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| Internationaler Verband zum Schutz von Pflanzenzüchtungen |  |

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| Technischer Ausschuss  Neunundfünfzigste Tagung  Genf, 23. und 24. Oktober 2023 | TC/59/20  Original: englisch  Datum: 29. September 2023 |

Teilüberarbeitung der Prüfungsrichtlinien für Melone

von einem Sachverständigen aus Frankreich erstelltes Dokument

Haftungsausschluss: dieses Dokument gibt nicht die Grundsätze oder eine Anleitung der UPOV wieder

Zweck dieses Dokuments ist es, einen Vorschlag für eine Teilüberarbeitung der Prüfungsrichtlinien für Melone (Dokument TG/104/5 Rev. 2) vorzulegen.

Auf ihrer siebenundfünfzigsten Tagung[[1]](#footnote-2) prüfte die Technische Arbeitsgruppe für Gemüsearten (TWV) einen Vorschlag für eine Teilüberarbeitung der Prüfungsrichtlinien für Melone (*Cucumis melo* L.) auf Grundlage der Dokumente TG/104/5 Rev. 2 und TWV/57/22 *“Partial revision of the Test Guidelines for Melon*”, und schlug folgende Änderungen vor (vergleiche Dokument TWV/57/26 „*Report*“, Absatz 70):

1. Überarbeitung des Merkmals 69 „Resistenzen gegen *Fusarium oxysporum* f. sp. *melonis* (Fom) - Pathotypen 0, 1, 2 und 1.2“;
2. Überarbeitung der Erläuterung zu 69 „Resistenzen gegen *Fusarium oxysporum* f. sp. *melonis* (Fom) - Pathotypen 0, 1, 2 und 1.2“ in Kapitel 8.2 „Erläuterungen zu einzelnen Merkmalen“.;
3. Überarbeitung der Merkmale 70.1 bis 70.5 “Resistenz gegen *Podosphaera xanthii* (Px) - Pathotypen 1, 2, 3, 5, 3.5”;
4. Überarbeitung der Erläuterungen Zu 70.1 bis 70.3, 71 „Resistenzen gegen *Podosphaera xanthii* (Px), Resistenz gegen *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*), Pathotyp 1 (Echter Mehltau) Gc (Ec)“;
5. Aufnahme von Merkmalen aus der Merkmalstabelle im Technischen Fragebogen

Die vorgeschlagenen Änderungen werden nachstehend angebeben. Die vorgeschlagenen Änderungen werden in der Anlage mit Hervorhebung durch Unterstreichen (Einfügungen) und ~~Durchstreichen~~ (Streichungen) angegeben (nur auf Englisch).

Überarbeitung des Merkmals 69 „Resistenzen gegen *Fusarium oxysporum* f. sp. *melonis* (Fom) - Pathotypen 0, 1, 2 und 1.2“

|  |  | English | français | deutsch | español | Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo | Note/ Nota |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69. | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* (Fom) | Résistance à *Fusarium oxysporum* f. sp. *melonis* (Fom) | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* (Fom) | Resistencia al *Fusarium oxysporum* f. sp. *melonis* (Fom) |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.1   (+) |  | **Race 0 (Fom: 0)** | **Race 0 (Fom: 0)** | **Pathotyp 0 (Fom: 0)** | **Raza 0 (Fom: 0)** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Atos, Charentais T | 1 |
|  |  | present | présente | vorhanden | presente | Cadence,  Charentais Fom-2, Dibango, Jubilo, Karakal, Védrantais | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.2   (+) |  | Race 1 (Fom: 1) | Race 1 (Fom: 1) | Pathotyp 1 (Fom: 1) | Raza 1 (Fom: 1) |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Atos, Charentais T,  Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | Cadence,  Charentais Fom-2, Dibango, Jubilo, Karakal | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.3   (+) |  | Race 2 (Fom: 2) | Race 2 (Fom: 2) | Pathotyp 2 (Fom: 2) | Raza 2 (Fom: 2) |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Atos, Charentais Fom-2, Charentais T, Dibango, Marianna | 1 |
|  |  | present | présente | vorhanden | presente | Cadence,  Charentais Fom-1, Jubilo, Karakal, Perlita, Védrantais | 9 |
| **69.4  (+)** | **VG** | Resistance to *Fusarium oxysporum* f. sp. *melonis*  Race 1.2 (Fom: 1.2) | **Résistance à *Fusarium oxysporum* f. sp. *melonis*****Race 1.2 (Fom: 1.2)** | **Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* Pathotyp 1.2 (Fom: 1.2)** | **Resistencia al *Fusarium oxysporum* f. sp. *melonis* Raza 1.2 (Fom: 1.2)** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | Graffio, Prity, Virgos | 1 |
|  |  | present | présente | vorhanden | presente | Isabelle, Kyriel, Lunasol, Meliance, Piboule | 9 |

## Vorgeschlagene Überarbeitung der Erläuterung Zu 69 „Resistenzen gegen *Fusarium oxysporum* f. sp. *melonis* (Fom) - Pathotypen 0, 1, 2 und 1.2“ in Kapitel 8.2 „Erläuterungen zu einzelnen Merkmalen“.

Zu 69: 69.1 - 69.3: Resistenz gegen *Fusarium oxysporum* f. sp. *melonis,* Pathotypen 0, 1 und 2 (Fom: 0, Fom: 1, Fom: 2)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Fusarium oxysporum* f. sp. *melonis* Pathotypen 0, 1 und 2 |
| 2. | Quarantänestatus | keiner |
| 3. | Wirtsarten | Melone - *Cucumis melo* |
| 4. | Quelle des Inokulums | z. B. GEVES (FR)[[2]](#footnote-3) |
| 5. | Isolat | z. B. in einer laborübergreifenden Prüfung[[3]](#footnote-4), [[4]](#footnote-5) validierter Referenzstamm  Fom: 0   * Stamm MLZ   = MAT/REF/04-07-01-03-02  Fom: 1   * Stamm FOM 26   = MAT/REF/04-07-01-01  Fom: 2   * Stamm F185 |
| 6. | Feststellung der Isolatidentität | Die neueste Tabelle ist beim ISF verfügbar unter  <https://www.worldseed.org/our-work/plant-health/differential-hosts/>  *Stand Juli 2019* |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Differentielle Wirtssorte** | **Gen vorhanden** | **Fom: 0\*** | **Fom: 1\*** | **Fom: 2\*** | **Fom: 1.2\*** | | Charantais T\* | - | S | S | S | S | | Védrantais\*,  Doublon\* | *Fom-1* | HR | S | HR | S | | Charantais Fom-2\*, CM17187\* | *Fom-2* | HR | HR | S | S | | Isabelle\* | *Polygen?* | HR | HR | HR | IR |   S = anfällig; HR = hochresistent; IR = mäßig resistent  \*Differentielle Wirtssorten und Isolate, die im Saatgutsektor verwendet werden  Mit freundlicher Genehmigung der Website Worldseed.org | | |
| 7. | Feststellung der Pathogenität | Verwendung anfälliger Melonensorten |
| 8. | Vermehrung des Inokulums |  |
| 8.1 | Vermehrungsmedium | auf Agarmedium - z. B. Kartoffeldextrose-Agar, Malz-Agar bei 20 °C bis 25 °C |
| 8.2 | Vermehrungssorte | - |
| 8.3 | Pflanzenstadium bei der Inokulation | - |
| 8.5 | Inokulationsmethode | - |
| 8.6 | Ernte des Inokulums | 7 - 10 Tage alte Kultur |
| 8.7 | Prüfung des geernteten Inokulums | - |
| 8.8 | Haltbarkeit / Lebensfähigkeit des Inokulums | Zwischen 4 und 8 Std. oder kühl stellen, um Keimen der Sporen zu verhindern |
| 9. | Prüfungsanlage |  |
| 9.1 | Anzahl der Pflanzen pro Genotyp | mind. 30 Pflanzen, wobei es wichtig ist, mind. 5 nicht inokulierte Pflanzen pro Genotyp zu haben, um die Wachstumsverringerung beurteilen zu können |
| 9.2 | Anzahl der Wiederholungen | Mind. z. B. 3 Wiederholungen (3 x10) |
| 9.3 | Kontrollsorten |  |
| 9.3.1 | Kontrollsorten für Pathotyp 0 | Resistenz fehlend: Charentais T  Resistenz vorhanden: Charentais Fom-2, Védrantais |
| 9.3.2 | Kontrollsorten für Pathotyp 1 | Resistenz fehlend: Charentais T, Védrantais  Resistenz vorhanden: Charentais Fom-2 |
| 9.3.3 | Kontrollsorten Pathotyp 2 | Resistenz fehlend: Marianna  Resistenz vorhanden: Perlita, Charentais Fom-1, Védrantais |
| 9.4 | Gestaltung der Prüfung | 3 Wiederholungen mit 10 Pflanzen für die statistische Analyse (in verschiedenen Schalen) und mind. 5 nicht inokulierte Pflanzen pro Genotyp. |
| 9.5 | Prüfungseinrichtung | Gewächshaus oder Klimakammer |
| 9.6 | Temperatur | - Fom: 0 und Fom: 1: 18 -~~25~~ 24°C  - Fom: 2: 24 °C |
| 9.7 | Licht | - Fom: 0 und Fom: 1: Mind. 12 Std.  - Fom: 2: 16 Std. |
| 9.9 | Besondere Maßnahmen | - Fom: 0 und Fom: 1: Es werden wirklich nachts 18 °C und tagsüber nicht mehr als 24 °C empfohlen. |
| 10. | Inokulation |  |
| 10.1 | Vorbereitung des Inokulums | Abschaben der Sporenkulturen mit Wasser von Agarmedium (vgl. 8.1) oder optional Vermehrung auf Flüssigmedium (z. B. Messiaen (1991) synthetischem Flüssigmedium, Saccharose 50 g/L, mit Dauerrührschüttler oder belüftetem Czapek-Dox-Kulturmedium für 5 - 7 Tage bei Raumtemperatur).  *Anmerkung*: Auf Toxinproduktion einiger Isolate achten (vgl. Anmerkung unter 13.) |
| 10.2 | Quantifizierung des Inokulums | 4x105 bis 1x106  sp /mL |
| 10.3 | Pflanzenstadium bei der Inokulation | Keimblatt entfaltet |
| 10.4 | Inokulationsmethode | Pflanzen im Inokulationsstadium werden vorsichtig geerntet, Wurzeln und Hypokotyle werden für 2 - 15 Min. in Sporensuspension getaucht; Kürzen der Wurzeln optional; in Schalen umpflanzen. |
| 10.5 | Erste Erfassung | Erste Erfassung: Symptome für Resistenz fehlend (anfällig) Kontrollsorte in den Klassen 2 und 3 mit einem starken Anteil in Klasse 3 |
| 10.6 | Zweite Erfassung | Eine zweite Erfassung kann erforderlich sein, um einige unklare Sorten neu zu bewerten |
| 11. | Erfassungen |  |
| 11.1 | Methode | Visuelle Erfassung |

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| --- | --- | --- |
| 11.2 | Erfassungsskala |  |

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| --- | --- | --- |
| nicht inokulierte Pflanze | Klasse 0 | Klasse 1 |
| mind. 5 Pflanzen | Gesunde Pflanze: keine Symptome von Vergilben und Welken, möglicherweise eine gewisse Wachstumsverringerung aufgrund von Inokulationsstress im Vergleich zu Probe. Manchmal kann bei der Probe ein Vergilben beobachtet werden, das sich von den Symptomen von *Fusarium* unterscheidet | Leichte Symptome von Vergilben/Welken |
|  | | |

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| --- | --- | --- |
| Klasse 2 | Klasse 3 |  |
| typische Symptome: Vergilben, Welken und Nekrose, Verkümmern (Beendigung des Wachstums) | Absterben der Pflanze (Abgestorben) |  |
|  | | Andere Symptome der Adernentfärbung können schwer zu beurteilen sein.  Es wird empfohlen, die Entwicklung dieser Symptome im Laufe der Zeit zu beobachten. |

Mit freundlicher Genehmigung von GEVES-SNES im Rahmen des CPVO Harmores-Projekts.

