|  |  |  |
| --- | --- | --- |
|  |  | E  TWV/47/30  **ORIGINAL:**  English  DATE:  April 19, 2013 |
| INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS | | |
| Geneva | | |

Technical working party for vegetables

Forty-Seventh Session  
Nagasaki, Japan, May 20 to 24, 2013

Partial Revision of the test guidelines for MELON  
(Document TG/104/5)

Document prepared by experts from France and the Netherlands

The purpose of this document is to present the proposals for the partial revision of the Test Guidelines for Melon (document TG/104/5).

The following changes are proposed:

1. Revision of grouping characteristics, including the behavior against pathogens
2. a revised format for disease resistance characteristics according to the explanations for disease resistance characteristics in Test Guidelines and eventual new proposal to update the protocol
   * Chapter 5: Grouping of Varieties and Organization of the Growing Trial
   * Chapter 7: Table of Characteristics
   * Chapter 8: Explanations on the Table of Characteristics
     + 8.2 Explanations for individual characteristics
   * Chapter 10 : Technical Questionnaire
     + Paragraph 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).
     + Paragraph 7: Additional information which may help in the examination of the variety

The proposed revisions are presented in Annex I to this document.

Annex II to this document contains comments by the subgroup on the provisional draft of this document.

[Annex I follows]

Proposal for a Revision of the Grouping Characteristics in Chapter 5.3

*Current wording:*

(a) Inflorescence: sex expression (at full flowering) (characteristic 12)

(b) Fruit: shape in longitudinal section (characteristic 28)

(c) Fruit: ground color of skin (characteristic 29)

(d) Fruit: warts (characteristic 38)

(e) Fruit: grooves (characteristic 43)

(f) Fruit: cork formation (characteristic 48)

(g) Fruit: main color of flesh (characteristic 54)

(h) Seed: length (characteristic 60)

(i) Seed: color (characteristic 63)

*Proposed new wording:*

(a) Inflorescence: sex expression (at full flowering) (characteristic 12)

(b) Fruit: shape in longitudinal section (characteristic 28)

(c) Fruit: ground color of skin (characteristic 29)

(d) Fruit: warts (characteristic 38)

(e) Fruit: grooves (characteristic 43)

(f) Fruit: cork formation (characteristic 48)

(g) Fruit: main color of flesh (characteristic 54)

(h) Seed: length (characteristic 60)

(i) Seed: color (characteristic 63)

(j) Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 0 (characteristic 69.1)

(k) Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 1 (characteristic 69.2)

(l) Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 2 (characteristic 69.3)

Proposal to revise Characteristics 69 to 76

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69.  (+) | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* | Résistance à *Fusarium oxysporum* f. sp. *melonis* | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* | Resistencia al *Fusarium oxysporum* f. sp. *melonis* |  |  |
| **QL** |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **69.1** |  | **Race 0** | **Pathotype 0** | **Pathotyp 0** | **Raza 0** |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2 | 1 |
|  |  | present | présente | vorhanden | presente | Jador, Joker, Védrantais | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.2 |  | Race 1 | Pathotype 1 | Pathotyp 1 | Raza 1 |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2, Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Jador, Joker | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.3 |  | Race 2 | Pathotype 2 | Pathotyp 2 | Raza 2 |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2, Joker | 1 |
|  |  | present | présente | vorhanden | presente | Jador, Védrantais | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **69.4   (+)** |  | Race 1-2 | Pathotype 1-2 | Pathotyp 1-2 | Raza 1-2 |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2 Joker, Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Jador | 9 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69.  (+) | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* | Résistance à *Fusarium oxysporum* f. sp. *melonis* | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* | Resistencia al *Fusarium oxysporum* f. sp. *melonis* |  |  |
| **QL** |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.1  (\*) |  | **Race 0** | **Race 0** | **Pathotyp 0** | **Raza 0** |  |  |
|  |  | absent | absente | fehlend | ausente | Charentais T,  Jaune Canari 2 | 1 |
|  |  | present | présente | vorhanden | presente | Charentais Fom-2, Jador, Védrantais, | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.2  (\*) |  | Race 1 | Race 1 | Pathotyp 1 | Raza 1 |  |  |
|  |  | absent | absente | fehlend | ausente | Charentais T,  Jaune Canari 2, Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Arapaho,  Charentais Fom-2, Jador, Rubbens | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.3  (\*) |  | Race 2 | Race 2 | Pathotyp 2 | Raza 2 |  |  |
|  |  | absent | absente | fehlend | ausente | Arapaho, Charentais Fom-2, Charentais T,  Jaune Canari 2, Rubbens | 1 |
|  |  | present | présente | vorhanden | presente | Anasta, Cléo, Jador, Védrantais, | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **69.4   (+)** |  | **Race 1-2** | **Race 1-2** | **Pathotyp 1-2** | **Raza 1-2** |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2, Védrantais, Virgos | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Lunasol | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Dinéro, Isabelle | 3 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 70.  (+)  QN | VG | Resistance to *Sphaerotheca fuliginea* *(Podosphaera xanthii)* (Powdery mildew) | Résistance à *Sphaerotheca fuliginea* *(Podosphaera xanthii)* (oïdium) | Resistenz gegen *Sphaerotheca fuliginea* *(Podosphaera xanthii* (Echter Mehltau) | Resistencia a *Sphaerotheca fuliginea* *(Podosphaera xanthii)* (Oidio) |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.1** |  | **Race 1** | **Pathotype 1** | **Pathotyp 1** | **Raza 1** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Alpha, Boneto, Delta, Jerac | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Escrito | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Cézanne, Anasta, Théo | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.2** |  | **Race 2** | **Pathotype 2** | **Pathotyp 2** | **Raza 2** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Boneto, Galoubet | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Flores, Enzo, Escrito | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Anasta, Cézanne, Théo | 3 |
| **70.3** |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
|  |  | **Race 5** | **Pathotype 5** | **Pathotyp 5** | **Raza 5** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Enzo, Flores | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Gaetano, Lucas, Théo | 3 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 70.  (+)  QN | VG | Resistance to *Podosphaera xanthii (Sphaerotheca fuliginea)* (Powdery mildew) | Résistance à *Podosphaera xanthii (Sphaerotheca fuliginea)* (oïdium) | Resistenz gegen *Podosphaera xanthii (Sphaerotheca fuliginea)* (Echter Mehltau) | Resistencia a *Podosphaera xanthii (Sphaerotheca fuliginea)* (Oidio) |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.1** |  | **Race 1** | **Race 1** | **Pathotyp 1** | **Raza 1** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Jaune Canari 2, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Escrito | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Anasta,Cézanne,  PMR45, PMR5, Edisto47 | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.2** |  | **Race 2** | **Race 2** | **Pathotyp 2** | **Raza 2** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Galoubet, PMR45, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Escrito, Pendragon | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Anasta, Cézanne, Edisto47, PMR45 | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **NEW (FR-1) 70.\*\*** |  | **Race 3** | **Race 3** | **Pathotyp 3** | **Raza 3** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | PMR5, PMR45, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Nettuno, WMR29 | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Batista, Edisto47, Godiva | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.3** |  | **Race 5** | **Race 5** | **Pathotyp 5** | **Raza 5** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Védrantais, Edisto47 | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Hugo, Pendragon | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Arapaho, PMR5 | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **NEW (NL-1) 70.\*\*** |  | **Race 3-5** | **Race 3-5** | **Pathotyp 3-5** | **Raza 3-5** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | Edisto47, PMR5, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Cisco | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | SVI0105, 90625 | 3 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **71.  (+)** | **VG** | **Resistance to *Erysiphe cichoracearum* *(Golovinomyces cichoracearum)*  Race 1 (Powdery mildew)** | **Résistance à *Erysiphe cichoracearum* *(Golovinomyces cichoracearum)*  Pathotype 1 (oïdium)** | **Resistenz gegen *Erysiphe cichoracearum* *(Golovinomyces cichoracearum)*  Pathotyp 1 (Echter Mehltau)** | **Resistencia a *Erysiphe cichoracearum* *(Golovinomyces cichoracearum)*  Raza 1 (Oidio)** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Bastion, Boneto | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Flores, Anasta | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Cézanne, Heliobel, Théo | 3 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **71.  (+)** | **VG** | **Resistance to *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum)*  Race 1 (Powdery mildew)** | **Résistance à *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum)* Race 1 (oïdium)** | **Resistenz gegen *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum* Pathotyp 1 (Echter Mehltau)** | **Resistencia a *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum)* Raza 1 (Oidio)** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Edisto47, Escrito, Score, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Anasta | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Heliobel, PMR45, 90625 | 3 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 72.  (+) | VG | Resistance to colonization by *Aphis gossypii* | Résistance à la colonisation par *Aphis gossypii* | Resistenz gegen Befall durch *Aphis gossypii* | Resistencia a la colonización por *Aphis gossypii* |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Charentais | 1 |
|  |  | present | présente | vorhanden | presente | AR, Margot, Top Mark | 9 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 72.  (+) | VG | Resistance to colonization by *Aphis gossypii* | Résistance à la colonisation par *Aphis gossypii* | Resistenz gegen Befall durch *Aphis gossypii* | Resistencia a la colonización por *Aphis gossypii* |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | AR Hale’s Best Jumbo,  AR Top Mark, Godiva, Heliobel, Virgos | 9 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 73.  (+) | VG | Resistance to Zucchini Yellow Mosaic Virus (ZYMV) Race F | Résistance au virus de la mosaïque jaune de la courgette (ZYMV) Pathotype F | Resistenz gegen Zucchinigelb-mosaikvirus (ZYMV), Pathotyp F | Resistencia al virus del mosaico amarillo del calabacín (ZYMV) Raza F |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Alpha, Boule d’Or, Cantor, Doublon | 1 |
|  |  | present | présente | vorhanden | presente | Eloro, Hermes, Védrantais | 9 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 73.  (+) | VG | Resistance to *Zucchini yellow mosaic virus* (ZYMV) |  |  |  |  |  |
|  |  | **If use of a F type strain (ie: strain 13.18Fn)** |  |  |  |  |  |
| **QL** |  | Susceptibility reaction: **mosaic** |  |  |  | Védrantais | 1-a |
|  |  | Systemic hypersusceptibility: **slow flacida necrosis** |  |  |  | ~~Cantor~~ | 1-b |
|  |  | Systemic hypersusceptibility: **fast** **flacida necrosis** |  |  |  | ~~Doublon~~, Galoubet, Génésis, Helios | 1-c |
|  |  | Localised hypersusceptibility: **local necrosis** |  |  |  | Lunaduke, PI414723, Polinyka | 9 |
|  |  | **If use of a NF type strain (ie: strain E15)** |  |  |  |  |  |
| **QL** |  | Susceptibility reaction: **mosaic** |  |  |  | Galoubet, Génésis, Helios, Védrantais | 1 |
|  |  | Localised hypersusceptibility: **local necrosis** |  |  |  | Lunaduke, PI414723, Polinyka | 9 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **74.   (+)** | **VG** | **Resistance to Papaya Ring Spot Virus (PRSV)** | **Résistance au virus des taches annulaires du papayer** | **Resistenz gegen Papayaringflecken-virus (PRSV)** | **Resistencia al virus de la mancha anular del papayo (PRSV)** |  |  |
| **QL** |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **74.1** |  | **Race GVA** | **Pathotype GVA** | **Pathotyp GVA** | **Raza GVA** |  |  |
|  |  | absent | absente | fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | WMRV 29, 72025 | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **74.2** |  | **Race E2** | **Pathotype E2** | **Pathotyp E2** | **Raza E2** |  |  |
|  |  | absent | absente | fehlend | ausente | Védrantais, 72025 | 1 |
|  |  | present | présente | vorhanden | presente | WMRV 29 | 9 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **74.   (+)** | **VG** | **Resistance to *Papaya ringspot virus* (PRSV)** | **Résistance au virus des taches annulaires du papayer** | **Resistenz gegen Papayaringflecken-virus (PRSV)** | **Resistencia al virus de la mancha anular del papayo (PRSV)** |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **74.1** |  | **Guadeloupe strain** | **Souche Guadeloupe** | **Pathotyp Guadeloupe** | **Cepa Guadeloupe** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | PI414723, WMR29, 72.025, | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **74.2** |  | **E2 strain** | **Souche E2** | **Pathotyp E2** | **Cepa E2** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | PI414723, Védrantais, 72.025, | 1 |
|  |  | present | présente | vorhanden | presente | WMR29 | 9 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 75.  (+) | VG | Resistance to Muskmelon Necrotic Spot Virus (MNSV) Race E8 | Résistance au virus de la criblure du melon (MNSV) Pathotype E8 | Resistenz gegen Netzmelonen-nekrosefleckenvirus (MNSV), Pathotyp E8 | Resistencia al virus del cribado del melón (MNSV) Raza E8 |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Primal, VA 435 | 9 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **75.  (+)** | **VG** | **Resistance to *Melon necrotic spot virus* (MNSV) E8 strain** | **Résistance au virus de la criblure du melon (MNSV) Souche E8** | **Resistenz gegen Netzmelonen-nekrosefleckenvirus (MNSV) Pathotyp E8** | **Resistencia al virus del cribado del melón (MNSV) Raza E8** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Cyro, PMR5, Primal,  VA 435, Yellow Fun, Virgos | 9 |

*Current wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 76.  (+) | VG | Resistance to Cucumber Mosaic Virus (CMV) | Résistance au virus de la mosaïque du concombre (CMV) | Resistenz gegen Gurkenmosaikvirus (CMV) | Resistencia al virus del mosaico del pepino (CMV) |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Cézanne, Dalton | 1 |
|  |  | present | présente | vorhanden | presente | Lunaduke | 9 |

*Proposed new wording:*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **76.  (+)** | **VG** | **Resistance to *Cucumber mosaic virus* (CMV)** | **Résistance au virus de la mosaïque du concombre (CMV)** | **Resistenz gegen Gurkenmosaikvirus (CMV)** | **Resistencia al virus del mosaico del pepino (CMV)** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Virgos, PI61375, Lunaduke | 9 |

Proposal to Include a Revised Format for Disease Resistance Characteristics

Please see next page, current and proposed new wording are presented on opposite pages.

