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| INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS  |
| Geneva |

Technical Committee

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

Document prepared by the Office of the Union

Disclaimer: this document does not represent UPOV policies or guidance

 At its forty-seventh session held in Nagasaki, Japan, from May 20 to 24, 2013, the Technical Working Party for Vegetables (TWV) considered the partial revision of the Test Guidelines for Melon on the basis of document TG/104/5 (see document TWV/47/34 “Report”, paragraphs 76 to 78).

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

 The structure of the Annex of this document is as follows:

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[Annex 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 for a Revision of the Chapter 7: Table of Characteristics

### 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* |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.1 (\*)(+) |  | **Race 0** | **Race 0** | **Pathotyp 0** | **Raza 0** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Jaune Canari 2 | 1 |
|  |  | present | présente | vorhanden | presente | Jador, Védrantais | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.2 (\*)(+) |  | Race 1 | Race 1 | Pathotyp 1 | Raza 1 |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Jaune Canari 2, Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Arapaho, Jador, Rubbens | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.3 (\*)(+) |  | Race 2 | Race 2 | Pathotyp 2 | Raza 2 |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Arapaho, 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**  |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Jaune Canari 2, Védrantais, Virgos | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Lunasol | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Dinero, 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. | 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** |  |  |
| **QN** |  | 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,  | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.2(+)** |  | **Race 2** | **Race 2** | **Pathotyp 2** | **Raza 2** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Galoubet, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Escrito, Pendragon | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Anasta, Cézanne | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.3(+)** |  | **Race 3** | **Race 3** | **Pathotyp 3** | **Raza 3** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Nettuno | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Batista, Godiva  | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.4(+)** |  | **Race 5** | **Race 5** | **Pathotyp 5** | **Raza 5** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Hugo, Pendragon | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Arapaho | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.5(+)** |  | **Race 3-5** | **Race 3-5** | **Pathotyp 3-5** | **Raza 3-5** |  |  |
| **QN** |  | susceptible | sensible | anfällig | susceptible | Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Cisco | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | 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 | Escrito, Score, Védrantais | 1 |
|  |  | moderately resistant | moyennement résistant | mäßig resistent | moderadamente resistente | Anasta | 2 |
|  |  | highly resistant | hautement résistant | hochresistent | altamente resistente | Heliobel | 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) | Résistance au virus de la mosaïque jaune de la courgette (ZYMV) | Resistenz gegen Zucchinigelb-mosaikvirus (ZYMV) | Resistencia al virus del mosaico amarillo del calabacín (ZYMV) |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Cardillo, Généris, Jador, Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Hannah’s Choice, Lunaduke | 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 (PRSV)** | **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 | Hannah’s Choice | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **74.2(+)** |  | **E2 strain** | **Souche E2** | **Pathotyp E2** | **Cepa E2** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Hannah’s Choice, Védrantais  | 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, Primal, 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, Lunaduke | 9 |

## Proposal for a Revision of the Chapter 8: Explanations on the Table of Characteristics

### Proposal to Include a Revised Format for Disease Resistance Characteristics under section 8.2

(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:  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *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 |

|  |  |  |
| --- | --- | --- |
| 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 | e.g. 3 |
| 9.3 | Control varieties | Jaune Canari 2 (susceptible), Vedrantais, Arapaho, Rubbens, Anasta, Cleo (resistant, depending on the considered race) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Gene* | Race 0 | Race 1 | Race 2 |
| **Jaune Canari 2** |  | S | S | S |
| **Védrantais** | *Fom-1* | R | S | R |
| **Arapaho, Rubbens** | *Fom-2* | R | R | S |
| **Anasta, Cleo** |  | 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 brothsome isolates need filtration or centrifugationresuspend 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 fungusat least 30 sec - 5 min |
| 10.5 | First observation | 7 days post inoculation |
| 10.6 | Second observation | 14 -20 days post inoculation |
| 10.7 | Final observations | 20 days post inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual, comparative |
| 11.2 | Observation scale |  |
|  | [1] absent | Growth retardation in combination with yellowing or wilting cotyledons (useful for judging the severity of the attack), possible internal vessel browning, death of plant. |
|  | [9] present | 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: Védrantais, Virgos (susceptible), Lunasol (moderately resistant), Dinero, Isabelle (highly resistant) |
| 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 |
| 9.2 | Number of replicates | e.g. 3 |
| 9.3 | Control varieties |  |
|  | [1] susceptible | Védrantais, Virgos, |
|  | [2] moderately resistant | Lunasol (the lowest accepted level) |
|  | [3] highly resistant | Dinero, Isabelle, 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 days post inoculation |
| 10.6 | Second observation | 14 - 21 days post inoculation |
| 10.7 | Final observations | 21- 28 days post inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual, comparative |
| 11.2 | Observation scale | symptoms: |
|  | [1] susceptible | Védrantais: growth retardation, yellow cotyledons, drying, possible internal vessel browning, 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 lower 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, 3, 5 and 3-5*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** **1** | **race** **2** | **race 3** | **race 5** | **race** **3-5** | **race 1** |
| **Védrantais** | S | S | S | S | S | S |
| **Nantais Oblong** | S | S | S | S | S | R |
| **PMR 45** | R | S | S | S | S | S |
| **Edisto 47, WMR 29** | R | R | R | S | S | S |
| **PI 124112, 90625** | R | R | R | R | R | R |
| **PMR 5** | R | R | S | R | S | R |
| **PI 414723** | R | R | IR | R | R/ IR | R |