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| 11.3 | Validierung der Prüfung | Validierung an Kontrollsorten.  Bei Fom: 0 und Fom: 1 Tests:  Erwartete Reaktion der Kontrollsorten:  Resistenz fehlend: die meisten Pflanzen in Klassen 2 und 3  Resistenz vorhanden: die meisten Pflanzen in Klassen 0 und 1, manchmal auch sehr wenige Pflanzen in Klassen 2 oder 3.  Bei Fom: 2 Test  Erwartete Reaktion der Kontrollsorten:   * Anfällige Kontrollsorten mit der UPOV-Ausprägungsstufe ‚Resistenz fehlend‘ sollten die meisten Pflanzen in den Erfassungsklassen 2 oder 3 und wenige oder keine Pflanzen in den Erfassungsklassen 0 oder 1 aufweisen.   + Marianna, die anfällige Kontrollsorte, ist weniger anfällig als Charentais Fom‑2, Charentais T * Resistente Kontrollsorten sollten die meisten Pflanzen in den Erfassungsklassen 0 oder 1 und wenige oder keine Pflanzen in den Erfassungsklassen 2 oder 3 aufweisen.   Perlita, die Resistenzkontrollsorte mit niedrigerem Schwellenwert, sollte zumindest einige Pflanzen in der Erfassungsklasse 1, 2 oder 3 aufweisen. Sie muss weniger resistent sein als Charentais Fom-1, Védrantais. |
| 11.4 | Abweicher | - |
| 12. | Auswertung der Daten hinsichtlich der UPOV-Ausprägungsstufen | Bei Sorten, deren Reaktion zwischen der anfälligen (Resistenz fehlend) und der resistenten Kontrollsorte liegt, ist die Prüfung zu wiederholen~~.~~  Wird das Ergebnis bestätigt, wird die Sorte als heterogen beurteilt.  Bei unklaren Ergebnissen ist die Prüfung zu wiederholen oder in einem anderen Labor durchzuführen. |

Resistenz gegen Fom: 0 und Fom: 1

Une image contenant diagramme

Description générée automatiquement

**Kein Unterschied zu** Kontrollsorte mit **vorhandener Resistenz**

**Kein Unterschied zu** Kontrollsorte mit **fehlender Resistenz**

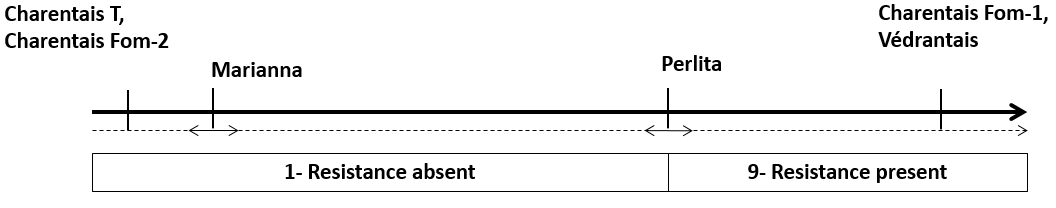
*Nicht eindeutiges Ergebnis*

*erneut testen*

**9 - Resistenz vorhanden**

**1 - Resistenz fehlend**

Resistenz gegen Fom: 2



**9 - Resistenz vorhanden**

**1 - Resistenz fehlend**

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| --- | --- | --- |
| 13. | Kritische Kontrollpunkte | Für Pathotyp 2 erlaubt die Kontrollsorte Perlita mit dem Fom-3-Gen die Validierung der Fähigkeit des Isolats, diese Sorte teilweise anzugreifen.  Bei einem Inokulums, das z. B. in einem synthetischen Flüssigmedium von Messiaen (1991) mit Dauerrührschüttler vermehrt wird, kann das Inokulum nach 5 bis 7 Tagen verwendet werden.  Für Pathotyp 0 und 1 wird eine Verdünnung von 1/12 empfohlen, während die Verdünnung für Pathotyp 2 nicht unter 1/20 liegen darf. Bei einer geringeren Verdünnung (höhere Konzentration des Mediums) wurde beobachtet, dass die von Pathotyp 2 in das Medium freigesetzten Toxine ein gewisses Vergilben der Melonenpflanzen verursachen können, selbst wenn diese resistent sind. Alternativ können die Sporen durch Resuspendieren einer auf einem Millipore-Filter gesammelten Sporenmasse mit Unterdruck „gewaschen“ werden. |

Zu 69.4: Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* pathotyp 1.2 (Fom: 1.2)

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| --- | --- | --- |
| 1. | Pathogen | *Fusarium oxysporum* f. sp. *melonis* Pathotyp 1.2 (Fom: 1.2) |
| 2. | Quarantänestatus | Keiner |
| 3. | Wirtsarten | Melone - *Cucumis melo* L. |
| 4. | Quelle des Inokulums | GEVES (FR)[[5]](#footnote-6) |
| 5. | Isolat | z. B. in einer laborübergreifenden Prüfung[[6]](#footnote-7) validierter Referenzstamm  Fom: 1.2   * Stamm TST   = MAT/REF/04-07-01-04 2 |
| 6. | Feststellung der Isolatidentität | Die neueste Tabelle ist beim ISF verfügbar unter  [https://www.worldseed.org/our-work/plant-health/vergleichssorte-hosts/](https://www.worldseed.org/our-work/plant-health/differential-hosts/)  *Stand Juli 2019* |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Differentielle Wirtssorte** | **Gen vorhanden** | **Fom: 0\*** | **Fom: 1\*** | **Fom: 2\*** | **Fom: 1.2\*** | | Charantais T\* | - | S | S | S | S | | Védrantais\*,  Doublon\* | *Fom-1* | HR | S | HR | S | | Charantais Fom-2\*, CM17187\* | *Fom-2* | HR | HR | S | S | | Isabelle\* | *Polygen?* | HR | HR | HR | IR |   S = anfällig; HR = hochresistent; IR = mäßig resistent  \*Differentielle Wirtssorten und Isolate, die im Saatgutsektor verwendet werden  Mit freundlicher Genehmigung der Website Worldseed.org | | |
| 7. | Feststellung der Pathogenität | Verwendung anfälliger Melonensorten |
| 8. | Vermehrung des Inokulums |  |
| 8.1 | Vermehrungsmedium | auf Agarmedium, z. B. Kartoffeldextrose-Agar, Sabouraud, bei 20 °C bis 25 °C |
| 8.2 | Vermehrungssorte | - |
| 8.3 | Pflanzenstadium bei der Inokulation | - |
| 8.5 | Inokulationsmethode | - |
| 8.6 | Ernte des Inokulums | 4-10 Tage alte Kultur |
| 8.7 | Prüfung des geernteten Inokulums | - |
| 8.8 | Haltbarkeit/Lebensfähigkeit des Inokulums | - |
| 9. | Prüfungsanlage |  |
| 9.1 | Anzahl der Pflanzen pro Genotyp | 30 Pflanzen pro Sorte plus 5 nicht inokulierte Kontrollsorten |
| 9.2 | Anzahl der Wiederholungen | mind. 3 x 10 Pflanzen, in verschiedenen Schalen |
| 9.3 | Kontrollsorten | Resistenz fehlend: Virgos  Resistenz vorhanden: Piboule und Lunasol und Isabelle (Es wird erwartet, dass Isabelle einen niedrigeren Krankheitsindex (DI) aufweist (= höhere Resistenz als Piboule und Lunasol).  Piboule und Lunasol werden beide benötigt, um das niedrigere Niveau von Resistenz zu veranschaulichen. Ihre Resistenz beruht auf anderen genetischen Faktoren und kann in verschiedenen Labors unterschiedlich hoch sein. |
| 9.4 | Gestaltung der Prüfung | 3 Wiederholungen mit 10 Pflanzen für die statistische Analyse (in verschiedenen Schalen) und mind. 5 nicht inokulierte Pflanzen pro Genotyp. |
| 9.5 | Prüfungseinrichtung | Gewächshaus oder Klimakammer |
| 9.6 | Temperatur | 18 – 24 °C |
| 9.7 | Licht | mind. 12 Std. |
| 10. | Inokulation |  |
| 10.1 | Vorbereitung des Inokulums | Abschaben der Kulturen mit Wasser auf Agarmedium (vgl. 8.1) oder optional Vermehrung auf Flüssigmedium (z. B. Kartoffel-Dextrose-Brühe (PDB), Czapek-Dox-Kulturmedium für 7 Tage bei Raumtemperatur und Dunkelheit oder Messiaen (1991) synthetischem Flüssigmedium, Saccharose 50 g/L, mit Dauerrührschüttler, bei Raumtemperatur, Inokulum kann nach 5 bis 7 Tagen verwendet werden) |
| 10.2 | Quantifizierung des Inokulums | 1x105-1x106 sp/ml, je nach Inokulationsmethode (vgl. 10.4) und Laborbedingungen |
| 10.3 | Pflanzenstadium bei der Inokulation | Keimblätter entfaltet, erstes Blatt erscheint |
| 10.4 | Inokulationsmethode | Für die Inokulation kann eine von zwei Methoden angewendet werden.   * Absorption:   Absorption einer Sporensuspension, z. B. 700 ml einer Suspension von 1,105 sp/ml für 50 Pflanzen in einer Schale von 30 cm\*30 cm.   * Injektion:   Injektion einer Sporensuspension in die Erde an der Basis der Pflanze, z. B. 5 ml bei 106 sp/ml pro Pflanze. |
| 10.7 | Abschließende Erfassungen | Erste Erfassung: Symptome bei anfälligen Kontrollsorten mind. in Klasse 3 [im Allgemeinen 10-21 dpi]. Eine zweite Erfassung kann erforderlich sein, um einige unklare Sorten neu zu bewerten. |
| 11. | Erfassungen |  |
| 11.1 | Methode | Visuelle Erfassung |
| 11.2 | Erfassungsskala |  |

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| Nicht inokulierte Pflanzen | Klasse 0 | Klasse 1 |
| Sorten müssen mit den nicht inokulierten Pflanzen verglichen werden. | Gesunde Pflanze, die ganze Pflanze ist grün oder auf dem gleichen Niveau wie bei der Probe. Es kann nur ein leichtes Vergilben bei der Probe akzeptiert werden. | Leichte Ausprägung der Symptome, leichtes Vergilben an Keimblättern und/oder Blättern ohne Nekrose |
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| Klasse 2 | Klasse 3 | Klasse 4 |
| Mäßige Ausprägung der Symptome, Vergilben der Keimblätter und/oder Blätter, Beginn von Nekrose und Welken, aber nicht ausgedehnt | Ausgeprägte Symptome von Vergilben und/oder Welken an Keimblättern und/oder Blättern mit ausgedehnter Nekrose | Abgestorbene Pflanze, kein grüner Blattteil oder Hypokotyl ist trocken |
|  | | |

Mit freundlicher Genehmigung von GEVES-SNES im Rahmen des CPVO Harmores-Projekts.

