|  |  |
| --- | --- |
|  | S |
| Unión Internacional para la Protección de las Obtenciones Vegetales |  |

|  |  |
| --- | --- |
| Comité Técnico  Quincuagésima novena sesión  Ginebra, 23 y 24 de octubre de 2023 | TC/59/20  Original: Inglés  Fecha: 29 de septiembre de 2023 |

Revisión parcial de las directrices de examen del melón

Documento preparado por un experto de Francia

Descargo de responsabilidad: el presente documento no constituye un documento de política u orientación de la UPOV

El presente documento tiene por finalidad exponer una propuesta de revisión parcial de las directrices de examen del melón (documento TG/ TG/104/5 Rev. 2).

En su quincuagésima séptima sesión[[1]](#footnote-2), el Grupo de Trabajo Técnico sobre Hortalizas (TWV), examinó una propuesta de revisión parcial de las directrices de examen del melón (*Cucumis melo* L.) conforme a los documentos TG/104/5 Rev. 2 y TWV/57/22 “*Partial revision of the Test Guidelines for Melon”* y propuso los siguientes cambios (véase el párrafo 70 del documento TWV/57/26 “*Report*”):

1. Revisión de los caracteres 69.1 a 69.4 “Resistencia a *Fusarium oxysporum* f. sp. *melonis* (Fom) - razas 0, 1, 2, y 1.2”;
2. Revisión de la explicación Ad. 69 “Resistencia a las razas 0, 1, 2, y 1.2 de *Fusarium oxysporum* f. sp. *melonis* (Fom)” de la sección 8.2 “Explicaciones relativas a caracteres individuales”;
3. Revisión de los caracteres 70.1 a 70.5 “Resistencia a *Podosphaera xanthii* (Px) - razas 1, 2, 3, 5, 3.5”;
4. Revisión de las explicaciones Ads. 70.1 a 70.3 y 71 “Resistencia a *Podosphaera xanthii* (Px), Resistencia a la raza 1 de *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*) (oídio) Gc (Ec)” de la sección 8.2 “Explicaciones relativas a caracteres individuales”;
5. Inclusión de caracteres de la tabla de caracteres en el Cuestionario Técnico

A continuación, se presenta la nueva redacción propuesta. Los cambios propuestos se indican como texto resaltado y subrayado (inserción) y ~~tachado~~ (eliminación) en el Anexo de este documento (sólo en inglés).

## Revisión de los caracteres 69.1 a 69.4 “Resistancia a *Fusarium oxysporum* f. sp. *melonis* (Fom) - razas 0, 1, 2, y 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 |

## Revisión de la explicación Ad. 69 “Resistencia a las razas 0, 1, 2, y 1.2 de *Fusarium oxysporum* f. sp. *melonis* (Fom)” de la sección 8.2 “Explicaciones relativas a caracteres individuales”