Proposal to Include a Revised Format for Disease Resistance Characteristics

(Current and Proposed New Wording are presented on opposite pages)

*Current wording:*

Ads. 69.1 - 69.3: Resistance to *Fusarium oxysporum* f. sp. *melonis,* races 0, 1 and 2

Maintenance of races

Type of medium: on agar medium at 22 to 25°C

Special conditions: transplantation of races each month

Execution of test

Growth stage of plants: cotyledons expanded

Temperature: 24°C during day, 18°C during night

Light: 10 - 12 hours per day

Growing method: Petri dishes in climatic chambers

Method of inoculation: soaking of the root system in a suspension of liquid medium of fungus

Duration of test

- from sowing to inoculation: 10-15 days

- from inoculation to reading: 20 days, death of susceptible plants

Number of plants tested: 30 plants

Remarks: plants raised and transplanted in sterilized sand, irrigation with nutrient solution

*Proposed new wording:*

Ads. 69.1 - 69.3: Resistance to *Fusarium oxysporum* f. sp. *melonis,* races 0, 1 and 2**(Fom)**

|  |  |
| --- | --- |
| 1. Pathogen | *Fusarium oxysporum* f. sp. *melonis* |
| 2. Quarantine status | no |
| 3. Host species | *Cucumis melo* |
| 4. Source of inoculum | GEVES (FR), Naktuinbouw (NL) |
| 5. Isolate | Fom: 0, Fom: 1, Fom: 2 |
| 6. Establishment isolate identity | use differential varieties: Charentais T, Védrantais,  Charentais -Fom 2, (Isabelle, Jador) |
| 7. Establishment pathogenicity | use susceptible melon varieties |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium | on agar medium – e.g.Potato Dextrose Agar |
| 8.2 Multiplication variety |  |
| 8.3 Plant stage at inoculation |  |
| 8.4 Inoculation medium | on liquid medium |
| 8.5 Inoculation method |  |
| 8.6 Harvest of inoculum |  |
| 8.7 Check of harvested inoculum |  |
| 8.8 Shelflife/viability inoculum |  |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 20 |
| 9.2 Number of replicates |  |
| 9.3 Control varieties |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Varieties | Gene | Race 0 | Race 1 | Race 2 |
| **Charentais T** |  | S | S | S |
| **Védrantais** | *Fom-1* | R | S | R |
| **Charentais Fom-2** | *Fom-2* | R | R | S |
| (Isabelle, Jador) |  | R | R | R |

|  |  |
| --- | --- |
| 9.4 Test design |  |
| 9.5 Test facility | glasshouse or climatic room |
| 9.6 Temperature | 18-25°C |
| 9.7 Light | 12h |
| 9.8 Season | all seasons |
| 9.9 Special measures | Optional: shading (no direct sunlight during 12 h after inoculation |
| 10. Inoculation |  |
| 10.1 Preparation inoculum | aerated culture 7-10 days, eg. Czapek Dox broth  some isolates need filtration or centrifugation  resuspend the pelleted spores in demineralized water |
| 10.2 Quantification inoculum | spore count; adjust to 106 -107 per mL |
| 10.3 Plant stage at inoculation | cotyledon expanded |
| 10.4 Inoculation method | soaking of the root system in a suspension of liquid medium of fungus  At least 30sec - 5 min |
| 10.5 First observation | 7 dpi |
| 10.6 Second observation | 14 -20 dpi |
| \*10.7 Final observations | 20 dpi |
| 11. Observations |  |
| 11.1 Method | visual, comparative |
| 11.2 Observation scale |  |
| [1] Susceptible | Growth retardation in combination with yellowing or wilting cotyledons (useful for judging the severity of the attack), Optional: internal vessel browning, death of plant. |
| [9] Resistant | No symptoms |
| 11.3 Validation of test | on standards |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states | QL |
| 13. Critical control points | For Race 1.2 the modified protocol on the next page should be used |

*Current wording:*

Ad. 69.4: Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 1-2

Maintenance of races

Type of medium: on agar medium at 22  to 25°C

Special conditions: transplantation of races each month

Execution of test

Growth stage of plants: cotyledons expanded

Temperature: 24°C during day, 18°C during night

Light: 12 hours per day

Growing method: dishes in climatic chambers

Method of inoculation: absorption of 700 ml of a very diluted (30 to 50 times) fungus culture

Duration of test

- from sowing to inoculation: 10 to 15 days

- from inoculation to reading: 3 weeks, until the death of the susceptible control

Number of plants tested: 30 plants

Remarks: a moderately aggressive type of race 1-2 should be used as this is likely to show the difference between the presence and absence of resistance most clearly.

*Proposed new wording:*

Ad. 69.4: Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 1-2 **(Fom)**

|  |  |
| --- | --- |
| 1. Pathogen | *Fusarium oxysporum* f. sp. *melonis* |
| 2. Quarantine status | no |
| 3. Host species | *Cucumis melo* |
| 4. Source of inoculum | GEVES (FR), Naktuinbouw (NL) |
| 5. Isolate | Fom: 1.2 (moderately aggressive): TST strain |
| 6. Establishment isolate identity | use differential varieties: susceptible:Védrantais, Virgos, moderately resistant : Lunasol, highly resistant Isabelle, Dinéro |
| 7. Establishment pathogenicity | use susceptible melon varieties |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium | on agar medium e.g. Potato Dextrose Agar |
| 8.2 Multiplication variety |  |
| 8.3 Plant stage at inoculation |  |
| 8.4 Inoculation medium | on liquid medium |
| 8.5 Inoculation method |  |
| 8.6 Harvest of inoculum |  |
| 8.7 Check of harvested inoculum |  |
| 8.8 Shelflife/viability inoculum |  |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 30  Remarks: It is a quantitative trait: necessity of replications, a sufficiently large number of plants to allow the use of a statistical analysis to determine if the level of resistance is significantly different or not from Lunasol. |
| 9.2 Number of replicates |  |
| 9.3 Control varieties |  |
| [1] susceptible | Virgos, Védrantais |
| [2] moderately resistant | Lunasol (the lowest accepted level) |
| [3] highly resistant | Isabelle, Dinéro, Jador |
| 9.4 Test design |  |
| 9.5 Test facility | glasshouse or climatic room |
| 9.6 Temperature | 18-25°C |
| 9.7 Light | at least 12h |
| 9.8 Season | All seasons in a climatic room / in a greenhouse: be aware of the strong environmental effect: winter could be too severe and summer could be too mild. |
| 9.9 Special measures | Optional shading (no direct sunlight during 12 h after inoculation) |
| 10. Inoculation |  |
| 10.1 Preparation inoculum | aerated culture 7-10 d old – e.g.: Czapek Dox broth |
| 10.2 Quantification inoculum | spore count; adjust to 2.104 - 105 per ml |
| 10.3 Plant stage at inoculation | cotyledons expanded |
| 10.4 Inoculation method | Soaking of the trays in spore suspension; 700 ml for a tray with 25 - 30 plants, plants are not uprooted |
| 10.5 First observation | 7 - 14 dpi |
| 10.6 Second observation | 14 - 21 dpi |
| \*10.7 Final observations | 21- 28 dpi |
| 11. Observations |  |
| 11.1 Method | Visual, comparative |
| 11.2 Observation scale | Symptoms: |
| [1] susceptible | Védrantais: Growth retardation, yellow cotyledons, drying, internal vessel browning (optional), death of the plant |
| [2] moderately resistant | Symptoms may be present, but the level of expression must be distinctly lower than the susceptible control variety.  = the lowest level of resistance is defined by the behavior of Lunasol |
| [3] highly resistant | Symptoms may be present, but the level of expression must be distinctly lower (interest of replication / statistical analysis) than the moderately control variety Lunasol. |
| 11.3 Validation of test | on standards; Lunasol is intermediate and will show a percentage of diseased plants (quantitative evaluation) |
| 11.4 Off-types | Calibrate with Lunasol |
| 12. Interpretation of data in terms of  UPOV characteristic states | QN |
| 13. Critical control points | a moderately aggressive type of Fom: 1.2 should be used as this is likely to show the difference between the presence and absence of resistance most clearly |
|  | There are two types of *Fusarium oxysporum* f. sp. *melonis,* Fom:1.2, viz. Fom: 1.2y which is a yellowing type with yellowing symptoms on leaves and another type and Fom: 1.2w which is a wilt type with wilting symptoms on leaves. |

*Current wording:*

Ads. 70.1 to 70.3: Resistance to *Sphaerotheca fuliginea (Podosphaera xanthii),* races 1, 2 and 5

Ad. 71: Resistance to *Erysiphe cichoracearum (Golovinomyces cichoracearum),* race 1

1. Inoculum

Production of cotyledons

Cotyledons to be inoculated and tested: sow the seed in disinfected peat inside a closed mini glasshouse. When the cotyledons have expanded, remove them from the plant.

Desinfect the cotyledons by soaking them for 3 minutes in a mercuric chloride solution (0.05%). Rinse them twice with sterilized water. Dry the cotyledons with sterile paper towel, then place them in Petri dishes with the following medium:

sucrose 10 g

mannitol 20 g

agar 5 g

distilled water 1 liter

Propagation of the strains

Scatter conidia on the cotyledons and blow them. Incube the inoculated cotyledons in Petri dishes at 23oC during 14 hours in the light and at 18oC during 10 hours in the dark.

9 to 11 days after the inoculation, the cotyledons will be covered with spores and can be used as an inoculum.

Maintenance of races

Type of medium: on inoculated cotyledons

Special conditions: 17oC, under very low light intensity. Maximum storage time is 1 to 1.5 months, after the inoculation.

2. Execution of Test

Inoculation on leaf disks (to be used as routine method)

Leaf disks, 2 cm in diameter, are taken from young plants and placed in polystyrene boxes (180 x 125 mm, 54 leaf disks per box) on a medium (mannitol 40g/l, benzamidazole 30 mg/l, agar 4 g/l). The leaf disks are inoculated by placing the boxes at the base of an inoculation tower (height: 1.00 m, diameter 0.25 m).

A cotyledon, already covered with inoculum, is placed on the top of the tower and blown with a Pasteur pipette to detach spores. Wait 1 to 2 minutes so that the conidia fall down through the tower onto the leaf discs. The leaf disks are kept for 24 hours in the dark by covering the boxes with a black polyethylene sheet. The boxes are then placed in a climatised chamber (20oC in the light for 14 hours; 24oC in the dark, for 10 hours per day).

Duration of test/Number of plants

- from inoculation to reading: 10 days

- number of plants tested: 5

Scoring

*Strongly resistant varieties (Note 3)*

0 no development of the fungi

1 isolated colonies (less than 10% of the disk surface)

*Moderately resistant varieties* (especially for *Erysiphe cichoracearum*

*(Golovinomyces cichoracearum)) (Note 2)*

2 isolated colonies (more than 10 % of the disk surface)

3 all the disk surface is covered with weak sporulation

*Susceptible varieties (Note 1)*

4 sporulation on all the disk surface

5 intense sporulation

Inoculation on young plants (to be used as a complementary method to the disk method, if necessary)

Take spores from a cotyledon already covered with conidia and deposit them on a leaf taken from a young plant. You can also proceed by blowing the spores from a cotyledon by the method mentioned above.