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| 11.3 | Validierung der Prüfung | Validierung an Kontrollsorten. Erwartete Reaktion der Kontrollsorten:   * Resistenz vorhanden:   Die meisten Pflanzen in Klassen 0 und 1, in einigen Fällen auch wenige Pflanzen in Klassen 2, 3 und 4.  Niedriger Krankheitsindex (DI) im Allgemeinen unter 40 %. Ein Unterschied im Krankheitsindex wird im Allgemeinen zwischen Piboule und Lunasol im Vergleich zu Isabelle beobachtet   * Resistenz fehlend:   Die meisten Pflanzen in Klassen 3 und 4, in einigen Fällen auch wenige Pflanzen in Klasse 0, 1 oder 2. Sehr hoher Krankheitsindex (DI) über 80 %. |
| 11.4 | Abweicher | ~~-~~ |
| 12. | Auswertung der Daten hinsichtlich der UPOV-Ausprägungsstufen | Auswertung der Sorten je nach Kontrollsorten (Abbildung 1)  Note 1 = Resistenz fehlend  Note 9 = Resistenz vorhanden  Die quantitative Analyse basiert auf dem Krankheitsindex (DI) UND der Verteilung der Pflanzen pro Klasse im Vergleich zu den Kontrollsorten  Die Sorten, die den resistenten Kontrollsorten statistisch ähnlich sind oder einen niedrigeren Krankheitsindex (DI) aufweisen, müssen als resistent beurteilt werden.  Die Sorten, die zwischen den anfälligen und den resistenten Kontrollsorten liegen, müssen als anfällig beurteilt werden.  Bei Unklarheit wird die Verwendung von Statistiken dringend empfohlen. |
| Resistenz gegen Fom:1-2:    **9 - Resistenz vorhanden**  **1 - Resistenz fehlend**  Nx: Anzahl von Pflanzen in Klasse x  *Abbildung 1: Formel für den Krankheitsindex (DI)* | | |

Überarbeitung der Merkmale 70.1 bis 70.5 “Resistenz gegen *Podosphaera xanthii* (Px) - Pathotypen 1, 2, 3, 5, 3.5”

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 70. | VG | Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) | Résistance à *Podosphaera xanthii* (Px)(ex *Sphaerotheca fuliginea)* (oïdium) | Resistenz gegen *Podosphaera xanthii* (Px)(ex *Sphaerotheca fuliginea)* (Echter Mehltau) | Resistencia a *Podosphaera xanthii* (Px)(ex *Sphaerotheca fuliginea)* (Oidio) |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.1  (+)** |  | **Race 1 (Px: 1)** | **Race 1 (Px: 1)** | **Pathotyp 1 (Px: 1)** | **Raza 1 (Px: 1)** |  |  |
| **QN** |  | absent or low | absente ou faible | fehlend oder gering | ausente o baja | Védrantais | 1 |
|  |  | medium | moyenne | mittel | media | Escrito | 2 |
|  |  | high | élevée | hoch | alta | Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.2  (+)** |  | **Race 2 (Px: 2)** | **Race 2 (Px: 2)** | **Pathotyp 2 (Px: 2)** | **Raza 2 (Px: 2)** |  |  |
| **QN** |  | absent or low | absente ou faible | fehlend oder gering | ausente o baja | Védrantais | 1 |
|  |  | medium | moyenne | mittel | media | Escrito, Pendragon | 2 |
|  |  | high | élevée | hoch | alta | Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.3  (+)** |  | **Race 3 (Px: 3)** | **Race 3 (Px: 3)** | **Pathotyp 3 (Px: 3)** | **Raza 3 (Px: 3)** |  |  |
| **QN** |  | absent or low | absente ou faible | fehlend oder gering | ausente o baja | Védrantais | 1 |
|  |  | medium | moyenne | mittel | media | Arago, Durango | 2 |
|  |  | high | élevée | hoch | alta | Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.4  (+)** |  | **Race 5 (Px: 5)** | **Race 5 (Px: 5)** | **Pathotyp 5 (Px: 5)** | **Raza 5 (Px: 5)** |  |  |
| **QN** |  | absent or low | absente ou faible | fehlend oder gering | ausente o baja | Védrantais | 1 |
|  |  | medium | moyenne | mittel | media | Arago, Durango | 2 |
|  |  | high | élevée | hoch | alta | Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.5  (+)** |  | **Race 3-5 (Px: 3.5)** | **Race 3-5 (Px: 3.5)** | **Pathotyp 3-5 (Px: 3.5)** | **Raza 3-5 (Px: 3.5)** |  |  |
| **QN** |  | absent or low | absente ou faible | fehlend oder gering | ausente o baja | Védrantais | 1 |
|  |  | medium | moyenne | mittel | media | Arago, Durango | 2 |
|  |  | high | élevée | hoch | alta | Arum | 3 |

## Überarbeitung der Erläuterungen Zu 70.1 bis 70.3, 71 „Resistenzen gegen *Podosphaera xanthii* (Px), Resistenz gegen *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*), Pathotyp 1 (Echter Mehltau) Gc (Ec)“ in Kapitel 8.2 „Erläuterungen zu einzelnen Merkmalen“.

Zu 70.1 bis 70.5: Resistenz gegen *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea*) (Echter Mehltau) Pathotypen 1, 2, 3, 5, 3.5 (Px: 1, 2, 3, 5, 3.5)

Zu 71: Resistenz gegen *Golovinomyces cichoracearum (Erysiphe cichoracearum),* Pathotyp 1 (Echter Mehltau) Gc (Ec)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | Echter Mehltau: *Podosphaera xanthii* (ex *Spaerotheca fuliginea*) Pathotypen 1, 2, 3, 5 und 3,5  *Golovinomyces cichoracearum* (ex *Erysiphe cichoracearum*) Pathotyp 1 |
| 2. | Quarantänestatus | keiner |
| 3. | Wirtsarten | Melone - *Cucumis melo* L. |
| 4. | Quelle des Inokulums | GEVES (FR)[[7]](#footnote-8) |
| 5. | Isolat | z. B. in einer laborübergreifenden Prüfung[[8]](#footnote-9) validierter Referenzstamm  Px: 1   * Stamm Sm 3   = MAT/REF/04-07-03-01 3  Px: 2   * Stamm S87-7   = MAT/REF/04-07-03-02 3  Px: 3   * Stamm 00Sm39   = MAT/REF/04-07-03-04-02 3  Px: 5   * Stamm 98Sm65   = MAT/REF/04-07-03-03-01-02 3  Px: 3.5   * Stamm 04Sm2   = MAT/REF/04-07-03-05-01 3  Gc: 1   * Stamm GEVES   = MAT/REF/04-07-02-01)[3](mailto:contact@geves.fr) |
| 6. | Feststellung der Isolatidentität | an Vergleichssorten (Tabelle 1) |

Tabelle 1:

Pathotypen von *Podosphaera xanthii* (Px) und *Golovinomyces cichoracearum* (Gc), J. McCreight und M. Pitrat

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | *Podosphaera xanthii* | | | | | | *Golovinomyces cichoracearum* | |
|  | Patho-typ 0 | Patho-typ 1 | Patho-typ 2 | Patho-typ 3 | Patho-typ 4 | Patho-typ 5 | Patho- typ 3,5 | Pathotyp 0 | Pathotyp 1 |
| Iran H | S | S | S | S | S | S | S | S | S |
| Védrantais | R | S | S | S | S | S | S | R | S |
| PMR45 | R | R | S | S | S | S | S | R | S |
| WMR29 | R | R | R | R | S | S | S | R | S |
| Edisto 47 | R | R | R | R | R | S | S | R | S |
| MR-1, PI124112 | R | R | R | R | R | R | R | R | R |
| PMR5 | R | R | R | S | S | R | S | R | R |
| Nantais Oblong | R | S | S | S | S | S | S | R | R |

|  |  |  |
| --- | --- | --- |
| 7. | Feststellung der Pathogenität | Verwendung anfälliger Melonensorten |
| 8. | Vermehrung des Inokulums |  |
| 8.1 | Vermehrungsmedium | Melonenpflänzchen |
| 8.2 | Vermehrungssorte | Anfällige Sorte, z. B. Védrantais.  Für höhere Isolate wie 3,5 oder 5 wird eine Sorte mit gebrochener Resistenz empfohlen, um das Isolat reinzuhalten. |
| 8.3 | Pflanzenstadium bei der Inokulation | Keimblatt |
| 8.5 | Inokulationsmethode | In Substrat, z. B. Erde oder desinfiziertem Torf in einem geschlossenen Mini-Gewächshaus aussäen. Wenn sich die Keimblätter ausgebildet haben, werden sie von der Pflanze entfernt. Keimblätter desinfizieren, indem sie für 3 Min. in eine Quecksilberchloridlösung (0,05 %) oder in Natriumhypochloritlösung eingeweicht werden. Mit sterilisiertem Wasser spülen. Die Keimblätter mit sterilem Papiertuch trocknen, dann mit folgendem Medium in Petrischalen legen:  Saccharose 10g  Manit 20g  Agar 5g  Destilliertes Wasser 1 Liter  Konidien auf die Keimblätter streuen und wegblasen oder Konidien auf der Oberfläche der Keimblätter absetzen. Die inokulierten Keimblätter z. B. bei 23 °C für 14 Std. im Licht und bei 18 °C für 10 Std. im Dunkeln oder bei 17 °C dauerhaft bei sehr geringer Lichtintensität in Petrischalen inkubieren. 9 bis 11 Tage nach der Inokulation sind die Keimblätter mit Konidien bedeckt und können als Inokulum verwendet werden. |
| 8.6 | Ernte des Inokulums | Sporenbildung auf Keimblättern |
| 8.8 | Haltbarkeit / Lebensfähigkeit des Inokulums | Höchstens 1 bis 1,5 Monate nach der Inokulation. |
| 9. | Prüfungsanlage |  |
| 9.1 | Anzahl der Pflanzen pro Genotyp | mind. 20 Pflanzen pro Sorte und Kontrollsorten, 5 Pflanzen für andere Vergleichssorten. |
| 9.2 | Anzahl der Wiederholungen | - |
| 9.3 | Kontrollsorten |  |
|  |  | Für *Podosphaera xanthii* (Px) Pathotyp 1, Resistenz   * fehlend oder gering: Védrantais * mäßig: Escrito * hoch: Arum   Für *Podosphaera xanthii* (Px) Pathotyp 2, Resistenz:   * fehlend oder gering: Védrantais * mäßig: Escrito, Pendragon * hoch: Arum   Für *Podosphaera xanthii* (Px) Pathotypen 3, 5, 3.5, Resistenz:   * fehlend oder gering: Védrantais * mäßig: Arago, Durango * hoch: Arum   Für *Golovinomyces cichoracearum* (Gc) Pathotyp 1, Resistenz:   * fehlend oder gering: Védrantais * mäßig: Anasta * hoch: Cézanne |
| 9.4 | Gestaltung der Prüfung | Zur Validierung des Pathotyps Vergleichssorten hinzufügen (mind. 5 Pflanzen pro Vergleichssorte) und den Grad an Sporenbildung vergleichen. |
| 9.5 | Prüfungseinrichtung | Klimakammer oder Gewächshaus |
| 9.6 | Temperatur | 20 - 24 °C |
| 9.7 | Licht | Mind. 12 Std. |
| 10. | Inokulation |  |
| 10.1 | Vorbereitung des Inokulums | - |
| 10.2 | Quantifizierung des Inokulums | - |
| 10.3 | Pflanzenstadium bei der Inokulation | Ganze Pflanzen im Stadium 3-4 echte Blätter, die voll entwickelt sind. Inokulation an den Blättern 2 und 3, wie in der nachstehenden Darstellung gezeigt.    Mit freundlicher Genehmigung von GEVES-SNES im Rahmen des CPVO Harmores-Projekts. |
| 10.4 | Inokulationsmethode | Sporen von einem bereits mit Konidien bedeckten Keimblatt entnehmen und sie auf ein Blatt geben. Es können verschiedene Isolate an der gleichen Pflanze (oder dem gleichen Blatt) geprüft werden, wenn die lokalen Ablagerungen gut voneinander getrennt sind und eine Markierung die Stelle der Ablagerung angibt. |
| 10.7 | Abschließende Erfassungen | Das Datum der Erfassung sollte auf der Grundlage der erwarteten Symptome an den drei Kontrollsorten gewählt werden. Die Sporenbildung sollte bei der anfälligen Kontrollsorte gut ausgeprägt sein. |
| 11. | Erfassungen |  |
| 11.1 | Methode | Visuelle Erfassung der Sporenbildung |
| 11.2 | Erfassungsskala |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Klasse 1: Keine Entwicklung des Pilzes (kein Myzel oder abgestorbenes Myzel) oder keine Sporenbildung | Klasse 3: schwache Sporenbildung | Klasse 5: mäßige Sporenbildung | Klasse 9: starke Sporenbildung |
| Beispiel einer Kontamination durch die Umwelt bei der anfälligen Kontrollsorte, Prüfung nicht validiert | | | |

Mit freundlicher Genehmigung von GEVES-SNES im Rahmen des CPVO Harmores-Projekts.