Ads. 69: 69.1 - 69.3: Resistencia a las razas 0, 1 y 2 del *Fusarium oxysporum* f. sp. *melonis* (Fom: 0, Fom: 1, Fom: 2)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Agentes patógenos | | razas 0, 1 y 2 de *Fusarium oxysporum* f. sp. *melonis* |
| 2. | Estado de cuarentena | | no |
| 3. | Especies huéspedes | | melón (*Cucumis melo*) |
| 4. | Fuente del inóculo | | p. ej., GEVES (FR)[[2]](#footnote-3) |
| 5. | Aislado | | p. ej., una cepa de referencia validada en un ensayo interlaboratorios[[3]](#footnote-4), [[4]](#footnote-5)  Fom: 0   * cepa MLZ   = MAT/REF/04-07-01-03-02    Fom: 1   * cepa FOM 26   = MAT/REF/04-07-01-01    Fom: 2   * cepa F185 |
| 6. | Establecimiento de la identidad del aislado | | El cuadro más reciente puede consultarse en la siguiente dirección de la ISF:  <https://www.worldseed.org/our-work/plant-health/differential-hosts/>  *Situación a julio de 2019* |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Huésped diferencial** | **Gen presente** | **Fom: 0\*** | **Fom: 1\*** | **Fom: 2\*** | **Fom: 1.2\*** | | Charantais T\* | - | S | S | S | S | | Védrantais\*, Doublon\* | *Fom-1* | AR | S | AR | S | | Charantais Fom-2\*, CM17187\* | *Fom-2* | AR | AR | S | S | | Isabelle\* | *¿poligénico?* | AR | AR | AR | RI |   S = susceptible; AR = altamente resistente; RI = resistencia intermedia  \* huéspedes diferenciales y aislados utilizados por el sector de las semillas  Cedido por el sitio web Worldseed.org | | | |
| 7. | Establecimiento de la capacidad patógena | | utilizar variedades de melón susceptibles |
| 8. | Multiplicación del inóculo | |  |
| 8.1 | Medio de multiplicación | | en medio agar, p. ej. papa-dextrosa-agar, malta agar, a 20°C - 25°C |
| 8.2 | Variedad para la multiplicación | | - |
| 8.3 | Estado de desarrollo en el momento de la inoculación | | - |
| 8.5 | Método de inoculación | | - |
| 8.6 | Cosecha del inóculo | | cultivo de 7-10 días |
| 8.7 | Comprobación del inóculo cosechado | | - |
| 8.8 | Período de conservación/viabilidad del inóculo | | de 4 a 8 horas o mantener a baja temperatura para evitar la germinación de las esporas |
| 9. | Formato del examen | |  |
| 9.1 | Número de plantas por genotipo | | 30 como mínimo; es importante que haya 5 plantas sin inocular de cada genotipo como mínimo, para poder evaluar la reducción del crecimiento |
| 9.2 | Número de réplicas | | p. ej., 3 réplicas (3 × 10) como mínimo |
| 9.3 | | Variedades de control |  |
| 9.3.1 | | Variedades de control para la raza 0 | ausencia de resistencia: Charentais T  presencia de resistencia: Charentais Fom-2, Védrantais |
| 9.3.2 | | Variedades de control para la raza 1 | ausencia de resistencia: Charentais T, Védrantais  presencia de resistencia: Charentais Fom-2 |
| 9.3.3 | | Variedades de control para la raza 2 | ausencia de resistencia: Marianna  presencia de resistencia: Perlita, Charentais Fom-1, Védrantais |
| 9.4 | | Diseño del ensayo | 3 réplicas de 10 plantas para poder realizar un análisis estadístico (en distintas bandejas) y 5 plantas sin inocular de cada genotipo como mínimo |
| 9.5 | | Instalación del ensayo | invernadero o sala climatizada |
| 9.6 | | Temperatura | - Fom: 0 y Fom: 1: de 18 a 24°C  - Fom: 2: 24°C |
| 9.7 | | Luz | - Fom: 0 y Fom: 1: 12 horas como mínimo  - Fom: 2: 16 horas |
| 9.9 | | Medidas especiales | - Fom: 0 y Fom: 1: se recomienda mantener 18°C reales por la noche y no más de 24°C durante el día |
| 10. | | Inoculación |  |
| 10.1 | | Preparación del inóculo | raspar los cultivos de esporas del medio agar con agua (véase el punto 8.1); opcionalmente, multiplicación en medio líquido (p. ej., medio líquido sintético de Messiaen (1991), sacarosa 50 g/L, en agitador permanente o medio de cultivo Czapek-Dox aireado durante 5-7 días a temperatura ambiente)  *Observación:* atención, algunos aislados producen toxinas (véase la observación del punto 13) |
| 10.2 | | Cuantificación del inóculo | de 4 × 10⁵ a 1 × 10⁶ esporas/ml |
| 10.3 | | Estado de desarrollo en el momento de la inoculación | cotiledones expandidos |
| 10.4 | | Método de inoculación | se recolectan con cuidado las plantas en el estado indicado para la inoculación y se sumergen las raíces y los hipocótilos en una suspensión de esporas durante 2-15 minutos; opcionalmente se pueden trocear las raíces; trasplantar a bandejas |
| 10.5 | | Primera observación | primera notación: síntomas de los controles con ausencia de resistencia (susceptibles) correspondientes a la clase 2 o 3, con una gran proporción en la clase 3 |
| 10.6 | | Segunda observación | puede ser necesaria una segunda notación para reevaluar variedades poco claras |
| 11. | | Observaciones |  |
| 11.1 | | Método | observación visual |