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

|  |  |  |
| --- | --- | --- |
| 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, possible add of 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 to 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 inoculationRemark: 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 | e.g. 3 |
| 9.3 | Control varieties |  |

|  |  |
| --- | --- |
|  | **Powdery Mildew** |
|  | ***Podosphaera xanthii***  | ***Golovinomyces cichoracearum***  |
|  | **race 1** | **race 2** | **race 3** | **race 5** | **race 3-5** | **race 1** |
| susceptible | Jaune Canari 2, Védrantais | Galoubet, Védrantais | Védrantais | Védrantais | Védrantais | Védrantais |
| moderately resistant | Escrito | Escrito, Pendragon | Nettuno | Hugo, Pendragon | Cisco | Anasta |
| highly resistant | Anasta, Cézanne | Anasta, Cézanne | Batista, Godiva | Arapaho | 90625 | Heliobel |

|  |  |  |
| --- | --- | --- |
| 9.4 | Test design | leaf discs placed on 0.4% agar with 1- 4% mannitol and possible add of 0.003% benzimidazol |
| 9.5 | Test facility | climatic room |
| 9.6 | Temperature | 20-24°C |
| 9.7 | Light | 12 to 24h darkness after inoculation |
| 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 days post inoculation |
| 10.6 | Second observation | - |
| 10.7 | Final observations | 11-12 days post inoculation |
| 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 (Corona, Védrantais, Ventura) |
| 8.3 | Plant stage at inoculation | at first leaf (measuring around 2-3 cm) |
| 8.4 | Inoculation medium | - |
| 8.5 | Inoculation method | deposit a piece of infested leaf (visual appreciation) or ten adult wingless aphids per plant |
| 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 | e.g. 3 |
| 9.3 | Control varieties |  |
|  | [1] absent | Védrantais |
|  | [9] present | AR Hale’s Best Jumbo, AR Top Mark, 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 | at least 10 adults wingless aphid per plant |
| 10.3 | Plant stage at inoculation | 1st leaf measuring around 2-3 cm |
| 10.4 | Inoculation method | deposit of a piece of infested leaf or ten adult wingless aphids per plant |
| 10.5 | First observation | 1-4 days post inoculation |
| 10.6 | Second observation | - |
| 10.7 | Final observations | 5-10 days post inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual, to compare with standards |
| 11.2 | Observation scale |  |
|  | [1] absent | 9 or 10 adult aphids per plant; larvae frequent, plants covered with aphids, shriveled leaves |
|  | [9] present | 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)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Zucchini yellow mosaic virus* (ZYMV) |
| 2. | Quarantine status | no |
| 3. | Host species | *Cucumis melo* |
| 4. | Source of inoculum | GEVES (FR) |
| 5. | Isolate | F strain (e.g.strain 1318 Fn) or a NF strain (e.g. strain E15) |
| 6. | Establishment isolate identity | use standard varieties, flaccida necrosis on Généris (Zym+ / Fn) |
| 7. | Establishment pathogenicity | on susceptible melon varieties - as above |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | - |
| 8.2 | Multiplication variety | susceptible variety (e.g.: Védrantais) |
| 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 | e.g. 3 |
| 9.3 | Control varieties | Védrantais, Jador, Cardillo (susceptible), Hannah’s Choice, Lunaduke, PI 414723 (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 | Second observation | - |
| 10.7 | Final observations | 14-15 days post inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual, comparative |
| 11.2 | Observation scale |  |