|  |  |  |
| --- | --- | --- |
| 11.3 | Validierung der Prüfung | Validierung an Kontrollsorten.  Zusätzliche Informationen zu den erwarteten Reaktionen von Kontrollsorten *Podosphaera* xanthii  Resistenz fehlend oder gering   * Pflanzen in Klasse 9 oder die meisten Pflanzen in Klasse 9 und wenige Pflanzen in Klasse 5 (hoher Krankheitsindex). * Wenige Pflanzen in Klasse 3, aber in diesem Fall sollten die resistenten Kontrollsorten alle in Klasse 1 und die mäßig resistente Kontrollsorte in Klassen 3 und 1 sein. * Keine Pflanzen in Klasse 1.   Resistenz mäßig   * Zwischen der resistenten und der anfälligen Kontrollsorte. * Im Allgemeinen Pflanzen in Klassen 3 und 5.   Resistenz hoch   * Pflanzen in Klasse 1 oder die meisten Pflanzen in Klasse 1 und wenige Pflanzen in Klasse 3 (sehr niedriger Krankheitsindex). * Pflanzen in Klasse 3, aber in diesem Fall sollte die anfällige Kontrollsorte in Klasse 9 sein. * Keine Pflanzen in Klassen 5 und 9. |
| 11.4 | Abweicher | - |
| 12. | Auswertung der Daten hinsichtlich der UPOV-Ausprägungsstufen | Auswertung von Sorten je nach Kontrollsorte (Abbildung 1)  Resistenz  Note 1 = fehlend oder gering  Note 2 = mäßig  Note 3 = hoch  Die quantitative Analyse basiert auf dem Krankheitsindex UND der Verteilung der Pflanzen pro Klasse im Vergleich zu den Kontrollsorten.  Zusätzliche Informationen zu der Kontrollsorte *Podosphaera xanthii*:  Die Sorten, die zwischen der mäßig resistenten und der resistenten liegen, müssen als mäßig resistent beurteilt werden (da sie nicht resistent genug sind, um als resistent zu gelten).  Die Sorten, die zwischen der anfälligen und der mäßig resistenten Kontrollsorte liegen, müssen als anfällig beurteilt werden (da sie nicht resistent genug sind, um als mäßig resistent zu gelten). |
| Resistenz gegen Px:    **1 - fehlende oder geringe Resistenz**  **3 - hohe Resistenz**  **2 - mäßige Resistenz**  ***Kein Unterschied zu*** *Kontrollsorte mit fehlender oder geringer Resistenz 🡪* ***als nicht oder gering resistent beurteilt***  ***Kein Unterschied zu*** *Kontrollsorte mit mäßiger Resistenz 🡪* ***als mäßig resistent beurteilt***  ***Kein Unterschied zu*** *Kontrollsorte mit hoher Resistenz 🡪* ***als hochresistent beurteilt***  **Zwischen** denKontrollsorten mit fehlender oder geringer und mäßiger Resistenz 🡪 **als nicht oder gering resistent beurteilt**  **Zwischen** denKontrollsorten mit mäßiger und hoher Resistenz 🡪 **als mäßig resistent beurteilt**    NX: Anzahl von Pflanzen in Klasse X  Abbildung 1: Formel für den Krankheitsindex | | |
| 13. | Kritische Kontrollpunkte | Um Kreuzkontamination zu vermeiden, wird empfohlen, das Inokulum verschiedener Pathotypen nicht im selben Raum herzustellen. |

Aufnahme von Merkmalen aus der Merkmalstabelle im Technischen Fragebogen

Folgende Merkmale sind zur Aufnahme im Technischen Fragebogen vorgeschlagen (Hervorhebung durch Unterstreichen):

|  |  |  |
| --- | --- | --- |
| **Merkm.**  **Nr.** | **(\*)** | **Bezeichnung des Merkmals** |
| 12 | (\*) | Blütenstand: Geschlechts-verteilung (bei Vollblüte) |
| 13 |  | Junge Frucht: Farbton der Grünfärbung der Schale |
| 14 | (\*) | Junge Frucht: Intensität der Grünfärbung der Schale |
| 24 | (\*) | Frucht: Länge |
| 25 | (\*) | Frucht: Durchmesser |
| 28 | (\*) | Frucht: Form im Längsschnitt |
| 29 | (\*) | Frucht: Grundfarbe der Schale |
| 31 |  | Frucht: Grundfarbton der Schale |
| 32 |  | Frucht: Dichte der Punkte |
| 36 | (\*) | Frucht: Dichte der Flecken |
| 38 | (\*) | Frucht: Warzen |
| 43 | (\*) | Frucht: Furchen |
| 45 |  | Frucht: Tiefe der Furchen |
| 47 | (\*) | Frucht: Faltenbildung der Oberfläche |
| 48 | (\*) | Frucht: Korkbildung |
| 49 | (\*) | Frucht: Dicke der Korkschicht |
| 50 | (\*) | Frucht: Muster der Korkbildung |
| 51 | (\*) | Frucht: Dichte des Musters der Korkbildung |
| 54 | (\*) | Frucht: Hauptfarbe des Fleisches |
| 60 | (\*) | Samen: Länge |
| 62 |  | Samen: Form |
| 63 | (\*) | Samen: Farbe |
| 68 | (\*) | Haltbarkeitsdauer der Frucht |
| 69.1 | (\*) | Resistance gegen *Fusarium oxysporum* f. sp. *melonis* Pathotyo 0 (Fom: 0) |
| 69.2 | (\*) | Resistance gegen *Fusarium oxysporum* f. sp. *melonis* Pathotyo 1 (Fom: 1) |
| 69.3 | (\*) | Resistance gegen *Fusarium oxysporum* f. sp. *melonis* Pathotyo 2 (Fom: 2) |
| 69.4 |  | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* Pathotyp 1.2 (Fom: 1.2) |
| 70.1 |  | Resistenz gegen *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Echter Mehltau) Pathotyp (Px: 1) |
| 70.2 |  | Resistenz gegen *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Echter Mehltau) Pathotyp 2 (Px: 2) |
| 70.3 |  | Resistenz gegen *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Echter Mehltau) Pathotyp 3 (Px: 3) |
| 70.4 |  | Resistenz gegen *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Echter Mehltau) Pathotyp 5 (Px: 5) |
| 70.5 |  | Resistenz gegen *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Echter Mehltau) Pathotyp 3-5 (Px: 3.5) |
| 71 |  | Resistenz gegen *Golovinomyces cichoracearum (Erysiphe cichoracearum* Pathotyp 1 (Echter Mehltau) Race 1 (Gc: 1) |
| 72 |  | Resistenz gegen Befall durch *Aphis gossypii* |
| 73 |  | Resistenz gegen Zucchinigelbmosaikvirus (ZYMV) |
| 74.1 |  | Resistenz gegen Papayaringfleckenvirus (PRSV) Pathotyp Guadeloup |
| 74.2 |  | Resistenz gegen Papayaringfleckenvirus (PRSV) Pathotyp E2 |
| 75 |  | Resistenz gegen Netzmelonennekrosefleckenvirus (MNSV) Pathotyp 0 (MNSV: 0) |
| 76 |  | Resistenz gegen Gurkenmosaikvirus (CMV) |

Die detaillierten Änderungen am Technischen Fragebogen werden in der Anlage mit Hervorhebung durch Unterstreichen (Einfügungen) und ~~Durchstreichen~~ (Streichungen) angegeben (nur auf Englisch).

[Anlage folgt]

VORGESCHLAGENEN ÄNDERUNGEN MIT HERVORHEBUNG

(nur auf Englisch)

## Proposed revision of Characteristics 69.1 to 69.4 “Resistances to *Fusarium oxysporum* f. sp. *melonis* (Fom) - races 0, 1, 2, and 1.2”

|  |  | English | français | deutsch | español | Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo | Note/ Nota |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 69. ~~A~~ | VG | Resistance to *Fusarium oxysporum* f. sp. *melonis* (Fom) | Résistance à *Fusarium oxysporum* f. sp. *melonis* (Fom) | Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* (Fom) | Resistencia al *Fusarium oxysporum* f. sp. *melonis* (Fom) |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.1  ~~(\*)~~ (+) |  | **Race 0 (Fom: 0)** | **Race 0 (Fom: 0)** | **Pathotyp 0 (Fom: 0)** | **Raza 0 (Fom: 0)** |  |  |
| **QL** |  | absent | absente | fehlend | ausente | ~~Jaune Canari 2~~ Atos, Charentais T | 1 |
|  |  | present | présente | vorhanden | presente | Cadence,  Charentais Fom-2, Dibango, ~~Jador,~~ Jubilo, Karakal, Védrantais | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.2  ~~(\*)~~ (+) |  | Race 1 (Fom: 1) | Race 1 (Fom: 1) | Pathotyp 1 (Fom: 1) | Raza 1 (Fom: 1) |  |  |
| **QL** |  | absent | absente | fehlend | ausente | ~~Jaune Canari 2~~  Atos, Charentais T,  Védrantais | 1 |
|  |  | present | présente | vorhanden | presente | ~~Arapaho, Jador, Rubbens~~ Cadence,  Charentais Fom-2, Dibango, Jubilo, Karakal | 9 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| 69.3  ~~(\*)~~ (+) |  | Race 2 (Fom: 2) | Race 2 (Fom: 2) | Pathotyp 2 (Fom: 2) | Raza 2 (Fom: 2) |  |  |
| **QL** |  | absent | absente | fehlend | ausente | ~~Arapaho, Jaune Canari 2, Rubbens~~ Atos, Charentais Fom-2, Charentais T, Dibango, Marianna | 1 |
|  |  | present | présente | vorhanden | presente | ~~Anasta, Cléo, Jador,~~ Cadence, Charentais Fom-1, Jubilo, Karakal, Perlita, Védrantais | 9 |
| **69.4 ~~B~~  (+)** | **VG** | Resistance to *Fusarium oxysporum* f. sp. *melonis*  Race 1.2 (Fom: 1.2) | **Résistance à *Fusarium oxysporum* f. sp. *melonis*****Race 1.2 (Fom: 1.2)** | **Resistenz gegen *Fusarium oxysporum* f. sp. *melonis* Pathotyp 1.2 (Fom: 1.2)** | **Resistencia al *Fusarium oxysporum* f. sp. *melonis* Raza 1.2 (Fom: 1.2)** |  |  |
| **~~QN~~ QL** |  | absent | absente | fehlend | ausente | Graffio, Prity, Virgos | 1 |
|  |  | present | présente | vorhanden | presente | Isabelle, Kyriel, Lunasol, Meliance, Piboule | 9 |
|  |  | ~~moderately resistant~~ | ~~moyennement résistant~~ | ~~mäßig resistent~~ | ~~moderadamente resistente~~ | ~~Lunasol~~ | ~~2~~ |
|  |  | ~~highly resistant~~ | ~~hautement résistant~~ | ~~hochresistent~~ | ~~altamente resistente~~ | ~~Dinero, Isabelle~~ | ~~3~~ |

## Proposed revision of explanation Ad. 69 “Resistances to *Fusarium oxysporum* f. sp. *melonis* (Fom) - races 0, 1, 2, and 1.2” in Chapter 8.2 “Explanations for individual characteristics”