|  |  |  |
| --- | --- | --- |
| 11.2 | Escala de observación |  |

|  |  |  |
| --- | --- | --- |
| plantas sin inocular | Clase 0 | Clase 1 |
| 5 plantas como mínimo | Planta sana: sin síntomas de amarilleo o marchitamiento, puede que se observe cierta reducción del crecimiento en comparación con la simulación debido al estrés por la inoculación. En ocasiones se puede observar cierto amarilleo en la simulación, distinto de los síntomas de *Fusarium* | Síntomas leves de amarilleo o marchitamiento |
|  | | |

|  |  |  |
| --- | --- | --- |
| Clase 2 | Clase 3 |  |
| Síntomas típicos: amarilleo, marchitamiento y necrosis, enanismo (interrupción del crecimiento) | Muerte de la planta (muerta) |  |
|  | | Otros síntomas de aclaramiento de la nervadura puede ser difíciles de juzgar.  Se recomienda efectuar una notación con posterioridad para observar la evolución de esos síntomas. |

Cedido por la SNES del GEVES en el marco del proyecto Harmores de la OCVV.

|  |  |  |
| --- | --- | --- |
| 11.3 | Validación del ensayo | Validación a partir de los controles.    Ensayos con Fom: 0 y Fom: 1:  Respuesta prevista de los controles:  Ausencia de resistencia: la mayor parte de las plantas en las clases 2 y 3  Presencia de resistencia: la mayor parte de las plantas en las clases 0 y 1; en ocasiones, unas pocas plantas en las clases 2 o 3    Ensayos con Fom: 2:  Respuesta prevista de los controles:   * En el caso de los controles susceptibles (con el nivel de los caracteres de la UPOV “ausencia de resistencia”), la mayor parte de las plantas deben corresponder a las clases de observación 2 o 3, y unas pocas plantas o ninguna a las clases de observación 0 o 1.   + El control susceptible Marianna es menos susceptible que Charentais Fom‑2 y Charentais T * En el caso de los controles resistentes, la mayor parte de las plantas deben corresponder a las clases de observación 0 o 1, y unas pocas plantas o ninguna a las clases de observación 2 o 3.   En el caso de Perlita (el control resistente que marca el umbral inferior de resistencia), al menos algunas plantas deben corresponder a las clases de observación 1, 2 o 3. Tiene que ser menos resistente que Charentais Fom-1 y Védrantais. |
| 11.4 | Fueras de tipo | - |
| 12. | Interpretación de los datos en función de los niveles de los caracteres de la UPOV | Si la variedad presenta una respuesta entre la del control susceptible (ausencia de resistencia) y la del control resistente, debe repetirse el ensayo.  Si se confirma el resultado, la variedad se considerará heterogénea.  Si los resultados no son claros, el ensayo debe repetirse o realizarse en otro laboratorio. |

