curl virus* (TYLCV)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Marmande, Moneymaker | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Delyca, Montenegro | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
|  |  |  |  |
|  |  |  |  |
| |  | | --- | | **5.41** |  |  | | --- | | **(69)** | | |  | | --- | | **Resistance to *Tomato spotted wilt virus* - Pathotype 0 (TSWV: 0)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Moneymaker, Montfavet 63-5, Mountain Magic | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Bodar, Mospomor | | |  | | --- | | 9 [   ] | |
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|  | Characteristics | Example Varieties | Note |
| --- | --- | --- | --- |
|  |  |  |  |
| |  | | --- | | **5.42** |  |  | | --- | | **(70)** | | |  | | --- | | **Resistance to *Leveillula taurica* (Lt)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Montfavet 63-5 | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Radiance | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
|  |  |  |  |
|  |  |  |  |
| |  | | --- | | **5.43** |  |  | | --- | | **(71)** | | |  | | --- | | **Resistance to *Pseudoidium neolycopersici* (ex *Oidium neolycopersici)*(Pn (ex On))** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Montfavet 63-5 | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Romiro | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
|  |  |  |  |
|  |  |  |  |
| |  | | --- | | **5.44** |  |  | | --- | | **(72)** | | |  | | --- | | **Resistance to *Tomato torrado virus* (ToTV)** | |  |  |
|  | |  | | --- | | absent | | |  | | --- | | Daniela | | |  | | --- | | 1 [   ] | |
|  | |  | | --- | | present | | |  | | --- | | Matias | | |  | | --- | | 9 [   ] | |
|  | |  | | --- | | not tested | | |  | | --- | |  | | |  | | --- | | [   ] | |
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| |  |  |  | | --- | --- | --- | | 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 | | | | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *Example* | |  | | --- | | *Immature fruit: green shoulder* | | |  | | --- | | *present* | | |  | | --- | | *absent* | | |  |  |  |  | |  |  |  |  | |  |  |  |  | | | |  | Comments: | |

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| |  |  |  | | --- | --- | --- | | 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    Other characteristics    (a) Fruits of the variety reach maturity                        yes [  ] / no [  ]    (b) LSL gene present                                                   yes [  ] / no [  ]    (c) LSL genetics                                                           homozygous RIN [  ] / heterozygous RIN [  ]                                                                                       homozygous NOR [  ] / heterozygous NOR [  ] /                                                                                       not known [  ] / other (please specify) [  ]      7.3.2   Special conditions for the examination of the variety    (a)        Type of culture:               - under glass [  ]                - in the open [  ]    (b) Main use:                 -fresh market or garden [  ]                 -industrial processing  [  ]                        - peel [  ]                        - paste  [  ]                        - other [  ]                 - pot plant  [  ]                 - rootstock  [  ]                 - other   [  ]    It is strongly recommended to add a representative colour image of the fruits of the variety to the TQ. | | | | | | |  |  |  |  |  | |

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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 8. | Authorization for release | | | | | |  | (a) | Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health? | | | | |  |  | Yes | [ ] | No | [ ] | |  | (b) | Has such authorization been obtained? | | | | |  |  | Yes | [ ] | No | [ ] | |  | If the answer to (b) is yes, please attach a copy of the authorization. | | | | | |  |  |  |  |  |  | |
| |  |  | | --- | --- | | |  | | --- | | 9. Information on plant material to be examined or submitted for examination | | |  | | 9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc. | |  | | |  | | --- | | 9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to: | | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | (a) | Microorganisms (e.g. virus, bacteria, phytoplasma) | Yes [ ] | No [ ] |  | |  | (b) | Chemical treatment (e.g. growth retardant, pesticide) | Yes [ ] | No [ ] |  | |  | (c) | Tissue culture | Yes [ ] | No [ ] |  | |  | (d) | Other factors | Yes [ ] | No [ ] |  | |  | Please provide details for where you have indicated “yes”. | | | |  | |  |  | | | |  | | |  | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 10. | I hereby declare that, to the best of my knowledge, the information provided in this form is correct: | | | | | |  |  |  |  |  |  | |  |  |  | | |  | |  | Applicant’s name |  | |  |  |  |  |  |  | |  | Signature |  | Date |  |  | |  |  |  | |  |  | |  |  |  |  |  |  | |
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