Ads. 69 ~~A~~: 69.1 - 69.3: Resistance to *Fusarium oxysporum* f. sp. *melonis,* races 0, 1 and 2 (Fom: 0, Fom: 1, Fom: 2)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Fusarium oxysporum* f. sp. *melonis* races 0, 1, and 2 |
| 2. | Quarantine status | No |
| 3. | Host species | Melon - *Cucumis melo* |
| 4. | Source of inoculum | e.g. GEVES (FR)[[9]](#footnote-10) |
| 5. | Isolate | ~~Fom: 0, Fom: 1, Fom: 2~~  e.g., Reference strain validated in an inter-laboratory test[[10]](#footnote-11), [[11]](#footnote-12)  Fom:0   * Strain MLZ   = MAT/REF/04-07-01-03-02 2  Fom: 1   * Strain FOM 26   = MAT/REF/04-07-01-01 2  Fom: 2   * Strain F185 |
| 6. | Establishment isolate identity | ~~use differential varieties~~:  ~~Test on differential hosts (potentially including Durango, see 13.).~~ The most recent table is available through ISF at  <https://www.worldseed.org/our-work/plant-health/differential-hosts/>  *Situation July 2019* |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Differential host** | **Gene present** | **Fom: 0\*** | **Fom: 1\*** | **Fom: 2\*** | **Fom: 1.2\*** | | Charantais T\* | - | S | S | S | S | | Védrantais\*, Doublon\* | *Fom-1* | HR | S | HR | S | | Charantais Fom-2\*, CM17187\* | *Fom-2* | HR | HR | S | S | | Isabelle\* | *Polygenic?* | HR | HR | HR | IR |   S = susceptible; HR = highly resistant; IR = intermediate  \*differential hosts and isolates that are used by the seed sector  Courtesy of Worldseed.org website | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *~~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, Malt agar at 20°C to 25°C |
| 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 | 7–10-day-old culture |
| 8.7 | Check of harvested inoculum | - |
| 8.8 | Shelf life /viability inoculum | Between 4 to 8 h or keep cool to prevent spore germination |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | ~~at least 20~~  at least 30 plants, it is important to have at least 5 non-inoculated plants per genotype to be able to judge growth reduction |
| 9.2 | Number of replicates | At least e.g. 3 replicates (3 x10) |
| 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~~ |

|  |  |  |
| --- | --- | --- |
| 9.3.1 | Control varieties for race 0 | Resistance absent: Charentais T  Resistance present: Charentais Fom-2, Védrantais |
| 9.3.2 | Control varieties for race 1 | Resistance absent: Charentais T, Védrantais  Resistance present: Charentais Fom-2 |
| 9.3.3 | Control varieties race 2 | Resistance absent: Marianna  Resistance present: Perlita, Charentais Fom-1, Védrantais |
| 9.4 | Test design | 3 replicates of 10 plants to allow statistical analysis (in different trays) and at least 5 non-inoculated plants per genotype. |
| 9.5 | Test facility | glasshouse or climatic room |
| 9.6 | Temperature | - Fom: 0 and Fom: 1: 18-~~25~~ 24°C  - Fom: 2: 24°C |
| 9.7 | Light | - Fom: 0 and Fom: 1: At least 12h  - Fom: 2: 16h |
| ~~9.8~~ | ~~Season~~ | ~~all seasons~~ |
| 9.9 | Special measures | ~~optional: shading (no direct sunlight during 12 h after inoculation~~  - Fom: 0 and Fom: 1: Recommend having really 18°C at night and not above 24°C during the day. |
| 10. | Inoculation |  |
| 10.1 | Preparation inoculum | ~~aerated culture 7-10 days, e.g., Czapek Dox broth~~  ~~some isolates need filtration or centrifugation~~  ~~resuspend the pelleted spores in demineralized water~~  Scrape spore cultures with water from agar medium (see 8.1) or optional multiplication on liquid medium (e.g., Messiaen (1991) synthetic liquid medium, sucrose 50g/L, on permanent agitator-shaker or aerated Czapek-Dox culture medium for 5-7 days at room temperature).  *Remark*: Beware of toxin productions by some isolates (see remark under 13.) |
| 10.2 | Quantification inoculum | ~~spore count; adjust to 10~~~~6~~ ~~-10~~~~7~~ ~~per mL~~  4x105 to 1x106 sp /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 30 sec - 5 min~~  Plant at the inoculation stage are harvested carefully, roots and hypocotyls are immersed in spore suspension for 2-15 min; trimming of roots is an option; transplant in trays. |
| 10.5 | First observation | ~~7 days post inoculation~~  1st notation: symptoms on Resistance absent (susceptible) control at classes 2 and 3 with a strong proportion at class 3 |
| 10.6 | Second observation | ~~14 -20 days post inoculation~~  A second notation can be necessary to re-evaluate some unclear varieties |
| ~~10.7~~ | ~~Final observations~~ | ~~20 days post inoculation~~ |
| 11. | Observations |  |
| 11.1 | Method | Visual observation, ~~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~~ |

|  |  |  |
| --- | --- | --- |
| non-inoculated plant | Class 0 | Class 1 |
| At least 5 plants | Healthy plant: no symptoms of yellowing and wilting, could be some growth reduction due to inoculation stress compared to mock. Sometimes in the mock we can observe some yellowing, different from the symptoms of *Fusarium* | Light symptoms of yellowing/wilting |
|  | | |

|  |  |  |
| --- | --- | --- |
| Class 2 | Class 3 |  |
| typical symptoms: yellowing, wilting and necrosis, stunting (growth stopped) | Death of plant (Dead) |  |
|  | | Other symptoms of vein clearing could be difficult to judge.  It is advised to make a later notation to observe the evolution of these symptoms over the time. |

Courtesy of GEVES-SNES in the framework of CPVO Harmores project.

|  |  |  |
| --- | --- | --- |
| 11.3 | Validation of test | ~~on standards~~  Validation on controls.  In case of the Fom: 0 and Fom:1 tests:  Controls expected response:  Resistance absent: most of the plants at classes 2 and 3  Resistance present: most of the plants at classes 0 and 1, sometimes very few plants at classes 2 or 3.  In case of the Fom: 2 test  Controls expected response:   * Susceptible controls, with UPOV characteristic state ‘Resistance absent’, should have most of the plants in observation classes 2 or 3, and few or no plants in observation classes 0 or 1.   + Marianna, the susceptible control is less susceptible than Charentais Fom‑2, Charentais T * Resistant controls should have most of the plants in observation classes 0 or 1, and few or no plant in observation classes 2 or 3.   Perlita, the lower threshold resistance control, should have at least some plants in observation class 1, 2, or 3. It has to be less resistant than Charentais Fom-1, Védrantais. |
| 11.4 | Off-types | - |
| 12. | Interpretation of data in terms of UPOV characteristic states | ~~QL~~  In case of varieties with a response between the susceptible (resistance absent) and the resistant control, repeat the test~~.~~  In case of confirmation of the result, the variety will be judged heterogeneous.  In case of unclear results, retest or test in another lab. |

Resistance to Fom: 0 and Fom: 1

**Not different** from the **resistance absent** control

**Not different** from the **resistance present** control

Une image contenant diagramme

Description générée automatiquement

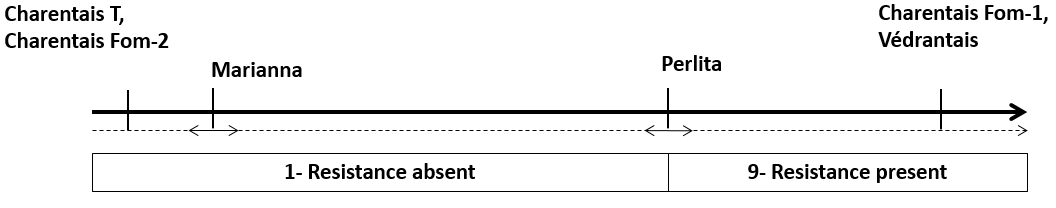
*Inconclusive result*

*retest*

**9 – Resistance present**

**1 – Resistance absent**

Resistance to Fom: 2



**9 – Resistance present**

**1 – Resistance absent**

|  |  |  |
| --- | --- | --- |
| 13. | Critical control points | ~~For Race 1.2 the modified protocol on the next page should be used.~~  For race 2, the control Perlita, with the *Fom-3* gene, allows to validate the capacity of the isolate to partially attack this variety.  In the case of inoculum increased in e.g. Messiaen (1991) synthetic liquid medium, on permanent agitator-shaker, inoculum can be used after 5 to 7 days.  For race 0 and 1, dilution 1/12 is recommended, while it must not be less than 1/20 for race 2. At a lower dilution (higher concentration of the medium), it has been observed that toxins released in the medium by the race 2 can cause some yellowing of melon plants, even if they are resistant. Alternatively, spores can be “washed” by resuspending a mass of spores collected on a Millipore filter with vacuum force. |

Ad ~~69 B~~ 69.4: Resistance to *Fusarium oxysporum* f. sp. *melonis* race 1.2 (Fom: 1.2)

|  |  |  |
| --- | --- | --- |
| 1. | Pathogen | *Fusarium oxysporum* f. sp. *melonis* race 1.2 (Fom: 1.2) |
| 2. | Quarantine status | No |
| 3. | Host species | Melon - *Cucumis melo* L. |
| 4. | Source of inoculum | GEVES (FR)[[12]](#footnote-13) ~~, Naktuinbouw (NL)~~ |
| 5. | Isolate | ~~Fom: 1.2 (moderately aggressive): TST strain~~  e.g., Reference strain validated in an inter-laboratory test 3  Fom: 1.2   * Strain TST   = MAT/REF/04-07-01-04 2 |
| 6. | Establishment isolate identity | ~~use differential varieties:  Védrantais, Virgos (susceptible)  Lunasol (moderately resistant) Dinero, Isabelle (highly resistant)~~  The most recent table is available through ISF at  <https://www.worldseed.org/our-work/plant-health/differential-hosts/>  *Situation July 2019* |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Differential host** | **Gene present** | **Fom: 0\*** | **Fom: 1\*** | **Fom: 2\*** | **Fom: 1.2\*** | | Charantais T\* | - | S | S | S | S | | Védrantais\*, Doublon\* | *Fom-1* | HR | S | HR | S | | Charantais Fom-2\*, CM17187\* | *Fom-2* | HR | HR | S | S | | Isabelle\* | *Polygenic?* | HR | HR | HR | IR |   S = susceptible; HR = highly resistant; IR = intermediate  \*differential hosts and isolates that are used by the seed sector  Courtesy of Worldseed.org website | | |
| 7. | Establishment pathogenicity | use susceptible melon varieties |
| 8. | Multiplication inoculum |  |
| 8.1 | Multiplication medium | on agar medium e.g., Potato Dextrose Agar, Sabouraud, at 20°C to 25°C |
| 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 | 4-10 day-old culture |
| 8.7 | Check of harvested inoculum | - |
| 8.8 | Shelf life/viability inoculum | - |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | ~~at least 30~~  30 plants per variety plus 5 non-inoculated controls |
| 9.2 | Number of replicates | ~~e.g.,~~ At least 3 x 10 plants, in different trays |
| 9.3 | Control varieties | ~~R~~esistance absent: Virgos  Resistance present: Piboule and Lunasol and Isabelle (Isabelle is expected to have a lower disease index (DI) (= higher resistance than Piboule and Lunasol).  Piboule and Lunasol are both needed to illustrate the lower level ~~to intermediate resistance~~ of resistance. Their resistance is based on other genetics and may have different levels in different labs. |
|  | ~~[1] susceptible~~ | ~~Védrantais, Virgos~~ |
|  | ~~[2] moderately resistant~~ | ~~Lunasol (the lowest accepted level)~~ |
|  | ~~[3] highly resistant~~ | ~~Dinero, Isabelle, Jador~~ |
| 9.4 | Test design | 3 replicates of 10 plants to allow statistical analysis (in different trays) and at least 5 non-inoculated plants per genotype. |
| 9.5 | Test facility | glasshouse or climatic room |
| 9.6 | Temperature | 18-~~25~~ 24°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~~  Scrape cultures with water on agar medium (see 8.1) or optional multiplication on liquid medium (e.g., Potato Dextrose Broth (PDB), Czapek-Dox culture medium for 7 days at room temperature and darkness or Messiaen (1991) synthetic liquid medium, sucrose 50 g/L, on permanent agitator-shaker, at room-temperature, inoculum can be used after 5 to 7 days) |
| 10.2 | Quantification inoculum | ~~spore count; adjust to 2.10~~~~4~~ ~~- 10~~~~5~~ ~~per ml~~  1x105-1x106 sp/mL, depending on inoculation method (see 10.4) and lab conditions |
| 10.3 | Plant stage at inoculation | cotyledons expanded, first leaf emerging |
| 10.4 | Inoculation method | ~~soaking of the trays in spore suspension; 700 ml for a tray with 25 - 30 plants, plants are not uprooted~~  One of two methods can be used for inoculation.   * Absorption:   Absorption of a suspension of spores, e.g., 700mL of a suspension at 1.105 sp/mL for 50 plants in a tray 30 cm\*30 cm.   * Injection:   Injection of a suspension of spores into the soil at the base of the plant, e.g., 5mL at 106 sp /mL per plant. |
| ~~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~~  1st notation: symptoms on susceptible control at least at class 3 [generally 10-21 dpi]. A 2nd notation can be necessary to reevaluate some unclear varieties. |
| 11. | Observations |  |
| 11.1 | Method | Visual observation~~, 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.~~ |

|  |  |  |
| --- | --- | --- |
| Non-inoculated plants | Class 0 | Class 1 |
| Varieties must be compared to the non-inoculated plants. | Healthy plant, the whole plant is green or at the same level than the mock. Just a light yellowing can be accepted on the mock | Light level of symptoms, light yellowing on cotyledons and/or leaves without necrosis |
|  | | |

|  |  |  |
| --- | --- | --- |
| Class 2 | Class 3 | Class 4 |
| Moderate level of symptoms, yellowing on cotyledon and/or leaves, starting of necrosis and wilting but not extended | Severe symptoms of yellowing and/or wilting on cotyledons and/or leaves with extended necrosis | Dead plant, no green leaf part or hypocotyl is dry |
|  | | |