Scoring

*Strongly resistant varieties (Note 3)*

0 no development of the fungi

1 isolated colonies (less than 10% of the leaves)

*Moderately resistant varieties* (especially for *Erysiphe cichoracearum*

*(Golovinomyces cichoracearum)) (Note 2)*

3 isolated colonies (more than 10% of the leaves)

5 weak sporulation

*Susceptible varieties (Note 1)*

7 medium sporulation

9 intense sporulation

3. Host differentials

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Sphaerotheca fuliginea*  (*Podosphaera xanthii)*** | | | | | ***Erysiphe cichoracearum (Golovinomyces cichoracearum)*** | | |
|  | **race 0** | **race 1** | **race 2** | **race 4** | **race 5** | **race 0** | **race 1** |
| Iran H | S | S | S | S | S | S | S |
| Védrantais | R | S | S | S | S | R | S |
| PMR 45 | R | R | S | S | S | R | S |
| WMR 29 | R | R | R | S | S | R | S |
| Edisto 47 | R | R | R | R | S | R | R |
| MR-1, PI 124112 | R | R | R | R | R | R | R |
| PMR 5 |  |  |  |  |  |  |  |
| Nantais Oblong | R | S | S | S | S | R | R |

S: susceptible (high sporulation) R: resistant (low sporulation)

*Proposed new wording:*

Ads. 70.1 to 70.3: Resistance to *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Powdery mildew)Px (Sf)

Ad. 71: Resistance to *Golovinomyces cichoracearum (Erysiphe cichoracearum),* race 1 (Powdery mildew) Gc (Ec)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Pathogen | | | | | Powdery mildew**:** *Podosphaera xanthii* (*Spaerotheca fuliginea*) races 1, 2 and 5  *Golovinomyces cichoRacearum* (*Erysiphe cichoracearum*) race 1 | | | | | | |
| 2. Quarantine status | | | | | no | | | | | | |
| 3. Host species | | | | | *Cucumis melo* | | | | | | |
| 4. Source of inoculum | | | | | GEVES (FR) | | | | | | |
| 5. Isolate | | | | | Px : races 1, 2, 3, 5 and 3-5; Gc : race 1 | | | | | | |
| 6. Establishment isolate identity | | | | | on differentials: | | | | | | |
|  | | | | |  | | | | | | |
|  | **Powdery Mildew** | | | | | | | | | | |
|  | ***Podosphaera xanthii*  (*Sphaerotheca fuliginea)*** | | | | | | | | ***Golovinomyces cichoracearum (Erysiphe cichoracearum)*** | | |
|  | **race 0** | **race 1** | **race 2** | | **~~race 4~~** | **race 3** | **race 5** | **race 3-5** | **race 0** | **race 1** | |
| Iran H | S | S | S | | ~~S~~ |  | S |  | S | S | |
| **Védrantais** | R | S | S | | ~~S~~ | S | S | S | R | S | |
| **Nantais Oblong** | R | S | S | | ~~S~~ | S | S | S | R | **R** | |
| **PMR 45** | R | **R** | S | | ~~S~~ | S | S | S | R | S | |
| **WMR 29** | R | **R** | **R** | | ~~S~~ | **R** | S | S | R | S | |
| **Edisto 47** | R | **R** | **R** | | ~~R~~ | **R** | S | S | R | S | |
| **PI 124112** | R | **R** | **R** | | ~~R~~ | **R** | **R** | **R** | R | **R** | |
| **PMR 5** | R | **R** | **R** | | ~~R~~ | S | **R** | S | R | **R** | |
| **AR Hale’s Best Jumbo** |  |  |  | |  |  |  | **R** |  |  | |

Legend: S susceptible (high sporulation); , R resistant (low sporulation)

|  |  |
| --- | --- |
| 7. Establishment pathogenicity | use susceptible melon varieties |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium | Detached cotyledon in Petri-dish on 0.35 - 0,5 % Agar, 1-2% mannitol, optional: 1% sucrose |
| 8.2 Multiplication variety | susceptible varieties |
| 8.3 Plant stage at inoculation | Young, unfolded cotyledon; decontaminated with e.g. 0,05% mercuric chloride or 3 à 5%.bleach (NaClO + NaCl) |
| 8.4 Inoculation medium | Air |
| 8.5 Inoculation method | Scatter conidia on the cotyledons transferred by blowing |
| 8.6 Harvest of inoculum | use cotyledons with strong sporulation |
| 8.7 Check of harvested inoculum | check presence of spores |
| 8.8 Shelflife/viability inoculum | on cotyledon, 17-23oC, under very low light intensity. Maximum storage time is 15 days, after the inoculation  Remark: In case of longer term preservation, inoculate locally with a few spores, store at 14°C/12h low light per day |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 16 plants |
| 9.2 Number of replicates |  |
| 9.3 Control varieties | Host differentials: table given in paragraph 6 |
| 9.4 Test design | Leaf discs placed on 0,4% agar with 1- 4% mannitol and (optional) 0,003% benzimidazol |
| 9.5 Test facility | climatic room |
| 9.6 Temperature | 20-24°C |
| 9.7 Light | Optional 24 h darkness after inoculation - at least 12h |
| 9.8 Season |  |
| 9.9 Special measures | Inoculation tower needed for even distribution of dry spores |
| 10. Inoculation |  |
| 10.1 Preparation inoculum |  |
| 10.2 Quantification inoculum |  |
| 10.3 Plant stage at inoculation | Routine method: Leaf disks, 2 cm in diameter, from young plants.  Complementary method, if necessary: young plants |
| 10.4 Inoculation method | Routine method: on leaf disks: inoculation tower needed for even distribution of dry spores.  Complementary method: Take spores from a cotyledon covered with conidia and deposit them on a leaf or blow the spores from a cotyledon. |
| 10.5 First observation | 8-10 dpi |
| 10.6 Second observation |  |
| \*10.7 Final observations | 11-12 dpi |
| 11. Observations |  |
| 11.1 Method | visual |
| 11.2 Observation scale |  |
| [1] susceptible | Medium or intense sporulation all over the leaf disc surface |
| [2] intermediate | Weak sporulation all over the surface or isolated colonies on more than 10 % of the surface |
| [3] resistant | Isolated colonies on less than 10 % of the surface or no sporulation |
| 11.3 Validation of test | on controls |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states | QN |
| 13. Critical control points |  |

*Current wording:*

Ad. 72: Resistance to colonization by *Aphis gossypii*

Maintenance of strain

Maintenance and multiplication: on susceptible variety (Védrantais)

Special conditions: low aphid density to avoid having too many winged types. “Synchronous”-type breeding in order to have only aphids of the same age and, therefore, at the same growing stage on a plant

Conduct of the test

Plant stage: 1st leaf measuring 2-3 cm

Temperature: 21oC

Light: 16 hours per day

Planting: plants sown in sand, pricked out at cotyledon stage in compost-filled pots

Manner of inoculation: deposit of ten adult wingless aphid per plant

Duration of test:

- from sowing to inoculation: 15-18 days

- from inoculation to reading: one day

Number of plants tested: 30

Recording: - Resistance present = less than 7 adult aphids per plant; eggs rare.

- Resistance absent = 9 or 10 adult aphids per plant; eggs frequent.

- Record number of aphids per plant, 24 hours after inoculation.

*Proposed new wording:*

Ad. 72: Resistance to colonization by *Aphis gossypii*

|  |  |
| --- | --- |
| 1. Pathogen | *Aphis gossypii* |
| 2. Quarantine status | no |
| 3. Host species | *Cucumis melo* |
| 4. Source of inoculum | INRA GAFL (FR) |
| 5. Isolate | NM1 clone |
| 6. Establishment isolate identity |  |
| 7. Establishment pathogenicity | on susceptible plants |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium | living plant (obligate parasite), e.g. young plants of Melon or Cucumber |
| 8.2 Multiplication variety | on susceptible variety (Védrantais, Corona, Ventura) |
| 8.3 Plant stage at inoculation | at first leaf (measuring around 2-3 cm) |
| 8.4 Inoculation medium |  |
| 8.5 Inoculation method | deposit ten adult wingless aphids per plant or a piece of infested leaf (visual appreciation) |
| 8.6 Harvest of inoculum |  |
| 8.7 Check of harvested inoculum |  |
| 8.8 Shelflife/viability inoculum |  |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | 30 |
| 9.2 Number of replicates |  |
| 9.3 Control varieties |  |
| [1] susceptible | Védrantais |
| [9] resistant | AR Top Mark, AR Hale’s Best Jumbo, Virgos |
| 9.4 Test design |  |
| 9.5 Test facility |  |
| 9.6 Temperature | 21-24°C day/16-20°C night |
| 9.7 Light | 16 hours per day |
| 9.8 Season |  |
| 9.9 Special measures |  |
| 10. Inoculation |  |
| 10.1 Preparation inoculum |  |
| 10.2 Quantification inoculum | optional: 10 adult wingless aphid per plant |
| 10.3 Plant stage at inoculation | 1st leaf measuring around 2-3 cm |
| 10.4 Inoculation method | optional: deposit of ten adult wingless aphids per plant or by deposit of a piece of infested leaf |
| 10.5 First observation | 1-4 dpi |
| \*10.6 Final observation | 5- 10 dpi |
| 11. Observations |  |
| 11.1 Method | visual, to compare with standards |
| 11.2 Observation scale |  |
| [1] susceptible: Védrantais | 9 or 10 adult aphids per plant; larvae frequent, plants covered with aphids, shriveled leaves |
| [9] resistant: AR Top Mark, AR Hale’s Best Jumbo Virgos | less than 7 adult aphids per plant; larvae rare.  Remark: counting is not compulsory, it can be a visual assessment of the respective level of colonization. |
| 11.3 Validation of test | on standards |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states | QL |
| 13. Critical control points | low aphid density to avoid having too many winged types. “Synchronous”-type breeding in order to have only aphids of the same age and, therefore, at the same growing stage on a plant.  Normally *Aphis gossypii* is viviparous, but sometimes (autumn, on particular crops) may produce eggs. |

*Current wording:*

Ad. 73: Resistance to Zucchini Yellow Mosaic Virus (ZYMV), race F

A. INOCULUM

Maintenance of strain

Maintenance: 5oC and kept dry using anhydrous calcium chloride

Special conditions: pre-multiplication of the virus on non-wilting variety (Védrantais) prior to testing

B. INOCULATION AND INCUBATION

Conduct of the test

Plant stage: 1st emergent leaf

Temperature: 25oC during day, 18oC during night

Light: 12 hours per day

Manner of inoculation: mechanical inoculation by rubbing of cotyledons with inoculum

Duration of test:

- from sowing to inoculation: 15 days

- from inoculation to reading: 15 days

Number of plants tested: 30

C. SYMPTOMS AND OBSERVATIONS

Reading difficulty: - heterozygotes (Fn/Fn+) wither and die more slowly than homozygotes (Fn/Fn)

- use the F pathotype of ZYMV

Example varieties:

Védrantais (Fn+/Fn+): mosaic (resistance present)

Cantor (Fn/Fn+): slower necrosis with wilting (resistance absent)

Doublon (Fn/Fn): necrosis with wilting (resistance absent)

*Proposed new wording:*

Ad. 73: Resistance to *Zucchini yellow mosaic virus* (ZYMV), F strain

|  |  |
| --- | --- |
| 1. Pathogen | *Zucchini yellow mosaic virus* (ZYMV) |
| 2. Quarantine status | no |
| 3. Host species | *Cucumis melo* |
| 4. Source of inoculum | GEVES (FR) |
| 5. Isolate | strain F(e.g.strain 13-18Fn) |

**Remark:** interest to work with a strain F (ie: strain 13-18Fn), rather than a strain NF (ie: train E15)

The resistance to ZYMV is given by the presence of the gene Zym. This gene is epistatic on the gene Fn. So, the status of the gene Fn is only reachable when the gene Zym is absent (Zym+). In this case, 3 “no resistant” phenotypes can be observed:

* Zym+;Fn+/Fn+ (“true” susceptible phenotype) : mosaic non wilting
* Zym+; Fn/Fn+ (systemic hypersensibility reaction, heterogysous Fn / Fn+): slow flacida necrosis Zym+; Fn/Fn (systemic hypersensibility reaction, homozygous Fn / Fn): fast flacida necrosis wilting (flacida necrosis)

|  |  |
| --- | --- |
| 6. Establishment isolate identity | use standard varieties, flaccida necrosis on Génésis (Zym+ / Fn) |
| 7. Establishment pathogenicity | on susceptible melon varieties - As above |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium |  |
| 8.2 Multiplication variety | Védrantais (Zym+; Fn+/Fn+) (non-wilting) |
| 8.3 Plant stage at inoculation | First leaf appearing |
| 8.4 Inoculation medium | Fresh and dried leaves homogenized, in PBS with carborundum |
| 8.5 Inoculation method | rubbing |
| 8.6 Harvest of inoculum | on symptomatic leaves |
| 8.7 Check of harvested inoculum |  |
| 8.8 Shelflife/viability inoculum |  |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 30 |
| 9.2 Number of replicates |  |
| 9.3 Control varieties | Védrantais (Zym+ ; Fn+/Fn+) (susceptible) ; ~~Doublon,~~ Génésis (Zym+; Fn/Fn), ~~Cantor~~ , \*\*\* (Zym+; Fn+/Fn) ; PI414723, Lunadule, Polinyka(Zym) (resistant) |
| 9.4 Test design |  |
| 9.5 Test facility | growth chamber |
| 9.6 Temperature | 22°C - 25°C during day and 18°C during night |
| 9.7 Light | 12 hours |
| 9.8 Season | all seasons |
| 9.9 Special measures |  |
| 10. Inoculation |  |
| 10.1 Preparation inoculum | ice cold buffer solution: Fresh leaves homogenized in PBS and carborundum |
| 10.2 Quantification inoculum |  |
| 10.3 Plant stage at inoculation | cotyledon expanded or first emergent leaf |
| 10.4 Inoculation method | mechanical inoculation by rubbing of cotyledons with inoculum |
| 10.5 First observation |  |
| 10.6 Final observation | 14-15 dpi |
| 11. Observations |  |
| 11.1 Method | visual, comparative |
| 11.2 Observation scale |  |
| [1] susceptible:  ~~Doublon,~~Génésis  (Fn/Fn; Zym+) | necrosis with fast wilting |
| [1] susceptible:  ~~Cantor~~) (Fn/Fn+; Zym+) | lower necrosis with wilting - Slow wilting and necrosis |
| [1] susceptible: Védrantais,  (Fn+/Fn+; Zym+) | mosaic, non-wilting |
| [9] resistant: PI 414723 (Zym) | no symptoms |
| 11.3 Validation of test | on Standards |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states |  |
| 13. Critical control points | heterozygous (Fn/Fn+) wither and die more slowly than homozygotes (Fn/Fn)  use the pathotype F of ZYMV  The gene Zym is épistatic on the gene Fn:  The gene Fn and the gene Vat are linked in repulsion. |