Resistencia a Fom: 0 y a Fom: 1

**No distinta** delcontrolcon **ausencia de resistencia**

**No distinta** del control con **presencia de resistencia**

Une image contenant diagramme

Description générée automatiquement

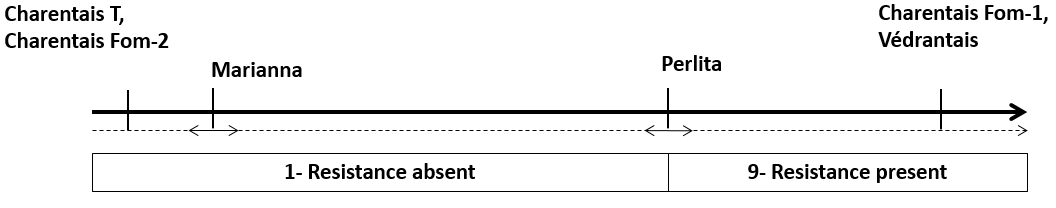
**1 – Ausencia de resistencia**

**9 – Presencia de resistencia**

*Resultado no concluyente*

*Repetir el ensayo*

Resistencia a Fom: 2



**9 – Presencia de resistencia**

**1 – Ausencia de resistencia**

|  |  |  |
| --- | --- | --- |
| 13. | Puntos de control esenciales | En el caso de la raza 2, el control Perlita, con el gen *Fom-3*, permite validar la capacidad del aislado de atacar esta variedad parcialmente.    Si el inóculo se hace crecer en, p. ej., medio líquido sintético de Messiaen (1991), en agitador permanente, se puede utilizar después de 5-7 días.  En el caso de las razas 0 y 1, se recomienda una dilución 1:12; en el caso de la raza 2, no debe ser inferior a 1:20. Con una dilución inferior (mayor concentración del medio), se ha observado que las toxinas liberadas en el medio por la raza 2 pueden producir cierto amarilleo de las plantas de melón aunque sean resistentes. Otra posibilidad consiste en “lavar” las esporas preparando una suspensión con una masa de esporas recogida en un filtro Millipore conectado a una fuente de vacío. |

Ad. 69.4: Resistencia a la raza 1.2 de *Fusarium oxysporum* f. sp. *melonis* (Fom: 1.2)

|  |  |  |
| --- | --- | --- |
| 1. | Agentes patógenos | raza 1.2 de *Fusarium oxysporum f. sp. melonis* (Fom: 1.2) |
| 2. | Estado de cuarentena | no |
| 3. | Especies huéspedes | melón (*Cucumis melo* L.) |
| 4. | Fuente del inóculo | GEVES (FR)[[5]](#footnote-6) |
| 5. | Aislado | p. ej., una cepa de referencia validada en un ensayo interlaboratorios[[6]](#footnote-7)  Fom: 1.2   * cepa TST   = MAT/REF/04-07-01-04 2 |
| 6. | Establecimiento de la identidad del aislado | El cuadro más reciente puede consultarse en la siguiente dirección de la ISF:  <https://www.worldseed.org/our-work/plant-health/differential-hosts/>  *Situación a julio de 2019* |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Huésped diferencial** | **Gen presente** | **Fom: 0\*** | **Fom: 1\*** | **Fom: 2\*** | **Fom: 1.2\*** | | Charantais T\* | - | S | S | S | S | | Védrantais\*, Doublon\* | *Fom-1* | AR | S | AR | S | | Charantais Fom-2\*, CM17187\* | *Fom-2* | AR | AR | S | S | | Isabelle\* | *¿poligénico?* | AR | AR | AR | RI |   S = susceptible; AR = altamente resistente; RI = resistencia intermedia  \* huéspedes diferenciales y aislados utilizados por el sector de las semillas  Cedido por el sitio web Worldseed.org | | |
| 7. | Establecimiento de la capacidad patógena | utilizar variedades de melón susceptibles |
| 8. | Multiplicación del inóculo |  |
| 8.1 | Medio de multiplicación | en medio agar, p. ej. papa-dextrosa-agar, Sabouraud, a 20°C - 25°C |
| 8.2 | Variedad para la multiplicación | - |
| 8.3 | Estado de desarrollo en el momento de la inoculación | - |
| 8.5 | Método de inoculación | - |
| 8.6 | Cosecha del inóculo | cultivo de 4-10 días |
| 8.7 | Comprobación del inóculo cosechado | - |
| 8.8 | Período de conservación/viabilidad del inóculo | - |
| 9. | Formato del examen |  |
| 9.1 | Número de plantas por genotipo | 30 de cada variedad, además de 5 controles sin inocular |
| 9.2 | Número de réplicas | 3 × 10 plantas como mínimo, en distintas bandejas |
| 9.3 | Variedades de control | Ausencia de resistencia: Virgos  Presencia de resistencia: Piboule, Lunasol e Isabelle (es previsible que el índice de enfermedad de Isabelle sea menor (es decir, mayor resistencia que Piboule y Lunasol)).  Piboule y Lunasol son necesarias para ilustrar el nivel inferior de resistencia. Su resistencia se basa en otras características genéticas y puede presentar distintos niveles en distintos laboratorios. |
| 9.4 | Diseño del ensayo | 3 réplicas de 10 plantas para poder realizar un análisis estadístico (en distintas bandejas) y 5 plantas sin inocular de cada genotipo como mínimo |
| 9.5 | Instalación del ensayo | invernadero o sala climatizada |
| 9.6 | Temperatura | de 18 a 24°C |
| 9.7 | Luz | 12 horas como mínimo |
| 10. | Inoculación |  |
| 10.1 | Preparación del inóculo | raspar los cultivos del medio agar con agua (véase el punto 8.1); opcionalmente, multiplicación en medio líquido (p. ej., caldo de papa-dextrosa o medio de cultivo Czapek-Dox durante 7 días a temperatura ambiente en oscuridad o medio líquido sintético de Messiaen (1991), sacarosa 50 g/L, en agitador permanente a temperatura ambiente, el inóculo se puede utilizar después de 5-7 días) |
| 10.2 | Cuantificación del inóculo | 1 × 10⁵-1 × 10⁶ esporas/ml, según el método de inoculación (véase el punto 10.4) y las condiciones del laboratorio |
| 10.3 | Estado de desarrollo en el momento de la inoculación | cotiledones expandidos, primera hoja brotando |
| 10.4 | Método de inoculación | Se puede emplear uno de los dos métodos siguientes:   * Absorción:   Absorción de una suspensión de esporas, p. ej. 700 ml de una suspensión de 1 × 10⁵ esporas/ml para 50 plantas en una bandeja de 30 × 30 cm.   * Inyección:   Inyección de una suspensión de esporas en la tierra, en la base de la planta, p. ej. 5 ml de 10⁶ esporas/ml por planta. |
| 10.7 | Observaciones finales | primera notación: síntomas en los controles susceptibles, correspondientes a la clase 3 como mínimo (generalmente de 10 a 21 días después de la inoculación). Puede ser necesaria una segunda notación para reevaluar variedades poco claras. |
| 11. | Observaciones |  |
| 11.1 | Método | observación visual |
| 11.2 | Escala de observación |  |