Courtesy of GEVES-SNES in the framework of CPVO Harmores project.

|  |  |  |
| --- | --- | --- |
| 11.3 | Validation of test | Validation on controls. Controls expected response:   * Resistance present ~~Intermediate Resistant:~~   Most plants in classes 0 and 1, in some cases with few plants in 2, 3, 4.  Low level of disease index (DI) generally below 40%. A difference of disease index is generally observed between Piboule and Lunasol compared to Isabelle   * Resistance absent ~~Susceptible~~:   Most plants in classes 3 and 4, in some cases with few plants at class 0, 1, or 2. Very high disease index (DI) above 80%. |
| 11.4 | Off-types | ~~calibrate with Lunasol~~  ~~-~~ |
| 12. | Interpretation of data in terms of UPOV characteristic states | ~~QN~~  Interpretation of varieties depending on controls (figure 1)  Note 1 = Resistance absent ~~Intermediate resistance absent = susceptibility~~  Note 9 = Resistance present ~~Intermediate resistance present~~  Quantitative analysis is based on the disease index (DI) AND the distribution of plants per class compared to the controls  The varieties statistically similar to the ~~intermediate~~ resistant controls or with a lower disease index (DI) have to be judged as ~~intermediate~~ resistant.  The varieties between the susceptible and the ~~intermediate~~ resistant controls have to be judged as susceptible. (~~not resistant enough to be considered)~~  If n~~ot clear results~~ are not clear, the use of statistics is highly recommended ~~suggested.~~ |
| Resistance to Fom:1-2:    **9 – Resistance present**  **1 – Resistance absent**  Nx : number of plants at class x  *Figure 1: disease index (DI) formula* | | |
| 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.~~ |

## Proposed revision of Characteristics 70.1 to 70.5 “Resistances to *Podosphaera xanthii* (Px) - races 1, 2, 3, 5, 3.5”

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 70. | VG | Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) | Résistance à *Podosphaera xanthii* (Px)(ex *Sphaerotheca fuliginea)* (oïdium) | Resistenz gegen *Podosphaera xanthii* (Px)(ex *Sphaerotheca fuliginea)* (Echter Mehltau) | Resistencia a *Podosphaera xanthii* (Px)(ex *Sphaerotheca fuliginea)* (Oidio) |  |  |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.1  (+)** |  | **Race 1 (Px: 1)** | **Race 1 (Px: 1)** | **Pathotyp 1 (Px: 1)** | **Raza 1 (Px: 1)** |  |  |
| **QN** |  | ~~susceptible~~ absent or low | ~~sensible~~ absente ou faible | ~~anfällig~~ fehlend oder gering | ~~susceptible~~ ausente o baja | ~~Jaune Canari 2,~~ Védrantais | 1 |
|  |  | ~~moderately resistant~~ medium | ~~moyennement résistant~~ moyenne | ~~mäßig resistent~~ mittel | ~~moderadamente resistente~~ media | Escrito | 2 |
|  |  | ~~highly resistant~~ high | ~~hautement résistant~~ élevée | ~~hochresistent~~ hoch | ~~altamente resistente~~ alta | ~~Anasta, Cézanne~~ Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.2  (+)** |  | **Race 2 (Px: 2)** | **Race 2 (Px: 2)** | **Pathotyp 2 (Px: 2)** | **Raza 2 (Px: 2)** |  |  |
| **QN** |  | ~~susceptible~~ absent or low | ~~sensible~~ absente ou faible | ~~anfällig~~ fehlend oder gering | ~~susceptible~~ ausente o baja | ~~Galoubet,~~ Védrantais | 1 |
|  |  | ~~moderately resistant~~ medium | ~~moyennement résistant~~ moyenne | ~~mäßig resistent~~ mittel | ~~moderadamente resistente~~ media | Escrito, Pendragon | 2 |
|  |  | ~~highly resistant~~ high | ~~hautement résistant~~ élevée | ~~hochresistent~~ hoch | ~~altamente resistente~~ alta | ~~Anasta, Cézanne~~ Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.3  (+)** |  | **Race 3 (Px: 3)** | **Race 3 (Px: 3)** | **Pathotyp 3 (Px: 3)** | **Raza 3 (Px: 3)** |  |  |
| **QN** |  | ~~susceptible~~ absent or low | ~~sensible~~ absente ou faible | ~~anfällig~~ fehlend oder gering | ~~susceptible~~ ausente o baja | Védrantais | 1 |
|  |  | ~~moderately resistant~~ medium | ~~moyennement résistant~~ moyenne | ~~mäßig resistent~~ mittel | ~~moderadamente resistente~~ media | ~~Nettuno~~ Arago, Durango | 2 |
|  |  | ~~highly resistant~~ high | ~~hautement résistant~~ élevée | ~~hochresistent~~ hoch | ~~altamente resistente~~ alta | ~~Batista, Godiva~~ Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.4  (+)** |  | **Race 5 (Px: 5)** | **Race 5 (Px: 5)** | **Pathotyp 5 (Px: 5)** | **Raza 5 (Px: 5)** |  |  |
| **QN** |  | ~~susceptible~~ absent or low | ~~sensible~~ absente ou faible | ~~anfällig~~ fehlend oder gering | ~~susceptible~~ ausente o baja | Védrantais | 1 |
|  |  | ~~moderately resistant~~ medium | ~~moyennement résistant~~ moyenne | ~~mäßig resistent~~ mittel | ~~moderadamente resistente~~ media | ~~Hugo, Pendragon~~ Arago, Durango | 2 |
|  |  | ~~highly resistant~~ high | ~~hautement résistant~~ élevée | ~~hochresistent~~ hoch | ~~altamente resistente~~ alta | ~~Arapaho~~ Arum | 3 |
|  |  | ------------------------ | -------------------------- | -------------------------- | ------------------------ | --------------------------- | ------- |
| **70.5  (+)** |  | **Race 3-5 (Px: 3.5)** | **Race 3-5 (Px: 3.5)** | **Pathotyp 3-5 (Px: 3.5)** | **Raza 3-5 (Px: 3.5)** |  |  |
| **QN** |  | ~~susceptible~~ absent or low | ~~sensible~~ absente ou faible | ~~anfällig~~ fehlend oder gering | ~~susceptible~~ ausente o baja | Védrantais | 1 |
|  |  | ~~moderately resistant~~ medium | ~~moyennement résistant~~ moyenne | ~~mäßig resistent~~ mittel | ~~moderadamente resistente~~ media | ~~Cisco~~ Arago, Durango | 2 |
|  |  | ~~highly resistant~~ high | ~~hautement résistant~~ élevée | ~~hochresistent~~ hoch | ~~altamente resistente~~ alta | ~~90625~~ Arum | 3 |

## Revision of explanation Ads. 70.1 to 70.3, 71 “Resistances to *Podosphaera xanthii* (Px), Resistance to *Golovinomyces cichoracearum* *(Gc)* (Powdery mildew)” in Chapter 8.2 “Explanations for individual characteristics”

Ads. 70.1 to 70.~~3~~ 5: Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea*) (Powdery mildew)~~Px (Sf)~~ races 1, 2, 3, 5, 3.5 (Px: 1, 2, 3, 5, 3.5)

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. | Pathogen | | Powdery mildew:*Podosphaera xanthii* (ex *Spaerotheca fuliginea*) races 1, 2, 3, 5 and 3.5  *Golovinomyces cichoracearum* (ex *Erysiphe cichoracearum*) race 1  *~~Only~~**~~Podosphaera xanthii~~* ~~was validated in Harmores 3 project.~~ | |
| 2. | Quarantine status | | No | |
| 3. | Host species | | Melon - *Cucumis melo* L. | |
| 4. | Source of inoculum | | GEVES (FR)[[13]](#footnote-14) | |
| 5. | Isolate | | ~~Px: races 1, 2, 3, 5 and 3-5;~~  e.g., Reference strain validated in an inter-laboratory test 6  Px: 1   * Strain Sm 3   = MAT/REF/04-07-03-01 7  Px: 2   * Strain S87-7   = MAT/REF/04-07-03-02 7  Px: 3   * Strain 00Sm39   = MAT/REF/04-07-03-04-02 7  Px: 5   * Strain 98Sm65   = MAT/REF/04-07-03-03-01-02 7  Px: 3.5   * Strain 04Sm2   = MAT/REF/04-07-03-05-01 7  Gc: 1   * Strain GEVES   = MAT/REF/04-07-02-01)[3](mailto:contact@geves.fr) | |
| 6. | Establishment isolate identity | on differentials (table 1) | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | ~~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)~~

Table 2:

Races of *Podosphaera xanthii* (Px) and *Golovinomyces cichoracearum* (Gc), J. McCreight and M. Pitrat

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | *Podosphaera xanthii* | | | | | | *Golovinomyces cichoracearum* | |
|  | Race 0 | Race 1 | Race 2 | Race 3 | Race 4 | Race 5 | Race 3.5 | Race 0 | Race 1 |
| Iran H | S | S | S | S | S | S | S | S | S |
| Védrantais | R | S | S | S | S | S | S | R | S |
| PMR45 | R | R | S | S | S | S | S | R | S |
| WMR29 | R | R | R | R | S | S | S | R | S |
| Edisto 47 | R | R | R | R | R | S | S | R | S |
| MR-1, PI124112 | R | R | R | R | R | R | R | R | R |
| PMR5 | R | R | R | S | S | R | S | R | R |
| Nantais Oblong | R | S | S | S | S | S | S | R | R |

|  |  |  |
| --- | --- | --- |
| 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~~  Melon plantlets |
| 8.2 | Multiplication variety | ~~susceptible varieties~~  Susceptible variety, for example Védrantais.  For higher isolates like 3.5 or 5, a variety with broken resistance is recommended to keep the isolate pure. |
| 8.3 | Plant stage at inoculation | ~~young, unfolded cotyledon; decontaminated with e.g., 0.05% mercuric chloride or 3 to 5% bleach (NaClO + NaCl)~~  Cotyledon |
| ~~8.4~~ | ~~Inoculation medium~~ | ~~Air~~ |
| 8.5 | Inoculation method | ~~scatter conidia on the cotyledons transferred by blowing~~  Sowing in substrate, for example soil or disinfected peat inside a closed mini glasshouse. When the cotyledons have expanded, remove them from the plant. Disinfect the cotyledons by soaking them for 3 minutes in a mercuric chloride solution (0.05%) or in sodium hypochlorite solution. Rinse them with sterilized water. Dry the cotyledons with sterile paper towel, then place them in Petri dishes with the following medium:  Sucrose 10g  Mannitol 20g  Agar 5g  Distilled water 1 liter  Scatter conidia on the cotyledons and blow them or deposit conidia at the surface of cotyledons. Incubate the inoculated cotyledons in Petri dishes for example at 23°C during 14 hours in the light and at 18°C during 10 hours in the dark or 17°C permanently under very low light intensity. 9 to 11 days after the inoculation, the cotyledons will be covered with conidia and can be used as an inoculum. |
| 8.6 | Harvest of inoculum | ~~use cotyledons with strong sporulation~~  Sporulation on cotyledons |
| 8.7 | Check of harvested inoculum | ~~check presence of spores~~ |
| 8.8 | Shelf life /viability inoculum | ~~on cotyledon, 17-23~~~~o~~~~C, 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~~  Maximum 1 to 1.5 months after the inoculation. |
| 9. | Format of the test |  |
| 9.1 | Number of plants per genotype | ~~at least 16 plants~~  At least 20 plants per variety and controls, 5 plants for other differentials. |
| 9.2 | Number of replicates | ~~e.g., 3~~  - |
| 9.3 | Control varieties |  |