*Current wording:*

Ad. 74: Resistance to Papaya Ring Spot Virus (PRSV), race GVA and race E2

A. INOCULUM

Maintenance of strain

Maintenance: 5oC and kept dry using anhydrous calcium chloride

Special conditions: pre-multiplication of the virus on susceptible variety (Védrantais) prior to testing

B. INOCULATION AND INCUBATION

Conduct of the test

Plant stage: 1st emergent leaf

Temperature: 25oC during day, 18oC during night

Light: 12 hours per day

Manner of inoculation: mechanical inoculation by rubbing cotyledons with inoculum

Duration of test:

- from sowing to inoculation: 15 days

- from inoculation to reading: 15-20 days

Number of plants tested: 30

C. SYMPTOMS AND OBSERVATIONS

Identification of two strains of the PRSV virus and of the two alleles concerned:

|  |  |  |
| --- | --- | --- |
| Genotypes/Strains | GVA strain | E2 strain |
| Védrantais (Prsv+) | Mosaic (vein-clearing)  = resistance absent | Mosaic (vein-clearing)  = resistance absent |
| 72025 (Prsv2) | - No systemic symptoms  - Local necrotic lesions on cotyledons (irregular)  = resistance present | - Apical necrosis  = Necrosis of plant instead of local lesions: resistance absent |
| WMRV 29 (Prsv1) | - No systemic symptoms  - Occasional local necrotic lesions on cotyledons  = resistance present | - No systemic symptoms  - Occasional local necrotic lesions on cotyledons  = resistance present |

*Proposed new wording:*

Ad. 74: Resistance to *Papaya ringspot virus* (PRSV), Guadeloupe strain and E2 strain

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Pathogen | *Papaya ringspot virus* (PRSV) | | |
| 2. Quarantine status | No | | |
| 3. Host species | *Cucumis melo* | | |
| 4. Source of inoculum |  | | |
| 5. Isolate | Guadeloupe strainand E2 strain | | |
| 6. Establishment isolate identity |  | | |
| For Guadeloupe strain: | |  |
| [1] Susceptible: Védrantais (Prv+) | | Mosaic (vein-clearing) |
| [9] Resistant: 72.025, PI414723, (Prv2) | | - No systemic symptoms  - Irregular local necrotic lesions on cotyledons |
| [9] Resistant: WMR29 (Prv1) | | No systemic symptoms   * Occasional local necrotic lesions on cotyledons |

|  |  |
| --- | --- |
| For E2 strain: |  |
| [1] Susceptible: Védrantais (Prv+) | Mosaic (vein-clearing) |
| [1] Susceptible: 72.025, PI414723, (Prv2) | - Apical necrosis  - Necrosis of plant instead of local lesions |
| [9] Resistant: WMR29 (Prv1) | - No systemic symptoms or few systemic chloronecrotic symptoms  - Occasional local necrotic lesions on cotyledons |

|  |  |
| --- | --- |
| 7. Establishment pathogenicity |  |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium |  |
| 8.2 Multiplication variety | pre-multiplication of the virus on non-wilting variety (Védrantais) prior to testing |
| 8.3 Plant stage at inoculation | First leaf appearing |
| 8.4 Inoculation medium | PBS with carborundum |
| 8.5 Inoculation method | rubbing |
| 8.6 Harvest of inoculum | Fresh or dried leaves homogenized in PBS and carborundum |
| 8.7 Check of harvested inoculum |  |
| 8.8 Shelflife/viability inoculum |  |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 30 |
| 9.2 Number of replicates |  |
| 9.3 Control varieties | Védrantais, 72.025, PI414723, WMR29 |
| 9.4 Test design |  |
| 9.5 Test facility |  |
| 9.6 Temperature | 25oC /18oC |
| 9.7 Light | 12 h |
| 9.8 Season |  |
| 9.9 Special measures |  |
| 10. Inoculation |  |
| 10.1 Preparation inoculum | Fresh leaves homogenized in PBS and carborundum |
| 10.2 Quantification inoculum |  |
| 10.3 Plant stage at inoculation | First emergent leaf |
| 10.4 Inoculation method | mechanical inoculation by rubbing cotyledons with inoculums |
| 10.5 First observation | 15 dpi |
| \*10.6 Final observation | 20 dpi |
| 11. Observations |  |
| 11.1 Method | visual, comparative |
| 11.2 Observation scale | **see 6** |
| 11.3 Validation of test | on standards |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states | QL |
| 13. Critical control points |  |

*Current wording:*

Ad. 75: Resistance to Muskmelon Necrosis Spot Virus (MNSV), race E8

A. INOCULUM

Maintenance of strain

Maintenance: 5oC and kept dry using anhydrous calcium chloride

Special conditions: pre-multiplication on susceptible variety (Védrantais) prior to test

B. INOCULATION AND INCUBATION

Conduct of the test

Plant stage: 1st emergent leaf

Temperature: 25oC during day, 18oC during night

Light: 12 hours per day

Manner of inoculation: mechanical inoculation by rubbing of cotyledons with inoculum

Duration of test:

- from sowing to inoculation: 15 days

- from inoculation to reading: 8 days

Number of plants tested: 30

C. SYMPTOMS AND OBSERVATIONS

Susceptible plants: necrotic lesions on the inoculated organs (cotyledons)

Resistant plants: no lesions

*Proposed new wording:*

Ad. 75: Resistance to *Melon necrotic spot virus* (MNSV), E8 strain

|  |  |
| --- | --- |
| 1. Pathogen | *Melon necrotic spot virus* (MNSV) |
| 2. Quarantine status |  |
| 3. Host species | *Cucumis melo* |
| 4. Source of inoculum | GEVES (F) |
| 5. Isolate | E8strain |
| 6. Establishment isolate identity |  |
| 7. Establishment pathogenicity | on susceptible plant |
| 8. Multiplication inoculum |  |
| 8.1 Multiplication medium | living plant |
| 8.2 Multiplication variety | pre-multiplication of the virus on non-wilting variety (Védrantais) prior to testing |
| 8.3 Plant stage at inoculation | 10.3 |
| 8.4 Inoculation medium |  |
| 8.5 Inoculation method | 10.4 |
| 8.6 Harvest of inoculum | 10.1 |
| 8.7 Check of harvested inoculum | symptomatic leaves |
| 8.8 Shelflife/viability inoculum | on susceptible variety |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 30 |
| 9.2 Number of replicates |  |
| 9.3 Control varieties | Védrantais (Susceptible), Virgos, PMR5 (Resistant) |
| 9.4 Test design |  |
| 9.5 Test facility | growth chamber |
| 9.6 Temperature | 25°C during day and 18°C during night or 22°C constant |
| 9.7 Light | 12 h per day |
| 9.8 Season | all seasons |
| 9.9 Special measures |  |
| 10. Inoculation |  |
| 10.1 Preparation inoculum | Fresh leaves homogenized in PBS and carborundum |
| 10.2 Quantification inoculum |  |
| 10.3 Plant stage at inoculation | cotyledon expanded or 1st emergent leaf |
| 10.4 Inoculation method | mechanical inoculation by rubbing of cotyledons with inoculum |
| 10.5 Final observation | 8-15 days after inoculation |
| 11. Observations |  |
| 11.1 Method | visual |
| 11.2 Observation scale |  |
| [1] susceptible: Védrantais | Necrotic lesions on the inoculated organs, optional: systemic reaction (depends on condition, and varieties), death of plant |
| [9] resistant: Virgos | No lesions |
| 11.3 Validation of test | on standards |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states | QL |
| 13. Critical control points |  |

*Current wording:*

Ad. 76: Resistance to Cucumber Mosaic Virus (CMV)

A. INOCULUM

1. Crushed solution

Phosphate disodic (Na2HPO4, 12 H2O) (0,03M): 1,075 g

Diéthyldithiocarbamate of sodium (= DIECA): 0,2 g

Distilled water: qsp 100 ml

The phosphate disodic solution can be stored in a refrigerator. Once the DIECA is added, the solution should be used within the next two hours.

2. Crushing the leaves

The source of the inoculum comes from crushing either the fresh leaves, or leaves desiccated in anhydrous calcium chloride (Ca Cl2), in a cold mortar.

Crush 1 gram of leaves with 4 ml of phosphate disodic solution at 5°C. Add active carbon (0,5 g) and carborendum (0,4 g) for each 1 gram of leaves. After crushing, put the mortar on a bed of ice.

Before using leaves dried with CaCl2 to inoculate a plant test, do a multiplication of the inoculum on some 10 susceptible plants which would be used as inoculum.

3. Strains maintenance

CMV can be stored for several years by desiccation with anhydrous CaCl2.. Leaves showing mosaic symptoms should be chopped finely with a razor blade and placed in cups. Put a layer of anhydrous calcium chloride (0,5 cm) in a plastic box and cover it with filter paper. Place the cups on this layer. Close the box well with adhesive tape, and then place it in a tightly closed plastic bag. Store it in a refrigerator at 5°C.

B. INOCULATION AND INCUBATION

Cotyledons or young leaves should be inoculated by rubbing them with a latex‑protected finger. After a few minutes, rinse the cotyledons with running water. Place the plants for incubation in a growth chamber (generally at 18°C at night and 25°C in the day, with 12 to 14  hours of daylight).

C. SYMPTOMS AND OBSERVATIONS

The “common” strains of CMV bring out mosaic symptoms on susceptible plants one week after inoculation. Resistant plants show no symptoms.

Remarks:

When light intensity and daylight are not sufficient (winter period), resistant plants (in particular PI 161375) may present chlorotic lesions on the first leaf.

Strains:

Use “common” strains (as T1, P9) rather than “song” strains (14, T2).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | CMV common strains (T1, P9) | CMV song strains (14, T2) |
| Susceptible | Védrantais | mosaïc | mosaic |
| Resistant | PI 161375 | no symptoms | mosaic, chlorotic lesions |
|  | Virgos |

P9 brings out “aucuba” mosaic on susceptible varieties

P9 is less aggressive than T1

It is preferable to use Virgos rather than PI 161375 (lower germination, weaker growth).

Observations, notes:

The genetic resistance is polygenic. Use a notation with classes. It is preferable to use the two strains P9 and T1 to have a better evaluation of the resistance.

High resistance confers resistance on all common strains. Some genotypes may present a resistance to P9 (no symptoms), and a slight susceptibility to T1 (slight mosaic).

*Proposed new wording:*

Ad. 76: Resistance to *Cucumber mosaic virus* (CMV)

|  |  |
| --- | --- |
| 1. Pathogen | *Cucumber mosaic virus* (CMV) |
| 2. Quarantine status | No |
| 3. Host species | *Cucumis melo* |
| 4. Source of inoculum | GEVES (F) |
| 5. Isolate | Use “common” strains (as Tl, P9) rather than “song” strains (14, T2). |
| 6. Establishment isolate identity |  |
| 7. Establishment pathogenicity | on susceptible melon varieties |
| 8. Multiplication inoculum | don’t use leaves dried with CaCl2 to inoculate, do a multiplication of the inoculum on susceptible plants |
| 8.1 Multiplication medium | living plant |
| 8.2 Multiplication variety | susceptible variety (e.g. Védrantais) |
| 8.3 Plant stage at inoculation | cotyledon expanded or first leaf appearing |
| 8.4 Inoculation medium | ice-cold buffer solution |
| 8.5 Inoculation method | Inoculation by rubbing. Optional: after a few minutes, rinse the cotyledons with running water. |
| 8.6 Harvest of inoculum | symptomatic leaves, e.g.: 1g leaves with 4mL buffer - 0,03 M PBS with 0,2% DIECA freshly added, addition of activated charcoal. |
| 8.7 Check of harvested inoculum |  |
| 8.8 Shelflife/viability inoculum | about 2 h |
| 9. Format of the test |  |
| 9.1 Number of plants per genotype | at least 30 plants |
| 9.2 Number of replicates |  |
| 9.3 Control varieties | Védrantais, 72.025, Virgos, PI161375  *Remark:* It is preferable to use Virgos rather than PI161375 (lower germination, weaker growth). |
| 9.4 Test design |  |
| 9.5 Test facility | Climatic room or glasshouse |
| 9.6 Temperature | 22°C constant |
| 9.7 Light | 12 hours at least |
| 9.8 Season | all seasons in climatic room, in glasshouse, strong environmental effect on the test severity (more severe in winter, too soft in summertime) |
| 9.9 Special measures |  |
| 10. Inoculation |  |
| 10.1 Preparation inoculum | Fresh leaves homogenized in ice-cold buffer solution- in PBS and carborundum (active charcoal), with 0.2% DIECA freshly added |
| 10.2 Quantification inoculum |  |
| 10.3 Plant stage at inoculation | cotyledon expanded or first leaf appearing |
| 10.4 Inoculation method | Inoculation by rubbing. Optional: After a few minutes, rinse the cotyledons with running water, especially when one uses activated charcoal |
| 10.5 Final observation | 7-8 days after inoculation |
| 11. Observations |  |
| 11.1 Method | visual, comparative |
| 11.2 Observation scale |  |
| [1] susceptible: Védrantais | Mosaics |
| [9] resistance present: Virgos, PI161375 | No symptoms or necrotic spot or very weak symptoms in case of a more aggressive strain like T1  *Remarks:* P9 strain brings out “aucuba” mosaic on susceptible varieties (aggressive symptoms)  P9 strain is less virulent than Tl strain. |
| 11.3 Validation of test | on control varieties |
| 11.4 Off-types |  |
| 12. Interpretation of data in terms of  UPOV characteristic states | QL |
| 13. Critical control points | When light intensity and daylight are not sufficient (winter period), resistant plants (in particular PI161375) may present chlorotic lesions on the first leaf.  Virgos seeds usually germinate better than seeds of PI161375 (Songwhan Charmi).  Resistance breaking CMV strains have been identified (“Song” strains).  Intermediate reactions may occur; the resistance is polygenic. |