|  |  |  |
| --- | --- | --- |
| Resistance to ZYMV | **ZYMV - Strain F**e.g.strain 1318 Fn | **ZYMV - Strain NF**e.g.: strain E15 |
| 1 | absent | Mosaic, non wilting | Mosaic, non wilting |
| Necrosis + slow wilting(flaccida necrosis) |
| Necrosis + fast wilting (flaccida necrosis) |
| 9 | present | chlorotic or necrotic systemic lesions and possibly an apical necrosis |
| 9 | present | No symptom |

|  |  |  |
| --- | --- | --- |
| 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 | The three distinct phenotypes associated with susceptibility to ZYMV strain F are connected with Fn gene.The Zym gene is epistatic on the Fn gene.The Fn gene modifies the susceptibility symptom expression of strain F: Fn/Fn is associated with fast wilting and necrosis (Flaccida-necrosis), Fn/Fn+ with the same reaction, but slower. Flaccida-necrosis is a form of systemic hypersensitivity, which is interpreted as susceptibility.The Fn gene has no influence on the symptom expression of resistant varieties. |

*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 | INRA Pathology - Avignon (FR) |
| 5. | Isolate | Guadeloupe strainand E2 strain |
| 6. | Establishment isolate identity |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Gene Pvr | **Standards** | Symptoms  | Behavior against PRSV **Guadeloupe strain** |
| allele (Prv+) | **Védrantais** | Mosaic (vein-clearing)  | susceptible |
| allele (Prv2) | **72-025, PI 414723**Hannah’s Choice | No systemic symptoms or Irregular local necrotic lesions on cotyledons  | **resistant** |
| allele (Prv1) | **WMR29** | No systemic symptomsOccasional local necrotic lesions on cotyledons | **resistant** |

|  |  |  |  |
| --- | --- | --- | --- |
| Gene Pvr | **Standards** | Symptoms | Behavior against PRSV **E2 strain** |
| allele (Prv+) | **Védrantais** | Mosaic (vein-clearing) | susceptible |
| allele (Prv2) | **72-025, PI 414723**Hannah’s Choice | Apical necrosisNecrosis of plant instead of local lesions  | susceptible |
| allele (Prv1) | **WMR29** | No systemic symptoms or few systemic chloronecrotic symptomsOccasional local necrotic lesions on cotyledons | **resistant** |

|  |  |  |
| --- | --- | --- |
| 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 | e.g. 3 |
| 9.3 | Control varieties | Védrantais (susceptible), Hannah’s Choice (resistant to Guadeloupe strain (Prv2 / Prv+)), WMR 29 (resistant to E2 strain (Prv1 / Prv+)) |
| 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 days post inoculation |
| 10.6 | Second observation | - |
| 10.7 | Final observations | 20 days post inoculation |
| 11. | Observations | visual, comparative |
| 11.1 | Method |  |
| 11.2 | Observation scale |  |

|  |  |  |
| --- | --- | --- |
| Resistance to PRSV -**Guadeloupe strain** | Gene Pvr | Symptoms  |
| [1] absent | allele (Prv+) | Mosaic (vein-clearing)  |
| [9] present | allele (Prv2) | No systemic symptomsIrregular local necrotic lesions on cotyledons  |
| [9] present | allele (Prv1) | No systemic symptomsOccasional local necrotic lesions on cotyledons |

|  |  |  |
| --- | --- | --- |
| Resistance to PRSV –**E2 strain** | Gene Pvr | Symptoms |
| [1] absent | allele (Prv+) | Mosaic (vein-clearing) |
| [1] absent | allele (Prv2) | Apical necrosisNecrosis of plant instead of local lesions  |
| [9] present | allele (Prv1) | No systemic symptoms or few systemic chloronecrotic symptomsOccasional local necrotic lesions on cotyledons |