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|  | ~~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~~ |

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|  |  | For *Podosphaera xanthii* (Px) race 1, resistance   * absent or low ~~Susceptible~~: Védrantais * medium ~~Intermediate resistant~~: Escrito * high ~~Resistant~~: Arum   For *Podosphaera xanthii* (Px) race 2, resistance:   * absent or low ~~Susceptible~~: Védrantais * medium ~~Intermediate resistant~~: Escrito, Pendragon * high ~~Resistant~~: Arum   For *Podosphaera xanthii* (Px) races 3, 5, 3.5, resistance:   * absent or low ~~Susceptible~~: Védrantais * medium ~~Intermediate resistant~~: Arago, Durango * high ~~Resistant~~: Arum   For *Golovinomyces cichoracearum* (Gc) race 1, resistance:   * absent or low ~~Susceptible~~: ~~Escrito, Score,~~ Védrantais * medium ~~Intermediate resistant~~: ~~Flores,~~ Anasta * high ~~Resistant~~: Cézanne, ~~Heliobel, Théo~~ |
| 9.4 | Test design | ~~leaf discs placed on 0.4% agar with 1- 4% mannitol and possible add of 0.003% benzimidazole~~  Include differentials to validate the race (at least 5 plants per differentials) and compare the level of sporulation. |
| 9.5 | Test facility | ~~climatic room~~  Climatic chamber or greenhouse |
| 9.6 | Temperature | 20-24°C |
| 9.7 | Light | ~~12 to 24h darkness after inoculation~~  At least 12 hours |
| ~~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~~  Whole plants at 3-4 true leaf fully expanded stage. Inoculation on the leaves 2 and 3 indicated on the diagram below.    Courtesy of GEVES-SNES in the framework of CPVO Harmores project. |
| 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~~.  Take spores from a cotyledon already covered with conidia and deposit them on a leaf. Different isolates can be tested on the same plant (or the same leaf) if the local deposit is well separated from each other and if a mark indicates the place of the deposit. |
| ~~10.5~~ | ~~First observation~~ | ~~8-10 days post inoculation~~ |
| ~~10.6~~ | ~~Second observation~~ | ~~-~~ |
| 10.7 | Final observations | ~~11-12 days post inoculation~~  The date of notation should be chosen based on expected symptoms on the three controls. Sporulation should be well expressed on the susceptible control. |
| 11. | Observations |  |
| 11.1 | Method | Visual observation of sporulation |
| 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~~ |
| |  |  |  |  | | --- | --- | --- | --- | | Class 1: No development of the fungus (no mycelium or dead mycelium) or no sporulation | Class 3: weak sporulation | Class 5: moderate sporulation | Class 9: strong sporulation | | Example of contamination by environment on the susceptible control, test not validated | | | | |   Courtesy of GEVES-SNES in the framework of CPVO Harmores project. | | |
| 11.3 | Validation of test | ~~on controls~~  Validation on controls.  Additional information for expected responses of *Podosphaera xanthii* controls  Resistance absent or low   * Plants at class 9, or most of the plants at class 9 and few plants at class 5 (high disease index). * Few plants at class 3 but in this case the resistant controls should be all at class 1 and the intermediate resistant control at classes 3 and 1. * No plants at class 1.   Resistance medium   * Between the resistant and the susceptible control. * Generally, plants at classes 3 and 5.   Resistance hiqh   * Plants at class 1, or most of the plants at class 1 and few plants at class 3 (very low disease index). * Plants at class 3 but in this case the susceptible control should be all at class 9. * No plants at classes 5 or 9. |
| 11.4 | Off-types | - |
| 12. | Interpretation of data in terms of UPOV characteristic states | ~~QN~~  Interpretation of varieties depending on controls (figure 1)  Resistance  Note 1 = ~~Resistance~~ absent or low~~= susceptibility~~  Note 2 = medium ~~Intermediate resistance present~~  Note 3 = high ~~Resistance present~~  Quantitative analysis is based on the disease index AND the distribution of plants per class compared to the controls.  Additional information for *Podosphaera xanthii* controls:  The varieties between the intermediate resistant and the resistant control have to be judged as intermediate resistant (because they are not resistant enough to be considered resistant).  The varieties between the susceptible and the intermediate resistant control have to be judged as susceptible (because they are not resistant enough to be considered intermediate resistant). |
| Resistance to Px:    **3 – high resistance**  **2 – medium resistance**  **1 – absent or low resistance**  ***Not different*** *from the  high resistant control 🡪* ***judged high resistant***  ***Not different*** *from the  absent or low resistant control 🡪* ***judged absent or low resistant***  ***Not different*** *from the  medium resistant control 🡪* ***judged medium resistant***  **Between** the absent or low and the medium resistant controls 🡪  **judged absent or low resistant**  **Between** the medium resistant and high resistant controls 🡪  **judged medium resistant**    NX: Number of plants at class X  Figure 2: disease index formula | | |
| 13. | Critical control points | To avoid cross contamination, it is advised to not produce inoculum of different races in the same room. |

Inclusion of characteristics from the Table of Characteristics in the Technical Questionnaire

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| 5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds). | | | |
|  | Characteristics | Example Varieties | Note |
| **5.1 (12)** | **Inflorescence: sex expression (at full flowering)** |  |  |
|  | monoecious | Alpha, Categoría | 1[ ] |
|  | andromonoecious | Piel de Sapo | 2[ ] |
| **5.2 (13)** | **Young fruit: hue of green color of skin** |  |  |
|  | whitish green | Geasol | 1[ ] |
|  | yellowish green | Fimel | 2[ ] |
|  | green | Lucas | 3[ ] |
|  | greyish green | Spanglia | 4[ ] |
| **5.3 (14)** | **Young fruit: intensity of green color of skin** |  |  |
|  | very light | Solarking | 1[ ] |
|  | very light to light |  | 2[ ] |
|  | light | Fimel | 3[ ] |
|  | light to medium |  | 4[ ] |
|  | medium | Eros | 5[ ] |
|  | medium to dark |  | 6[ ] |
|  | dark | Galia | 7[ ] |
|  | dark to very dark |  | 8[ ] |
|  | very dark | Edén | 9[ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.4 (24)** | Fruit: length |  |  |
|  | very short | Doublon, Golden Crispy | 1[ ] |
|  | very short to short |  | 2[ ] |
|  | short | Topper, Védrantais | 3[ ] |
|  | short to medium |  | 4[ ] |
|  | medium | Marina, Spanglia | 5[ ] |
|  | medium to long |  | 6[ ] |
|  | long | Categoría, Toledo | 7[ ] |
|  | long to very long |  | 8[ ] |
|  | very long | Katsura Giant, Valdivia | 9[ ] |
| **5.5 (25)** | **Fruit: diameter** |  |  |
|  | very narrow | Banana, Golden Crispy | 1[ ] |
|  | very narrow to narrow |  | 2[ ] |
|  | narrow | Alpha, Maestro | 3[ ] |
|  | narrow to medium |  | 4[ ] |
|  | medium | Categoría, Galia | 5[ ] |
|  | medium to broad |  | 6[ ] |
|  | broad | Albino, Kinka | 7[ ] |
|  | broad to very broad |  | 8[ ] |
|  | very broad | Noir des Carmes | 9[ ] |

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|  | Characteristics | Example Varieties | Note |
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| **5.~~2~~ 6 (28)** | **Fruit: shape in longitudinal section** |  |  |
|  | ovate | De Cavaillon, Piolín | 1[ ] |
|  | medium elliptic | Piel de Sapo | 2[ ] |
|  | broad elliptic | Corin, Sardo | 3[ ] |
|  | circular | Alpha, Galia | 4[ ] |
|  | quadrangular | Zatta | 5[ ] |
|  | oblate | Jívaro, Noir de Carmes | 6[ ] |
|  | obovate | Cganchi | 7[ ] |
|  | elongated | Alficoz, Banana | 8[ ] |
| **5.~~3~~ 7 (29)** | **Fruit: ground color of skin** |  |  |
|  | white | Albino, Honey Dew | 1[ ] |
|  | yellow | Amarillo-Canario, Edén, Galia, Passport, Solarking | 2[ ] |
|  | green | Gohyang, Piel de Sapo | 3[ ] |
|  | grey | Geaprince, Geamar, Romeo, Sirio, Supporter, Védrantais | 4[ ] |
| **5.8 (31)** | **Fruit: hue of ground color of skin** |  |  |
|  | absent or very weak | Amarillo-Canario, Albino, Piel de Sapo, Sirio | 1[ ] |
|  | whitish | Romeo | 2[ ] |
|  | yellowish | Geaprince, Supporter | 3[ ] |
|  | orange | Edén | 4[ ] |
|  | ochre | Passport | 5[ ] |
|  | greenish | Geamar, Honey Dew, Solarking | 6[ ] |
|  | greyish | Gohyang | 7[ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.9 (32)** | **Fruit: density of dots** |  |  |
|  | absent or very sparse | Charentais | 1[ ] |
|  | very sparse |  | 2[ ] |
|  | sparse |  | 3[ ] |
|  | sparse to medium |  | 4[ ] |
|  | medium | Petit Gris de Rennes | 5[ ] |
|  | medium to dense |  | 6[ ] |
|  | dense | Piel de Sapo | 7[ ] |
|  | dense to very dense |  | 8[ ] |
|  | very dense | Albino | 9[ ] |
| **5.~~4~~ 10 (36)** | **Fruit: density of patches** |  |  |
|  | absent or very sparse | Rochet | 1[ ] |
|  | very sparse to sparse |  | 2[ ] |
|  | sparse |  | 3[ ] |
|  | sparse to medium |  | 4[ ] |
|  | medium | Braco | 5[ ] |
|  | medium to dense |  | 6[ ] |
|  | dense | Piel de Sapo | 7[ ] |
|  | dense to very dense |  | 8[ ] |
|  | very dense | Oranje Ananas | 9[ ] |
| **5.~~5~~ 11 (38)** | **Fruit: warts** |  |  |
|  | absent | Piel de Sapo | 1[ ] |
|  | present | Zatta | 9[ ] |