Proposed changes to Chapter 10 “Technical Questionnaire”

To add the following characteristics to Chapter TQ 5:

Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 0 (characteristic 69.1)

Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 1 (characteristic 69.2)

Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 2 (characteristic 69.3)

[Annex II follows]

Comments by the Subgroup on the Provisional Draft of Document TWV/47/30

**Regular color code used in this document:**

Comments, remarks, questions sent to the leading expert : ISF, ES, NL

Proposal, remark, answers of the **leading expert**

**Controls** or differentials quoted in scientific literature (included in MATREF network)

**Chapter 5- Grouping of Varieties and Organization of the Growing Trial**

5.3 The following have been agreed as **useful grouping characteristics**:

[…]

Proposal to add:

(j) Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 0 (characteristic **69.1)**

(k) Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 1 (characteristic **69.2** )

(l) Resistance to *Fusarium oxysporum* f. sp. *melonis,* race 2 (characteristic **69.3**)

(ISF – MP1) : ISF feel it is **not necessary for grouping** to include *Fusarium oxysporum* f.sp. *melonis* races 0, 1 and 2

and make it **\*characteristics.** There are enough characteristics left for grouping and establishing DUS and it might lead to higher cost in the examination.

(ES): We agree with the new draft of disease protocols and to include the resistance to *Fusarium* 0, 1, 2 as **grouping characteristics.** Also to **include the disease resistances in the TQ**

NL: Naktuinbouw **supports the \*** for Fom:0,1 and 2. Fom:0,1 and 2 should be included in the **list of grouping characteristics**

**FR proposal**

**To keep char 69.1, 69.2, 69.3 as grouping characteristics, with an asterisk (\*). Char. included in the TQ.**

**Chapter 7-Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de characters**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69.  (+) | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* | Résistance à *Fusarium oxysporum* f. sp. *melonis* | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* | Resistencia al *Fusarium oxysporum* f. sp. *melonis* |  |  |
| **QL** |  |  |  |  |  |  |  |
| 69.1  (\*) |  | **Race 0** | Race **0** | **~~Pathotyp~~ 0** | **Raza 0** |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2, Charentais T | 1 |
|  |  | present | présente | vorhanden | presente | Jador, ~~Joker,~~ Védrantais, Charentais Fom-2 | 9 |

ISF – MP2: ISF feel that **an asterisk not needed** (see remark under grouping characteristics)

NL: Naktuinbouw **supports the \*** for Fom: 0,1 and 2. Fom: 0,1 and 2 should be included in the **list of grouping characteristics**

**FR proposal**

**To keep char 69.1, 69.2, 69.3 as grouping characteristics, with an asterisk (\*). Char. included in the TQ.**

ISF – F3 Why is it different from controls put in protocols?

**FR proposal**

**It could be harmonized, but we can identify some little particularities for the choice of varieties included:**

* Example varieties included in Chapter 7: **Commercial varieties** which are available with the characteristic
* Example varieties included in Chapter 8: **Controls** or differentials quoted in scientific literature (included in MATREF network)
* Difference of display unnecessary.

**To be discussed.**

**FR remark**

* **Joker : cancelled variety, to delete.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69.  (+) | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* | Résistance à *Fusarium oxysporum* f. sp. *melonis* | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* | Resistencia al *Fusarium oxysporum* f. sp. *melonis* |  |  |
| QL |  |  |  |  |  |  |  |
| 69.2  (\*) |  | Race 1 | Race ~~Pathotyp~~e 1 | ~~Pathotyp 1~~ | Raza 1 |  |  |
|  |  | ~~absent~~ | ~~absente~~ | ~~fehlend~~ | ~~ausente~~ | Jaune Canari 2,Charentais T, Védrantais | 1 |
|  |  | ~~present~~ | ~~présente~~ | ~~vorhanden~~ | ~~presente~~ | Arapaho, Jador~~,~~ Rubbens, ~~Joker,~~ Charenaits Fom-2 | 9 |

ISF – MP4: ISF feel that **an asterisk not needed** (see remark under grouping characteristics)

NL: Naktuinbouw **supports the \*** for Fom:0,1 and 2. Fom:0,1 and 2 should be included in the **list of grouping characteristics**

**FR proposal**

* **To keep char 69.1, 69.2, 69.3 as grouping characteristics, with an asterisk (\*). Char. included in the TQ.**
* **To delete Joker (9): cancelled variety**
* **To add Arapaho (9), Rubbens (9)**

**To be discussed.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69.  (+) | VG | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* | Résistance à *Fusarium oxysporum* f. sp. *melonis* | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* |  |  |
| QL |  |  |  |  |  |  |  |
| 69.3 (\*) |  | Race 2 | Race ~~Pathotype~~ 2 | ~~Pathotyp~~ 2 | Raza 2 |  |  |
|  |  | absent | absente | fehlend | ausente | Arapaho, Rubbens  Jaune Canari 2, ~~Joker,~~ Charentais T, Charentais Fom-2 | 1 |
|  |  | present | présente | vorhanden | presente | Anasta, Cléo, Jador, Védrantais | 9 |

ISF – MP5: ISF feel that **an asterisk not needed** (see remark under grouping characteristics)

NL: Naktuinbouw **supports the \*** for Fom:0,1 and 2. Fom:0,1 and 2 should be included in the **list of grouping characteristics**

**FR proposal**

* **To keep char 69.1, 69.2, 69.3 as grouping characteristics, with an asterisk (\*)**
* **To delete Joker (1): cancelled variety**
* **To add Arapaho (1), Rubbens (1), Anasta (9), Cléo (9)**

**To be discussed.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **69.  (+)** | **VG** | **Resistance to *Fusarium oxysporum* f. sp. *melonis*** | **Résistance à *Fusarium oxysporum* f. sp. *melonis*** | **Resistenz gegen *Fusarium oxysporum* f. sp. *melonis*** | **Resistencia al *Fusarium oxysporum* f. sp. *melonis*** |  |  |
| **QL** |  |  |  |  |  |  |  |
| **69.4  (+)** |  | **Race 1-2** | Race **~~Pathotype~~ 1-2** | **~~Pathotyp~~ 1-2** | **Raza 1-2** |  |  |
|  |  | absent | absente | fehlend | ausente | Jaune Canari 2, ~~Joker,~~ Védrantais, Virgos | 1 |
|  |  | moderately resistant |  |  |  | Lunasol | 2 |
|  |  | highly resistant |  |  |  | Dinéro,Isabelle~~, Jador~~ | 3 |

ISF – MP6: ISF feel that an **asterisk not needed** (see remark under grouping characteristics)

**FR proposal**

**We agree without asterisk, not a grouping characteristic.**

**To be discussed.**

ISF – F7: *Fusarium* race 1-2 is **not a monogenic trait**, it is a **quantitative trait**. It is not something that is either present or absent, it is something for which there is a **level on a continuous scale from 1 to 9**.

**FR proposal**

To modify the way to describe this characteristic, with a relative scale with 3 states.

* + absent (1): Jaune Canari 2, Védrantais, Virgos
  + moderately resistant (2) Lunasol
  + highly resistant (3) Isabelle, ~~Jador,~~ Dinéro
* Lunasol is the variety to illustrate the minimum resistance level for the state “moderately resistant”.

We prefer not display Manta here, to avoid confusion, because Manta’s behavior is intermediate between Lunasol and Dinéro / Isabelle.

* To add Dinéro as example variety highly resistant to replace Jador.
* To delete Joker (1): cancelled variety

**To be discussed.**

NL: the issue is not whether the resistance is **polygenic**, but whether the result is **reproducible**

**FR proposal**

To test an adequate number of assessed plants to allow the use of statistical method if necessary.

**To be discussed.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 70.  (+)  QN | VG | Resistance to *Podosphaera xanthii (Sphaerotheca fuliginea)* (Powdery mildew) | Résistance à *Podosphaera xanthii (Sphaerotheca fuliginea)* (oïdium) | Resistenz gegen *Podosphaera xanthii (Sphaerotheca fuliginea)* (Echter Mehltau) | Resistencia a *Podosphaera xanthii (Sphaerotheca fuliginea)* (Oidio) |  |  |
| **70.1** |  | **Race 1** | Race **~~Pathotype~~ 1** | **~~Pathotyp~~ 1** | **Raza 1** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | ~~Alpha,~~ ~~Boneto, Delta,~~ ~~Jerac,~~ Jaune Canari 2, Védrantais, | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Escrito | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Cézanne, Anasta, ~~Théo~~  PMR45, PMR5, Edisto 47 | 3 |

ISF – MP8: ISF think *Podosphaera xanthii* race 1 **no longer relevant for Europe** – IF it is **still relevant outside Europe**, we have no problem keeping it.

NL: May be kept for **historic reference**. Only when the **race is no longer available**, it has to be **deleted**.

**FR questions**

* Is Px1 is still relevant somewhere?
* Where it is available?
  + INRA answer: it is not relevant in Europe anymore. Interest for other races more virulent.
* **Interest of Px 1 to be discussed**

NL: Adding Védrantais is OK. (Px1: **susceptible**) **FR answer: Agree.**

ISF – F9: Alpha should be **moderately resistant**. It has Pm-1 gene at heterozygous stage. Védrantais should be put as a control here. **FR answer: Alpha is cancelled in 2013 (**time to market for 3 years).

ISF – F10: Why controls of the protocols are not listed here ? **PMR45** is the control for resistance. It is **intermediate** in expression. **FR answer:** **PMR45** isn’t moderately but highly resistant.

**FR proposal**

* to detete Alpha (1), Boneto (1), Delta(1), Théo (3) which are cancelled
* to add Védrantais, Jaune Canari 2 (1) susceptible (to replace Jérac by Jaune Canari 2)

Eecrito (2)

PMR45, PMR5, Edisto 47:(3) highly resistant

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **70.  (+)  QN** | **VG** | **Resistance to *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Powdery mildew)** | **Résistance à *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (oïdium)** | **Resistenz gegen *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Echter Mehltau)** | **Resistencia a *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Oidio)** |  |  |
| **70.2** |  | **Race 2** | Race **~~Pathotype~~ 2** | **~~Pathotyp 2~~** | **Raza 2** |  |  |
|  |  | susceptible | sensible | anfällig | susceptible | ~~Boneto~~, Galoubet, Védrantais, PMR45, ~~Alpha~~ | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | ~~Flores, Enzo~~, Escrito, Pendragon | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Anasta, Cézanne, ~~Théo~~  PMR5, Edisto 47 | 3 |

ISF – F11: Px2 Susceptible: Should include Védrantais, PMR45, eventually Alpha would fit here.

**FR proposal**

* **to detete Alpha (1), Boneto (1), Enzo (2), Flores(2), Théo (3) which are cancelled**
* **to add Védrantais, PMR45 : susceptible (1)**
* **to add Pendragon: moderatly resistant (2)**
* **to add PMR5, Edisto 47 : highly resistant (3)**
  + **To validate.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **70.  (+)  QN** | VG | Resistance to *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Powdery mildew) | Résistance à *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (oïdium) | Resistenz gegen *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Echter Mehltau) | Resistencia a *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Oidio) |  |  |
| **NEW (FR-1)**  **70.\*\*** | **VG** | **Race 3** |  |  |  |  |  |
|  |  | susceptible |  |  |  | Védrantais, PMR45, PMR5 | 1 |
|  |  | moderately resistant |  |  |  | WMR29, Nettuno | 2 |
|  |  | highly resistant |  |  |  | Edisto 47, Godiva, Batista | 3 |

**FR proposal**

**To include the characteristic** Resistance to *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Powdery mildew) **race 3.**

* **to add Védrantais, PMR45, PMR5: susceptible (1)**
* **to add WMR29,** Nettuno**: moderatly resistant (2)**
* **to add Edisto 47,** Godiva, Batista **: highly resistant (3)**

**To be discussed.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **70.  (+)  QN** | VG | | Resistance to *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Powdery mildew) | | Résistance à *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (oïdium) | Resistenz gegen *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Echter Mehltau) | Resistencia a *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Oidio) | |  | |  |
| **70.~~3~~** |  | | **Race 5** | | Race **~~Pathotype~~ 5** | **~~Pathotyp~~ 5** | | **Raza 5** | |  |  |
|  | |  | | susceptible | sensible | anfällig | | susceptible | | Védrantais, Edisto 47 | 1 |
|  | |  | | moderately resistant | moyennement résistant | mäßig resistent | | moderadamente resistente | | ~~Enzo, Flores~~, Hugo, Pendragon | 2 |
|  |  | | highly resistant | | hautement résistant | hochresistent | | altamente resistente | | ~~Gaétano, Lucas~~, ~~Théo,~~ Arapaho, PMR5 | 3 |

ISF – F12: susceptible (1): Védrantais: Interesting!