|  |  |  |
| --- | --- | --- |
| 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 (FR) |
| 5. | Isolate | E8strain |
| 6. | Establishment isolate identity | Védrantais (susceptible), PMR5, VA 435, Virgos (resistant) |
| 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 | e.g. 3 |
| 9.3 | Control varieties | Védrantais (susceptible), Cyro, Primal, Virgos, Yellow Fun, (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 | First observation | - |
| 10.6 | Second observation | - |
| 10.7 | Final observations | 8-15 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual |
| 11.2 | Observation scale |  |
|  | [1] absent | necrotic lesions on the inoculated organs, possible systemic reaction (depends on condition, and varieties), possible death of plant |
|  | [9] present  | 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 (FR) |
| 5. | Isolate | Use “common” strains (e.g. Tl, P9) |
| 6. | Establishment isolate identity | Védrantais, 72-025 (susceptible), PI 161375, Virgos (resistant) |
| 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.: 1 g leaves with 4 mL 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 | e.g. 3 |
| 9.3 | Control varieties | Védrantais (susceptible), Lunaduke, Virgos (resistant) |
| 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. After a few minutes, rinse the cotyledons with running water, when uses activated charcoal. |
| 10.5 | First observation | - |
| 10.6 | Second observation | - |
| 10.7 | Final observations | 7-8 days after inoculation |
| 11. | Observations |  |
| 11.1 | Method | visual, comparative |
| 11.2 | Observation scale |  |
|  | [1] absent | Mosaics |
|  | [9] present  | 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 PI 161375) may present chlorotic lesions on the first leaf.- Virgos seeds usually germinate better than seeds of PI 161375 - Songwhan Charmi = PI 161375: name of the melon variety, on which this strain was identified. The “song” strains break the common resistance to CMV (e.g.: “song” strains 14, T2).- Intermediate reactions may occur; the resistance is polygenic. |

## Proposal for a Revision of the Chapter 9 “Literature”

To add the following literature reference to Chapter 9:

Bohn, G. W., Kishaba, A. N., McCreight, J. D., 1980: WMR 29 muskmelon breeding line. HortScience 15: pp 539-540

Henning, M. J., Munger, H. M., Jahn, M. M., 2005: Hannah's Choice F1: a new muskmelon hybrid with resistance to powdery mildew, Fusarium race 2, and potyviruses. HortScience 40:492-493

OECD, 2006: International Standards for Fruit and Vegetables – Commercial types of Melons. OECD publication, 96 pp.

Mention P., Cottet V. et al., 2011: Recognizing commercial melon and watermelon types - CTIFL publication. 203 pp.

## Proposal for a Revision of the Chapter 10 “Technical Questionnaire”

### Section 5: TQ characteristics selected from the Table of Characteristics

To add the following characteristics to Section 5 “Characteristics of the variety to be indicated”

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)

### Section 7: Addition of new characteristics under 7.3.1

To add the following to Section 7 “Additional information which may help in the examination of the variety”:

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | susceptible | moderately resistant | highly resistant | not tested |
| (a) | *Fusarium oxysporum* f. sp. *melonis,* Race 1.2(char. 69.4) | [ ] | [ ] | [ ] | [ ] |
| (b) | *Podosphaera xanthii (*ex *Sphaerotheca fuliginea)* Race 1 (char. 70.1) | [ ] | [ ] | [ ] | [ ] |
| (c) | *Podosphaera xanthii (*ex *Sphaerotheca fuliginea)* Race 2 (char. 70.2) | [ ] | [ ] | [ ] | [ ] |
| (d) | *Podosphaera xanthii (*ex *Sphaerotheca fuliginea)* Race 3 (char. 70.3) | [ ] | [ ] | [ ] | [ ] |
| (e) | *Podosphaera xanthii (*ex *Sphaerotheca fuliginea)* Race 5 (char. 70.4) | [ ] | [ ] | [ ] | [ ] |
| (f) | *Podosphaera xanthii (*ex *Sphaerotheca fuliginea)* Race 3-5 (char. 70.5) | [ ] | [ ] | [ ] | [ ] |
| (g) | *Golovinomyces cichoracearum* (ex *Erysiphe cichoracearum*)*,* Race 1 *- Powdery mildew -* Gc (Ec) (char. 71) | [ ] | [ ] | [ ] | [ ] |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | absent | present | not tested |
| (h) | colonization by *Aphis gossypii* (char. 72) | [ ] | [ ] | [ ] |
| (i) | *Zucchini yellow mosaic virus* (ZYMV) (char. 73) | [ ] | [ ] | [ ] |
| (j) | *Papaya ringspot virus* (PRSV) (char. 74) *Strain to precise:* * Guadeloupe □
* E2 □
 | [ ] | [ ] | [ ] |
| (k) | *Melon necrotic spot virus* (MNSV), E8 strain (char. 75) | [ ] | [ ] | [ ] |
| (l) | *Cucumber mosaic virus* (CMV) (char. 76) | [ ] | [ ] | [ ] |

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