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|  | Characteristics | Example Varieties | Note |
| --- | --- | --- | --- |
| **5.~~6~~ 12 (43)** | **Fruit: grooves** |  |  |
|  | absent or very weakly expressed | Piel de Sapo, Arava | 1[ ] |
|  | weakly expressed | Total, Hobby | 2[ ] |
|  | strongly expressed | Védrantais, Galia | 3[ ] |
| **5.13 (45)** | **Fruit: depth of grooves** |  |  |
|  | very shallow | Amber | 1[ ] |
|  | very shallow to shallow |  | 2[ ] |
|  | shallow | Galia | 3[ ] |
|  | shallow to medium |  | 4[ ] |
|  | medium | Alpha | 5[ ] |
|  | medium to deep |  | 6[ ] |
|  | deep | Panamá, Supermarket | 7[ ] |
|  | deep to very deep |  | 8[ ] |
|  | very deep | Noir des Carmes,  Sucrin de Tours | 9[ ] |
| **5.14 (47)** | **Fruit: creasing of surface** |  |  |
|  | absent or very weak | Védrantais | 1[ ] |
|  | very weak to weak |  | 2[ ] |
|  | weak | Melchor, Sirocco | 3[ ] |
|  | weak to medium |  | 4[ ] |
|  | medium | Costa, Piolín | 5[ ] |
|  | medium to strong |  | 6[ ] |
|  | strong | Tendral Negro | 7[ ] |
|  | strong to very strong |  | 8[ ] |
|  | very strong | Balbey, Kirkagac | 9[ ] |
| **5.~~7~~ 15 (48)** | **Fruit: cork formation** |  |  |
|  | absent | Alpha | 1[ ] |
|  | present | Dalton | 9[ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.16 (49)** | **Fruit: thickness of cork layer** |  |  |
|  | very thin | Amarillo Oro | 1[ ] |
|  | very thin to thin |  | 2[ ] |
|  | thin | Riosol, Védrantais | 3[ ] |
|  | thin to medium |  | 4[ ] |
|  | medium | Marina | 5[ ] |
|  | medium to thick |  | 6[ ] |
|  | thick | Geamar, PMR 45 | 7[ ] |
|  | thick to very thick |  | 8[ ] |
|  | very thick | Honey Rock, Perlita | 9[ ] |
| **5.~~8~~ 17 (50)** | **Fruit: pattern of cork formation** |  |  |
|  | dots only | Hermes, Védrantais | 1[ ] |
|  | dots and linear | Jivaro, Topper | 2[ ] |
|  | linear only | Futuro, Riosol | 3[ ] |
|  | linear and netted | Anatol, Chantal | 4[ ] |
|  | netted only | Galia, Perlita | 5[ ] |
| **5.~~9~~ 18 (51)** | **Fruit: density of pattern of cork formation** |  |  |
|  | very sparse | Alpha, Amarillo Oro | 1[ ] |
|  | very sparse to sparse |  | 2[ ] |
|  | sparse | Védrantais | 3[ ] |
|  | sparse to medium |  | 4[ ] |
|  | medium | Regal, Vital | 5[ ] |
|  | medium to dense |  | 6[ ] |
|  | dense | Galia, Geamar | 7[ ] |
|  | dense to very dense |  | 8[ ] |
|  | very dense | Honey Rock, Perlita | 9[ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.~~10~~ 19 (54)** | Fruit: main color of flesh |  |  |
|  | white | Piel de Sapo | 1[ ] |
|  | greenish white | Galia | 2[ ] |
|  | green | Radical | 3[ ] |
|  | yellowish white | Guaraní | 4[ ] |
|  | orange | Védrantais | 5[ ] |
|  | reddish orange | Magenta | 6[ ] |
| **5.~~11~~ 20 (60)** | **Seed: length** |  |  |
|  | very short | Geumssaraki, Golden Crispi | 1[ ] |
|  | very short to short |  | 2[ ] |
|  | short | Elario, Katsura Giant | 3[ ] |
|  | short to medium |  | 4[ ] |
|  | medium | Arava, Sancho | 5[ ] |
|  | medium to long |  | 6[ ] |
|  | long | Amarillo Oro, Toledo | 7[ ] |
|  | long to very long |  | 8[ ] |
|  | very long | Albino | 9[ ] |
| **5.21 (62)** | **Seed: shape** |  |  |
|  | not pine-nut shape | Toledo | 1[ ] |
|  | pine-nut shape | Piel de Sapo | 2[ ] |
| **5.~~12~~ 22 (63)** | **Seed: color** |  |  |
|  | whitish | Amarillo Oro s.b. | 1[ ] |
|  | cream yellow | Galia, Piel de Sapo | 2[ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.~~13~~ 23 (68)** | **Shelf life of fruit** |  |  |
|  | very short | Charentais | 1[ ] |
|  | very short to short |  | 2[ ] |
|  | short | Galia | 3[ ] |
|  | short to medium |  | 4[ ] |
|  | medium | Clipper | 5[ ] |
|  | medium to long |  | 6[ ] |
|  | long | Piel de Sapo | 7[ ] |
|  | long to very long |  | 8[ ] |
|  | very long | Tendral Negro | 9[ ] |
| **5.~~14~~ 24 (69.1)** | **Resistance to *Fusarium oxysporum* f. sp. *melonis* (Fom) *–* Race 0  (Fom: 0)** |  |  |
|  | absent | ~~Jaune Canari 2~~ Atos, Charentais T | 1[ ] |
|  | present | Cadence, Charentais Fom-2, Dibango, ~~Jador,~~ Jubilo, Karakal, Védrantais | 9[ ] |
| **5.~~15~~ 25 (69.2)** | **Resistance to *Fusarium oxysporum* f. sp. *melonis* (Fom)** ***-* Race 1 (Fom: 1)** |  |  |
|  | absent | ~~Jaune Canari 2~~  Atos, Charentais T, Védrantais | 1[ ] |
|  | present | ~~Arapaho, Jador, Rubbens~~ Cadence, Charentais Fom-2, Dibango, Jubilo, Karakal | 9[ ] |
| **5.~~16~~ 26 (69.3)** | **Resistance to *Fusarium oxysporum* f. sp. *melonis* (Fom) *-* Race 2 (Fom: 2)** |  |  |
|  | absent | ~~Arapaho, Jaune Canari 2, Rubbens~~ Atos,  Charentais Fom-2, Charentais T, Dibango, Marianna | 1[ ] |
|  | present | ~~Anasta, Cléo, Jador,~~ Cadence,  Charentais Fom-1, Jubilo, Karakal, Perlita, Védrantais | 9[ ] |
| **5.27 (69.4)** | **Resistance to *Fusarium oxysporum* f. sp. *melonis -* Race 1.2 (Fom: 1.2)** |  |  |
|  | ~~susceptible~~ | ~~Jaune Canari 2,  Védrantais, Virgos~~ | ~~1[ ]~~ |
|  | ~~moderately resistant~~ | ~~Lunasol~~ | ~~2[ ]~~ |
|  | ~~highly resistant~~ | ~~Dinero, Isabelle~~ | ~~3[ ]~~ |
|  | absent | Graffio, Prity, Virgos | 1[ ] |
|  | present | Isabelle, Kyriel, Lunasol, Meliance, Piboule | 9[ ] |
|  | not tested |  | [ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.28 (70.1)** | **Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) - Race 1 (Px: 1)** |  |  |
|  | ~~susceptible~~ absent or low | ~~Jaune Canari 2,~~ Védrantais | 1[ ] |
|  | ~~moderately resistant~~ medium | Escrito | 2[ ] |
|  | ~~highly resistant~~ high | ~~Anasta, Cézanne~~ Arum | 3[ ] |
|  | not tested |  | [ ] |
| **5.29 (70.2)** | **Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) - Race 2 (Px: 2)** |  |  |
|  | ~~susceptible~~ absent or low | ~~Galoubet,~~ Védrantais | 1[ ] |
|  | ~~moderately resistant~~ medium | Escrito, Pendragon | 2[ ] |
|  | ~~highly resistant~~ high | ~~Anasta, Cézanne~~ Arum | 3[ ] |
|  | not tested |  | [ ] |
| **5.30 (70.3)** | **Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) - Race 3 (Px: 3)** |  |  |
|  | ~~susceptible~~ absent or low | Védrantais | 1[ ] |
|  | ~~moderately resistant~~ medium | ~~Nettuno~~ Arago, Durango | 2[ ] |
|  | ~~highly resistant~~ high | ~~Batista, Godiva~~ Arum | 3[ ] |
|  | not tested |  | [ ] |
| **5.31 (70.4)** | **Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) - Race 5 (Px: 5)** |  |  |
|  | ~~susceptible~~ absent or low | Védrantais | 1[ ] |
|  | ~~moderately resistant~~ medium | ~~Hugo, Pendragon~~ Arago, Durango | 2[ ] |
|  | ~~highly resistant~~ high | ~~Arapaho~~ Arum | 3[ ] |
|  | not tested |  | [ ] |
| **5.32 (70.5)** | **Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Powdery mildew) - Race 3-5 (Px: 3.5)** |  |  |
|  | ~~susceptible~~ absent or low | Védrantais | 1[ ] |
|  | ~~moderately resistant~~ medium | ~~Cisco~~ Arago, Durango | 2[ ] |
|  | ~~highly resistant~~ high | ~~90625~~ Arum | 3[ ] |
|  | not tested |  | [ ] |

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|  | Characteristics | Example Varieties | Note |
| **5.33 (71)** | Resistance to *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*) (Powdery mildew) Race 1 (Gc: 1) |  |  |
|  | susceptible | Escrito, Score, Védrantais | 1[ ] |
|  | moderately resistant | Flores, Anasta | 2[ ] |
|  | highly resistant | Cézanne, Heliobel, Théo | 3[ ] |
|  | not tested |  | [ ] |
| **5.34 (72)** | **Resistance to colonization by *Aphis gossypii*** |  |  |
|  | absent | Védrantais | 1[ ] |
|  | present | AR Hale’s Best Jumbo,  AR Top Mark, Godiva, Heliobel, Virgos | 9[ ] |
|  | not tested |  | [ ] |
| **5.35 (73)** | **Resistance to *Zucchini yellow mosaic virus* (ZYMV)** |  |  |
|  | absent | Cardillo, Généris, Jador, Védrantais | 1[ ] |
|  | present | Hannah’s Choice, Lunaduke | 9[ ] |
|  | not tested |  | [ ] |
| **5.36 (74.1)** | **Resistance to *Papaya ringspot virus* (PRSV) - Guadeloupe strain** |  |  |
|  | absent | Védrantais | 1[ ] |
|  | present | Hannah’s Choice | 9[ ] |
|  | not tested |  | [ ] |
| **5.37 (74.2)** | **Resistance to *Papaya ringspot virus* (PRSV) - E2 strain** |  |  |
|  | absent | Hannah’s Choice, Védrantais | 1[ ] |
|  | present | WMR29 | 9[ ] |
|  | not tested |  | [ ] |
| **5.38 (75)** | **Resistance to *Melon necrotic spot virus* (MNSV) Strain 0 (MNSV: 0)** |  |  |
|  | absent | Védrantais | 1[ ] |
|  | present | Cyro, Primal, Virgos, Yellow Fun | 9[ ] |
|  | not tested |  | [ ] |

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| --- | --- | --- | --- |
|  | Characteristics | Example Varieties | Note |
| **5.39 (76)** | **Resistance to *Cucumber mosaic virus* (CMV)** |  |  |
|  | absent | Cézanne, Dalton | 1[ ] |
|  | present | Lunaduke, Virgos | 9[ ] |
|  | not tested |  | [ ] |

[Ende der Anlage und des Dokuments]

1. vom 1. bis 5. Mai 2023 in Antalya, Türkiye. [↑](#footnote-ref-2)
2. [matref@geves.fr](mailto:matref@geves.fr) [↑](#footnote-ref-3)
3. Projekt Harmores 3 CPVO [(https://cpvo.europa.eu/sites/default/files/documents/report\_harmores\_3\_final\_meeting\_v0\_0.pdf](https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf) [↑](#footnote-ref-4)
4. ISF EG DRT Fom: 2 Resistance in melon - Link to include – *not yet available* [↑](#footnote-ref-5)
5. [matref@geves.fr](mailto:matref@geves.fr) [↑](#footnote-ref-6)
6. Projekt Harmores 3 CPVO [(](https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf)https://cpvo.europa.eu/sites/default/files/documents/report\_harmores\_3\_final\_meeting\_v0\_0.pdf) [↑](#footnote-ref-7)
7. [matref@geves.fr](mailto:matref@geves.fr) [↑](#footnote-ref-8)
8. Projekt Harmores 3 CPVO [(](https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf)https://cpvo.europa.eu/sites/default/files/documents/report\_harmores\_3\_final\_meeting\_v0\_0.pdf) [↑](#footnote-ref-9)
9. [matref@geves.fr](mailto:matref@geves.fr) [↑](#footnote-ref-10)
10. Harmores 3 CPVO project (<https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf> [↑](#footnote-ref-11)
11. ISF EG DRT Fom: 2 resistance in Melon – Link to include – *not yet available* [↑](#footnote-ref-12)
12. [matref@geves.fr](mailto:matref@geves.fr)

    3 Harmores 3 CPVO project (<https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf>) [↑](#footnote-ref-13)
13. 3 [matref@geves.fr](mailto:matref@geves.fr)

    6 Harmores 3 CPVO project (<https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf>) [↑](#footnote-ref-14)