FR answer: Védrantais is susceptible to all *Px.*

ISF – F13: moderatly resistant: Should include Anasta, Cézanne

FR answer: No; Hugo, Pendragon that’s enough.

FR proposal

* to detete Enzo (2), Flores (2), Gaétano (3), Lucas (3), Théo (3) which are cancelled
* to add Edisto 47: susceptible (1)
* to add Hugo, Pendragon : moderatly resistant (2)
* to add PMR5, Arapaho : highly resistant (3)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **70.  (+)  QN** | VG | Resistance to *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Powdery mildew) | Résistance à *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (oïdium) | Resistenz gegen *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Echter Mehltau) | Resistencia a *Podosphaera xanthii* (*Sphaerotheca fuliginea*) (Oidio) |  |  |
| **NEW (ISF)**  **70.\*\*** | **VG** | **Race 3-5** |  |  |  |  |  |
| **QN** |  | susceptible |  |  |  | Védrantais, PMR5, Edisto 47 | 1 |
|  |  | moderately resistant |  |  |  | ~~AR Hale’s Best Jumbo,~~ Cisco | 2 |
|  |  | highly resistant |  |  |  | ~~PI 414723,~~ SVI 0105, 90625 | 3 |

ISF to add the characteristic Resistance to Podosphaera xanthii (Sphaerotheca fuliginea) (Powdery mildew) **race 3-5**

**FR proposal**

**To include this characteristic.**

**Controls proposed:**

* **susceptible (1):** Védrantais, PMR5, Edisto 47
* **moderatly resistant (2):** We prefer **not to use** AR Hale’s Best Jumbo here and illustrate this state with the variety Cisco, which behavior less subject to interpretation.

AR Hale’s Best Jumbo (AR HBJ) is the control to check all the potential intermediate behavior of *Px* races.

|  |  |
| --- | --- |
|  | **AR HBJ behavior** |
| *Px* 1 | **Susceptible**: if use of a strain of the type 1B such as the strain 06Sm10 |
| **Resistant:** if use of a strain of the type 1A such as the strain Sm 3 |
| *Px* 2 | **Susceptible**: if use of a strain of the type 2B |
| **Resistant:** if use of a strain of the type 2A such as the strain S87.7 |
| *Px* 3 | Only one type of strain : strain 3B |
| *Px* 5 | **Susceptible**: if use of a strain of the type 5B |
| **Resistant:** if use of a strain of the type 5A |
| *Px* 3-5 | **Susceptible**: if use of a strain of the type 3-5B |
| **Resistant:** if use of a strain of the type 3-5A |

Up to now, in the current pathological tests, it is the following strains which are used:

* Px 1 strain type 1A
* Px 1 strain type 2A
* Px 1 strain type 3B
* Px 1 strain type 5B
* Px 1 strain type 3-5A

In the pedigree of AR HBJ, there is PI 414723. In reason of the complexity of this running work (several research projects on going), we prefer not to use here these controls.

* **highly resistant (3):** We prefer **not to use** PI 414723AR (see reason above). We propose to make reference to 90625, an Indian line which enjoys international references, whereas the line SVI 0105 is more an internal French reference (not published in international literature).

**To be discussed.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **71.  (+)** | **VG** | **Resistance to *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum)*  Race 1 (Powdery mildew)** | **Résistance à *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum*** Race **~~Pathotype~~ 1 (oïdium)** | **Resistenz gegen *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum* ~~Pathotyp~~ 1 (Echter Mehltau)** | **Resistencia a *Golovinomyces cichoracearum*  *(Erysiphe cichoracearum* Raza 1 (Oidio)** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | ~~Bastion, Bonetto,~~ Védrantais, Edisto 47, Escrito, Score | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | ~~Flores~~, Anasta | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | ~~Cézanne,~~ Heliobel, ~~Théo~~, PMR45, 90625 | 3 |

ISF – F14 highly resistant, **Cézanne** Not sure, I would put in moderately….

FR proposal

* to detete Bastion (1), Bonetto (1), Flores (2) , Théo (3) which are cancelled

**susceptible (1):** Védrantais, to add : Edisto 47, Escrito, Score

* **moderatly resistant (2):** Anasta
* **highly resistant (3):** 
  + to add: PMR45, 90625
  + status of **Cézanne** to be check, not to include as control here.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 72.  (+) | VG | Resistance to colonization by *Aphis gossypii* | Résistance à la colonisation par *Aphis gossypii* | Resistenz gegen Befall durch *Aphis gossypii* | Resistencia a la colonización por *Aphis gossypii* |  |  |
| **QL** |  | absent | absente | fehlend | ausente | ~~Charentais,~~ Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | ~~AR- Top Mark ,~~ ~~AR,~~ ~~Margot~~, AR Hale’s Best Jumbo, Heliobel, Godiva, Virgos | 9 |

ISF – F15: Why not Védrantais ? what interest to introduce a new control, since Védrantais is perfectly susceptible

FR anwer: Agree

ISF – F16: “AR”doesn’t exist

ISF – F17: Top-Mark is susceptible. It is AR-TopMark which is resistant, AR=Aphid Resistant. Probably a **typing mistake**.

FR anwer: Agree

NL reference

* **AR Topmark reference**: McCreight, J. D., A. N. Kishaba & G. W. Bohn, 1984.
* **AR Hale’s Best Jumbo**, AR 5, and AR Topmark: Melon aphid-resistant muskmelon breeding lines. HortScience 19: 309–310.

**FR proposal**

* (1) absent Védrantais
* (9 ) present to replace AR-Top Mark by AR Hale’s Best Jumbo, which is an control even indluded in this guideline

to add Heliobel, Godiva, Virgos

to delete Margot because cancelled.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 73.  (+) | VG | Resistance to *Zucchini yellow mosaic virus* (ZYMV) Race F | Résistance au virus de la mosaïque jaune de la courgette (ZYMV) Race ~~Pathotype~~ F | Resistenz gegen Zucchinigelb-mosaikvirus (ZYMV), ~~Pathotyp~~F | Resistencia al virus del mosaico amarillo del calabacín (ZYMV) Raza F |  |  |
| **QL** |  | absent | absente | fehlend | ausente | ~~Alpha, Boule d’Or,~~ ~~Cantor, Doublon~~, Génésis Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | PI 414723  ~~Eloro, Hermes,~~ | 9 |

ISF – F18: Eloro, Hermès : state 9 I am surprised of this. Would need confirmation….

NL: Eloro and Hermes: please check whether these **old varieties** are still alive. Are there more recent examples?

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NEW73.  (+) | VG | Resistance to *Zucchini yellow mosaic virus* (ZYMV) |  |  |  |  |  |
|  |  | *If use of the a* F type *strain* (ex: strain 13.18Fn) |  |  |  |  |  |
|  |  | gene Zym absent Zym+/  Epistatis of the gene Zym on the gene Fn is **not operational,** so the state of the Fn gene can be observed:  gene Fn absent: Fn+/Fn+  symptom: Susceptibility reaction  Final phenotype :  mosaic |  |  |  | Védrantais | 1-a |
|  |  | gene Zym absent Zym+/  Epistatis of the gene Zym on the gene Fn is **not operational,** so the state of the Fn gene can be observed:  gene Fn present: Fn+/Fn  symptom: systemic hypersusceptibility reaction  Final phenotype :  Flacida necosis  *But less quick than in the following case* |  |  |  | ~~Cantor~~ | 1-b |
|  |  | gene Zym absent Zym+/  Epistatis of the gene Zym on the gene Fn is **not operational,** so the state of the Fn gene can be observed:  gene Fn present: Fn/Fn  symptom: systemic hypersusceptibility reaction  Final phenotype :  Flacida necosis |  |  |  | ~~Doublon~~, ~~Boule d’Or~~, Génésis, Galoubet, Hélios | 1-c |
|  |  | gene Zym present:  Zym / Zym  **Epistatis** of the gene Zym on the gene Fn is **operational**, so the state of the **Fn** gene **can’t be** observed.  symptom: localised hypersusceptibility reaction  Final phenotype :  local necrosis - Resistance |  |  |  | PI 414723, Lunaduke, Polinyka | 9 |
|  |  | *If use of a* NF *type strain* (ex: strain E15) |  |  |  |  |  |
|  |  | 1-gene Zym absent Zym+  symptom: Susceptibility reaction  Final phenotype :  mosaic |  |  |  | ~~Doublon~~,, ~~Boule d’Or~~, Génésis, Galoubet, Hélios Védrantais | 1 |
|  |  | gene Zym present: Zym / Zym  symptom: localised hypersusceptibility reaction  Final phenotype :  local necrosis - Resistance |  |  |  | PI 414723, Lunaduke, Polinyka | 9 |

**FR proposal**

* Alpha, Cantor, Doublon, Boule d’Or (state 1), Eloro, Hermès (state 9) are cancelled - To delete
* to replace Doublon, by Génésis which are both (Zym+ ; Fn/Fn)
* which variety can replace Cantor (Zym+ ; Fn+/Fn)?
* to check the attribution of controls.

Remark: The gene Vat and the gene Fn are linked in repulsion.

**To be validated.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **74.   (+)** | **VG** | **Resistance to *Papaya ringspot virus* (PRSV)** | **Résistance au virus des taches annulaires du papayer** | **Resistenz gegen Papayaringflecken-virus (PRSV)** | **Resistencia al virus de la mancha anular del papayo (PRSV)** |  |  |
| **QL** |  |  |  |  |  |  |  |
| **74.1** |  | **GVA strain** | Souche **GVA** | **~~Pathotyp~~ GVA** | **~~Raza~~ GVA** |  |  |
|  |  | absent | absente | Fehlend | ausente | Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | WMR~~V~~ 29, 72.025 | 9 |
| **74.2** |  | **E2 strain** | Souche **E2** | **~~Pathotyp~~ E2** | **~~Raza~~ E2** |  |  |
|  |  | absent | absente | Fehlend | ausente | Védrantais, 72.025 | 1 |
|  |  | present | présente | Vorhanden | presente | WMR~~V~~ 29 | 9 |

ISF – F19 I don’t know this strain. (GVA)

FR answer: No additional reference on this strain. We mainly the strain E2, which was isolated in France and elsewhere. I suppose it could be in relation with the strains **Gua**deloupe …?

ISF –F20 “**72.025**”: I don’t know this material. I guess it has Prv² allele.

FR answer: The line **72.0285** is a line **selected by INRA Guadeloupe**. It is resistant to the Guadeloupe strain.

The line 72.025 has the Prv² allele, as the line PI414723.

NL When companies claim resistance to PRSV, does this means **resistance to** E2 **or** GVA?

FR answer:I don’t know exactly.

NL Are there any examples of commercial varieties with the same phenotype as **line 72.025**?

If no examples can be given, **what is the relevance of keeping this characteristic**? No claims known in NL applications.

FR answer

No claims up to now in French applications.

Which relevance to keep this characteristic? To be discussed.

FR proposal

* to replace WMR~~V~~29 by WMR29
* **GVA strain**: it could be a mistyping… It could be the **Guadeloupe strain** (GUA strain)
* Gene Pvr, with 3 loci
  + Pvr +: **susceptibility allele**
  + Pvr1: in the strains Guadeloupe, Florida and E2: **resistance allele.**
  + Pvr2:
    - in the strains Guadeloupe and strain Florida there is a **resistance allele** (**hyper susceptibility**)
    - in the strain E2 : **incompatibility reaction** (generalized necrosis, death)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Védrantais** | **WMR 29** | **PI414723**  **72.025** |
| Prv alleles | Prv+ | Prv1 | Prv2 |
|  |  |  |  |
| Strain Guadeloupe  Strain Florida | susceptible (mosaic) | resistant | resistant  (hyper susceptibility) |
| Strain E2 | susceptible (mosaic) | resistant | Incompatibility reaction  necrosis, death |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **NEW74.   (+)** | **VG** | **Resistance to *Papaya ringspot virus* (PRSV)**  **Pvr gene** |  |  |  |  |  |
| **74.1** |  | **Guadeloupe strain** | **Souche Guadeloupe** |  |  |  |  |
| **QL** |  | absent  (allele Prv+)  **mosaic** |  |  |  | Védrantais | 1 |
|  |  | present  (alleles Prv1, Prv2)  **resistant** |  |  |  | 72.025, PI414723, WMR 29, | 9 |
| **74.2** |  | **E2 strain** | **Souche E2** |  |  |  |  |
| **QL** |  | absent  (allele Prv+)  **mosaic** |  |  |  | Védrantais, | 1-a |
|  |  | absent  (allele Prv2)  Incompatibility reaction  **necrosis, death** |  |  |  | 72.025, PI414723, | 1-b |
|  |  | present  (alleles Prv1)  **resistant** |  |  |  | WMR29 | 9 |

FR proposal

* To add PI414723 as control. Same behavior as the line 72.025.
* the use of the E2 strain is more informative than the use of the Guadeloupe strain. It allow to describe the state of the 3 alleles of the Pvr gene.

To be discussed.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **75.  (+)** | **VG** | **Resistance to *Melon necrotic spot virus* (MNSV) E8 strain** | **Résistance au virus de la criblure du melon (MNSV) Souche E8** | **Resistenz gegen Netzmelonen-nekrosefleckenvirus (MNSV), ~~Pathotyp~~ E8** | **Resistencia al virus del cribado del melón (MNSV) ~~Raza~~ E8** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Védrantais, | 1 |
|  |  | present | présente | vorhanden | presente | Primal, Cyro, Yellow Fun, Virgos, PMR5 | 9 |

FR proposal

To add PMR5 as control for state (9)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **76. (+)** | **VG** | **Resistance to *Cucumber mosaic virus* (CMV)** | | | | | |
| **QL** |  | absent | absente | fehlend | ausente | ~~Cézanne, Dalton,~~ Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Lunaduke, PI161375, Virgos | 9 |

ISF – F21: **Cézanne** (state 1) Again, why not Védrantais ?

FR answer: I agree . Védrantais, that’s enough as reference for the susceptible control.

ISF – F22: **Lunaduke** (state 9): This is **not a good control**. Nobody can provide seeds of this hybrid. I asked Nunhems, ASL, INRA. Virgos could be put, but it has a **too high resistance level**. PI 161375 could be a **good control.**

FR remark:

*PI 161375: Korean line, which name in Korean is “Song Whan Charmi”. It is progenitor of Virgos. It is use to identified the “song” CMV strains, able to attack this line and Virgos. The “song” strains (14strain, Tz strain or I17F strain) are more virulent than the common strains (Tl strain, P9 strain), which are not able to attack PI161375 and Virgos.*

FR answer:

The resistance to CMV is a quantitative resistance. It is assessed up to now according the protocol for a qualitative resistance.

We prefer :

* to keep Virgos and Lunaduke as resistant control. Lunaduke is always maintained in the French offical catalogue. It can be purchased.
* And add the control PI161375.

FR proposal:

**Resistance to *Cucumber mosaic virus* (CMV)**

* absent Védrantais, 1
* present Lunaduke, Virgos, PI161375, 9

**Chapter 8 - Explanations on the Table of Characteristics**

Ads. 69.1 - 69.3: Resistance to *Fusarium oxysporum* f. sp. *melonis,* Races 0, 1 and 2**(Fom)**

**6. Establishment isolate identity** use differential varieties: Charentais T, Védrantais, Charentais Fom-2, ~~Joker~~, ~~Margot~~, **Isabelle, Jador**

ISF – F23: “Isabelle, Jador” **No use here**. Margot is enough for it has Fom-1 and Fom-2 gene, and is susceptible to Fusarium race 1-2

FR answer: I don’t agree. Margot is cancelled.

**FR proposal**

**To use differential varieties: Charentais T, Védrantais, Charentais Fom-2**

**10.4 Inoculation method** soaking of the root system in a suspension of liquid medium of fungus

**at least 5 min**

ISF – F24: “at least 5min”: This is **optional**. 30 seconds are enough, even less if one takes care of having all roots in contact with inoculum suspension.

**FR proposal**

Optional: At least 30sec -5min

**11.2 Observation scale**

[1] Susceptible Growth retardation, wilting, yellow cotyledons, internal vessel browning,

death of plant

ISF – F25: “**Growth retardation**”: Not a good criteria

NL: **Growth retardation (in combination with yellowing or wilting**) can be **useful for judging the severity of Fusarium attack**; controls should preferably be mock-inoculaed for this reason.

ISF – F26: “**internal vessel browning**”: Optional. Not necessary. We never look at vessels. It is not as informative as it is in case of tomato and Fusarium.

NL: We also don’t use vessel browning to judge the severity of Fusarium attack.

However, it helps as a diagnostic character, to distinguish Fusarium from other types of rotting like Pythium.

**FR / NL proposal**

We share the NL point of view about the interest of “Growth retardation combined with other observation” and the optional interest of the observation of the “internal vessel browing”.

To keep:

**[1] Susceptible Growth retardation in combination with yellowing or wilting cotyledons (useful for judging the severity of the attack), Optional: internal vessel browning, death of plant.**

Ad. 69.4: Resistance to *Fusarium oxysporum* f. sp. *melonis,* Race 1-2 **(Fom)**

**5. Isolate** **Fom: 1.2**

ISF – F27: Need to **specify which isolate** is used?? There is a high variability in race 1-2 isolates.

NL Suggestion:  5. Isolate….. Fom: 1.2 (moderately aggressive)

**FR / NL proposal**

**Fom: 1.2 (moderately aggressive): TST strain**

**6. Establishment isolate identity** use differential varieties: **Virgos**, Védrantais, Lunasol, Manta, Isabelle, Dinero, Jador

ISF – F28: “**Virgos**”: Definitely **not a good control**. Will not grow well enough. **~~Margot~~** is the **control to use as susceptible**. It has **both Fom-1 and Fom-2**, and is **susceptible to race 1-2**.

**FR proposal**

We don’t meet problem with the use of the variety Virgos. So we propose:

**use differential varieties: susceptible: Védrantais, Virgos; moderately resistant : Lunasol; highly resistant: Isabelle, Dinéro, Jador**

**9. Format of the test**

**9.1 Number of plants per genotype** at least 20

ISF – F29: Again, it is a quantitative trait. Need **5 reps of 12 plants** to be able to make **statistical analysis**, and determine if **level of resistance** is significantly different or not **from Lunasol**.

NL: If five repeats are really necessary for Fom:1.2 testing, **we wonder** whether this characteristic is suitable for variety description and **whether QL** can be **maintained** under point 12.

**FR proposal**

**Number of plants per genotype at least 30**

**Remarks: It is a quantitative trait: necessity of replications, a sufficiently large number of plants to allow the use of a statistical analysis to determine if the level of resistance is significantly different or not from Lunasol.**

**9.3 Control varieties**

[1] Susceptible ~~Virgos,~~ Védrantais

ISF – F30 No use Virgos but use ~~Margot~~

**FR proposal**

We work with Virgos (included in the MATREF network). So we propose:

[**1] Susceptible** **~~Margot~~ (cancelled), Virgos, Védrantais**

**9.5 Test facility** glasshouse or climatic room

ISF – s31: Greenhouse? -

FR proposal

“Glasshouse” or “Greenhouse”. I don’t identify a technical difference between these wordings.

**9.8 Season** all seasons

ISF – F32: Not correct. There is a strong environmental effect if grown in the greenhouse.

Winter is too severe. Summer is too mild

**FR proposal**

**All seasons in a climatic room / in a greenhouse: be aware of the strong environmental effect: winter could be too severe and summer could be too mild.**

**10.4 Inoculation method** Soaking of the root system in spore suspension; 700 ml for a tray with 25 - 30 plants, plants are not uprooted

ISF – F33 to replace “soaking of the root system” by “Soaking of the trays”

ISF – F34 “plants are not uprooted”: correct

**FR proposal**

**Soaking of the trays in spore suspension; 700 ml for a tray with 25 - 30 plants, plants are not uprooted**.

**10.5 First observation** ISF proposal :14 dpi ~~7~~

**10.6 Second observation** ISF proposal :21 dpi ~~14~~

**\*10.7 Final observations** ISF proposal :28dpi ~~21~~

**FR proposal**

**10.5 First observation** **7 - 14 dpi**

**10.6 Second observation** **14 - 21 dpi**

**\*10.7 Final observations** **21- 28dpi**

**11.2 Observation scale** Symptoms:

**[1] Susceptible:** Védrantais Growth retardation, yellow cotyledons, drying,

internal vessel browning, death of the plant

ISF – F35 “internal vessel browning” : Optional. Not necessary. We never look at vessels. It is not as informative as it is in case of tomato and Fusarium.

**FR proposal**

**[1] Susceptible: Védrantais** **Growth retardation, yellow cotyledons, drying,**

**internal vessel browning (optional), death of the plant**

**[9] Resistant** Symptoms may be present, but the level of expression must be distinctly lower than in the susceptible control variety.

= the lowest level of resistance is defined by the behavior of Lunasol

ISF – F36 “the level of expression must be distinctly lower “:That’s why replications are needed, for statistical analysis.

**FR proposal**

We agree the remark.

**Symptoms may be present, but the level of expression must be distinctly lower(interest of replication / statistical analysis) than in the susceptible control variety = the lowest level of resistance is defined by the behavior of Lunasol.**

Ads. 70.1 to 70.3: Resistance to Powdery mildew *Podosphaera xanthii* (*Sphaerotheca fuliginea*) Px (Sf)

Ad. 71: Resistance to Powdery mildew *Golovinomyces cichoRacearum (Erysiphe cichoRacearum)* Gc (Ec)

**6. Establishment isolate identity** on differentials:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Powdery Mildew** | | | | | | |
|  | ***Podosphaera xanthii*  (*Sphaerotheca fuliginea)*** | | | | | ***Golovinomyces cichoRacearum (Erysiphe cichoRacearum)*** | |
|  | **race 0** | **race 1** | **race 2** | **race 4** | **race 5** | **race 0** | **race 1** |

ISF – F37: “race 4”: Nobody can provide a race 4. Doesn’t exist.

NL: *Px* race 4 can be deleted if it is no longer available.

NL: About relevance of **Px: 3.5** we have no opinion. However, it is important to consider also reliability of the protocol,

in particular for IR scores

**FR proposal**

***Px* race 4 is an artifact. It doesn’t exist really.**

**To delete *Px* race 4**

**To include *Px* race 3, *Px* race 3-5**

on differentials:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Powdery Mildew** | | | | | | | | |
|  | ***Podosphaera xanthii*  (*Sphaerotheca fuliginea)*** | | | | | | | ***Golovinomyces cichoracearum (Erysiphe cichoracearum)*** | |
|  | **race 0** | **race 1** | **race 2** | **~~race 4~~** | **race 3** | **race 5** | **race 3-5** | **race 0** | **race 1** |
| Iran H | S | S | S | ~~S~~ |  | S |  | S | S |
| **Védrantais** | R | S | S | ~~S~~ | S | S | S | R | S |
| **Nantais Oblong** | R | S | S | ~~S~~ | S | S | S | R | **R** |
| **PMR 45** | R | **R** | S | ~~S~~ | S | S | S | R | S |
| **WMR 29** | R | **R** | **R** | ~~S~~ | **R** | S | S | R | S |
| **Edisto 47** | R | **R** | **R** | ~~R~~ | **R** | S | S | R | S |
| **PI 124112** | R | **R** | **R** | ~~R~~ | **R** | **R** | **R** | R | **R** |
| **PMR 5** | R | **R** | **R** | ~~R~~ | S | **R** | S | R | **R** |
| **AR Hale’s Best Jumbo** |  |  |  |  |  |  | **R** |  |  |

Legend: S susceptible (high sporulation); , R resistant (low sporulation)

**8. Multiplication inoculums**

**8.1 Multiplication medium** Detached cotyledon in Petri-dish on 0,5 % Agar ~~with 1% sucrose~~ and ~~2~~ 1% mannitol

ISF – F38: Sucrose not needed. It is not good for preservation

**FR proposal**

**Detached cotyledon in Petri-dish on 0.35 - 0,5 % Agar, 1-2% mannitol, optional: 1% sucrose**

**8.3 Plant stage at inoculation** Young, unfolded cotyledon; decontaminated with e.g. 0,05% mercuric chloride or 3 à 5%.bleach (NaClO + NaCl)

ISF – F39: “decontamined”: Not necessary if cotyeldons are obtained in clean enough conditions. On an other hand, decontamination is never 100% efficient

**FR proposal**

**We prefer to keep “decontaminated” even if it is not 100% efficient.**

**8.8 Shelflife/viability inoculums** - on cotyledon, 17-23oC, under very low light intensity.

ISF – F40 “low light intensity”: Around **1000Lux fluorescent tubes**

**FR proposal**

**We don’t agree to add this proposal; it is highly dependent of the type of climatic room or greenhouse. To keep as it is.**

- Maximum storage time is 1 to 1.5 months, after the inoculation

ISF – F41: “after the inoculation”: In the described conditions, viability is no longer than 15days. In case of longer term preservation, inoculate locally with a few spores, and store at 14°C/12hours low light per day.

**FR proposal**

* **Maximum storage time is 15 days ~~1 to 1.5 months~~, after the inoculation**

**Remark: In case of longer term preservation, inoculate locally with a few spores, and store at 14°C/12hours low light per day.**

**9.4 Test design** Leaf discs placed on 0,4% agar with 1~~- 4~~% mannitol and 0,003% benzimidazol.

ISF – F42 …“1% mannitol and 0,003% benzimidazol: This is optional

**FR proposal**

**Leaf discs placed on 0,4% agar with 1~~- 4~~% mannitol and (optional) 0,003% benzimidazol**

**9.7 Light** Optional 24 h darkness after inoculation - at least 12h

ISF – F43 “at least 12h”: Optional. Light is low enough

**FR proposal**

**Optional 24 h darkness after inoculation – optional: at least 12h**

**10.2 Quantification inoculum** ISF proposal: 100 to 400 spores per cm²

**FR proposal**

Additional proposal is too precise. To let open.

**10.5 First observation** ISF proposal 8-9 dpi ~~10~~

**\*10.7 Final observations** ISF proposal 11-12dpi ~~11~~

**FR proposal**

**10.5 First observation 8-10 dpi**

**\*10.7 Final observations 11-12dpi**

Ad. 72: Resistance to colonization by *Aphis gossypii*

**5. Isolate** No strain variation reported

ISF – F44 This is wrong! With the described protocol, only the NM1 clone is working.

**FR proposal**

**Isolate: NM1 clone**

8.5 Inoculation method deposit 10 adullt wiglessaphids per plant, or

**9.3 Control varieties**

[1] Susceptible: Védrantais, Top Mark ~~Charentais~~

[9] Resistant: ~~Margot~~, AR Hale’s Best Jumbo, AR-Top Mark, Virgos  
ISF proposal

**FR proposal**

1. Védrantais could be enough

(9) Virgos, AR Hale’s Best Jumbo, AR Top Mark

could be enough

**9.6 Temperature** 21oC

ISF – F45: 21-23°C day/16-20°C night

**FR proposal**

**21-24°C day/16-20°C night**

10.4 Ino

11.2 **Observation scale**

[1] Susceptible: Védrantais ~~Charentais~~ 9 or 10 adult aphids per plant; eggs frequent.

ISF – F46: It is **not eggs**, it is larvae. *A.gossypii* is viviparous

FR proposal

Védrantais 9 or 10 adult aphids per plant; larvea frequent.

[9] Resistant: ~~Margot~~,

AR Top Mark, Virgos less than 7 adult aphids per plant; larvae rare.

**FR proposal**

Virgos, AR Hale’s Best Jumbo less than 7 adult aphids per plant, larvae rare.

**13. Critical control points**

[…]

ISF proposal

Normally ~~the aphids~~ *Aphis gossypii* is ~~are~~ viviparous, ~~but sometimes~~ *~~Aphis gossypii~~* ~~may produce eggs.~~

NL: Good point about strain variation within *A. gossypii*. Reference: Thomas et al, Arthropod-plant interactions 6(1) - *A gossypii* is **viviparous** and in autumn on specific crops **sometimes oviparous**. There are numerous studies about oviparous *A. gossypii*. Nevertheless, this information is out of place in this protocol. If this point would be decided by a vote, I would vote **against eggs** and **in favour of larvae**

FR proposal

Normally *Aphis gossypii* is viviparous, ~~but sometimes (in autumn, on specific crops may produce eggs.~~

Ad. 73: Resistance to *Zucchini yellow mosaic virus* (ZYMV), F strain

**13. Critical control points** heterozygous (Fn/Fn+) wither and die more slowly than homozygotes (Fn/Fn)

use the pathotype F of ZYMV

ISF – F47: Something is not clear in this protocol. What is the goal?

* Is it to show presence of Zym gene (resistance to ZYMV)
* or is it to determine the presence of Fn (quick death in case of F pathotype)?

Fn is not taken in account in variety description, correct?

in this case, pathotype NF will also work.

What is **important** is to **use a pathotype 0**, because pathotypes 1 and 2 overcome resistance of PI414723.

**NL Is it really necessary to use and mention this gene when the aim is to detect Zym? We do not support this characteristic when there are no examples of varieties. No claims known in NL applications**

**FR proposal**

**5. Isolate Strain F, sub strain 0F = strain 13.18Fn, or Strain NF, sub strain 0NF**

**6. Establishment isolate identity**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **F (ex : strain 13.18 Fn)** | | | **NF (ex : strain E15 PAT)** | | |
| **Sub-strain** | **0F** | **1F** | **2F** | **0NF** | **1NF** | **2NF** |
| Védrantais  Zym+; Fn+ | Mosaic- **Susceptible** | Mosaic- **Susceptible** | Mosaic- **Susceptible** | Mosaic- **Susceptible** | Mosaic- **Susceptible** | Mosaic- **Susceptible** |
| ~~Doublon~~ Génésis  Zym+ / Fn | Wilting, necrosis - **Susceptible** | Wilting, necrosis **- Susceptible** | Wilting, necrosis - **Susceptible** | Mosaic- **Susceptible** | Mosaic- **Susceptible** | Mosaic- **Susceptible** |
| PI 414723  Zym / Fn | **Resistant** | Mosaic, necrosis **Intermediate** | Mosaic- **Susceptible** | **Resistant** | Mosaic, necrosis **Intermediate** | Mosaic- **Susceptible** |

In paragraph **9.3 and 11.2:**

To replace Doublon (which is cancelled) by Génésis which have the same profil Zym+ / Fn

**13. Critical control points**

**The interest to work with the strain F – sub strain 0F (ex: 13.18Fn) is to describe more precisely the phenotype of the assessed varieties, and especially the phenotype of the susceptible ones (Zym+), which can be:**

* **mosaic (Fn+)**
* **or wilting necrosis (Fn)**

**If this level of description of the susceptible varieties is not required, it is possible to work with a strain NF- sub strain NF0 ( importnance of the sub-strain), because pathotypes 1 and 2 overcome resistance of the variety PI414723 , which is the resistance control. .**

Ad. 74: Resistance to *Papaya ringspot virus* (PRSV), GVA strain and E2 strain

|  |  |
| --- | --- |
| For GVA strain: |  |
| [1] Susceptible: Védrantais (**Prv+** ~~Prsv~~+) | Mosaic (vein-clearing) |
| [9] Resistant: 72025 (**Prv**2 ~~Prsv~~2) | - No systemic symptoms  - Irregular local necrotic lesions on cotyledons |
| [9] Resistant: WMRV 29 (**Prv**1 ~~Prsv~~1) | - No systemic symptoms  - Occasional local necrotic lesions on cotyledons |

|  |  |
| --- | --- |
| For E2 strain: |  |
| [1] Susceptible: Védrantais (**Prv+** ~~Prsv~~+) | Mosaic (vein-clearing) |
| [1] Susceptible: 72025 (**Prv**2 ~~Prsv~~2) | - Apical necrosis  - Necrosis of plant instead of local lesions |
| [9] Resistant: WMRV 29 (**Prv**1 ~~Prsv~~1) | - No systemic symptoms  - Occasional local necrotic lesions on cotyledons |

ISF – F48: The official name of the gene is **Prv**, not Prsv

NL: When companies **claim resistance to PRSV**, does this means resistance to **E2** or  **GVA**?

Are there any examples of **commercial varieties** with the same phenotype as **line 72025**?

**If no examples can be given, what is the relevance of keeping this characteristic?**

* + No claims known in NL applications.

**FR proposal**

**To correct the name of the gene : Prv and not Prsv**

Ad. 75: Resistance to *Melon necrotics spot virus* (MNSV), E8 strain

**11.2 Observation scale**

**[1] Susceptible**: Védrantais Necrotic lesions on the inoculated organs,

systemic reaction, death of plant

ISF – F49: “Necrotic lesions on the inoculated organs”: This is the most important trait

ISF – F50: “systemic reaction, death of plant”: This is **not a good criteria** : systemic reaction depends on conditions, and also on varieties.

FR proposal

**11.2 Observation scale**

**[1] Susceptible**: Védrantais **Necrotic lesions on the inoculated organs**,

systemic reaction (depends on conditions, and also on varieties), death of plant

Ad. 76: Resistance to Cucumber mosaic virus (CMV)

**5. Isolate** Use “common” strains (as T1, P9) rather than “song” strains (14, T2).

**8.5 Inoculation method** Inoculation by rubbing. After a few minutes, rinse the cotyledons with running water.

ISF – F51: “After a few minutes, rinse the cotyledons with running water”: Optional

**FR proposal**

Inoculation by rubbing. Optional: After a few minutes, rinse the cotyledons with running water.

**8.6 Harvest of inoculums** symptomatic leaves, e.g.: 1g leaves with 4mL buffer - 0,03 M PBS with 0,2% DIECA freshly added

ISF – F52: Important for CMV : addition of activated charcoal

**FR proposal** symptomatic leaves, e.g.: 1g leaves with 4mL buffer - 0,03 M PBS with 0,2% DIECA freshly added (addition of activated charcoal)

**9.3 Control varieties** Védrantais, 72025, WMRV, Virgos, PI 161375

ISF – F53 “WMRV”: what is this ?

FR proposal

Mistyping – to delete

**9.5 Test facility** Climatic room or glasshouse

ISF – s54: Greenhouse?

FR answer

I don’t identify a difference of meaning between the

**9.8 Season** all seasons

ISF – F55: strong environmental effect on test severity. In GH, more severe in winter, too soft in summertime.

FR proposal

Remark to include.

**10.1 Preparation inoculums** Fresh leaves homogenized in ice-cold buffer solution- in PBS and carborundum

ISF – F56

FR proposal

Fresh leaves homogenized in ice-cold buffer solution- in PBS and carborundum (active charcoal), with 0.2% DIECA freshly added

**10.4 Inoculation method** Inoculation by rubbing.

Optional : After a few minutes, rinse the cotyledons with running water.

ISF – F57: “Optional : After a few minutes, rinse the cotyledons with running water”, especially when one uses activated charcoal.

FR proposal

Optional: After a few minutes, rinse the cotyledons with running water, especially when one uses activated charcoal

**11.2 Observation scale**

[…]

*Remarks :* P9 strain brings out “aucuba” mosaic on susceptible varieties

P9 strain is less aggressive than T1 strain.

ISF – F58: Aucuba is strong symptom= more aggressive

ISF – F59: The term of “virulent” should be used here.

FR proposal

*Remarks :* P9 strain brings out strong symptoms (“aucuba” mosaic on susceptible varieties).

P9 strain is less virulent than T1 strain

**Chapter 9 – Literature**

**NL: General remark:** the literature list is extremely long. How to deal with this? Some guidance would be welcome.

FR proposal

To classify the articles according the key words, then the publication year?

To be discussed.

**Chapter 10 - Technical Questionnaire**

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?

7.1.1. Varietal type or cultigroup :

(ES)The additional information about **type of varieties** was discussed when the last version of the TG was agreed. It was France who proposed not to include it because it exist a lot of different types around the world. As it is **not the objective of this partial revision**, I should delete the paragraph 7.1.1. that would need **a longer discussion**.

FR proposal

**I agree, it is not the objective of this partial revision. It could be the base of a next discussion.**

* + Literature to consult to prepare this discussion:

**- OECD publication**

**International Standards for Fruit and Vegetables - Melons**

**ISSN :**1993-5668 (online)

**ISSN :**1011-0518 (print)

**DOI :**[10.1787/19935668](http://www.oecd-ilibrary.org/agriculture-and-food/international-standards-for-fruit-and-vegetables_19935668;jsessionid=1ebrskpsq9795.x-oecd-live-01" \o "10.1787/19935668)



***English/French***

**Authors:**OECD

**Publication Date :**30 May 2006

**Pages :**96

**ISBN :**9789264022553 (PDF) ; 9789264022546 (print)

**DOI :**10.1787/9789264022553-en-fr

This book provides comments and illustrations to facilitate the common interpretation of the standard in force for grading melons in international trade under the Scheme for the Application of International Standards for Fruit and Vegetables set up by the OECD in 1962. It is therefore a valuable tool for both the Inspection Authorities and professional bodies responsible for the application of standards or those interested in international trade of melons.

**-CTIFL publication:**

|  |  |
| --- | --- |
| http://www.ctifl.fr/Pages/Kiosque/Couverture.aspx?id=873&width=100 | **RECONNAITRE LES TYPES COMMERCIAUX DE MELONS ET DE PASTEQUES**  Philippe MENTION (Ctifl) - Valentine COTTET (Ctifl)  Ils s'appellent Canari, Charentais jaune ou vert, Galia, Honeydew, mais aussi Sugar Baby, Asiatique... Pour permettre de mieux les connaître, le Ctifl publie ce fascicule à l'usage de toute la filière dans une approche distribution du produit. Vingt-huit types commerciaux de melons et sept types commerciaux de pastèques présents sur le marché européen, à des volumes plus ou moins importants sont décrits.  Cet ouvrage est rédigé en français et en anglais, pour être plus accessible aux opérateurs du marché international susceptibles de valoriser les produits français.  Réf. : 33008 - Janvier 2011 - **29 €** 203 pages - Format : 10 X 16 ISBN : 9782879113043 |

7.1.2. Additional Disease resistance characteristics

Qualitative traits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resistance to | absent | present | not tested | Char |
| *Fusarium oxysporum* f. sp. *melonis,* Race 1-2 |  |  |  | 69.4 |

ISF – F60: Again, this is not a qualitative trait. Should be in the other table.

FR proposal

**FR agree.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Zucchini yellow mosaic virus* (ZYMV), F strain |  |  |  | 73 |

ISF – F61: Again, what is absent/present?

Is it *Fn* or is it *Zym* ?

*Fn* is not a resistance. If *Zym* only is looked for, a NF strain can be used.

FR proposal

Use of a strain F or strain NF to be discussed. The **use of a strain F** (eg: 1318) is more informative. With the same pathological test, we can have information about the state of the gene Zym and, if it is absent, to have information on the state of the gene Fn.

7.2 Are there any special conditions for growing the variety or conducting the examination?

**Type of culture**

FR proposal

This section is not highly informative. **To delete?**

7.3 Other information

A **representative color photograph** of the variety (fruit) should accompany the Technical Questionnaire.

(ES)The **inclusion of photos** requested in the paragraph 7.3.of the TQ make the 7.1.1 **unnecessary**.

FR proposal

**We don’t agree.**

**We support the interest of the picture of the fruit as long as the discussion of the types of varieties will not be achieved. To be associated to the discussion on the definition of the the cultigroups.**

[End of Annex and of document]