|  |  |  |
| --- | --- | --- |
| Plantas sin inocular | Clase 0 | Clase 1 |
| Las variedades deben compararse con las plantas sin inocular. | Planta sana, toda la planta está verde o al mismo nivel que la simulación. Se puede admitir un ligero amarilleo en la simulación. | Síntomas leves, ligero amarilleo en los cotiledones y/o en las hojas, sin necrosis |
|  | | |

|  |  |  |
| --- | --- | --- |
| Clase 2 | Clase 3 | Clase 4 |
| Síntomas moderados, amarilleo en los cotiledones y/o en las hojas, inicio de necrosis y marchitamiento, pero no extendidos | Síntomas intensos de amarilleo y/o marchitamiento en los cotiledones y/o en las hojas, con necrosis extendida | Planta muerta, sin partes verdes en las hojas o hipocótilo seco |
|  | | |

Cedido por la SNES del GEVES en el marco del proyecto Harmores de la OCVV.

|  |  |  |
| --- | --- | --- |
| 11.3 | Validación del ensayo | Validación a partir de los controles. Respuesta prevista de los controles:   * Presencia de resistencia:   La mayor parte de las plantas en las clases 0 y 1, en algunos casos con unas pocas plantas en las clases 2, 3 o 4.  Bajo índice de enfermedad, generalmente inferior al 40%. Suele observarse diferencia entre el índice de enfermedad de Piboule y Lunasol y el de Isabelle   * Ausencia de resistencia:   La mayor parte de las plantas en las clases 3 y 4, en algunos casos con unas pocas plantas en las clases 0, 1 o 2. Índice de enfermedad muy alto, generalmente superior al 80%. |
| 11.4 | Fueras de tipo | - |
| 12. | Interpretación de los datos en función de los niveles de los caracteres de la UPOV | Interpretación de las variedades en función de los controles (gráfico 1)  nota 1 = ausencia de resistencia  nota 9 = presencia de resistencia    El análisis cuantitativo se basa en el índice de enfermedad Y en la distribución de las plantas por clases en comparación con los controles.    Las variedades estadísticamente similares a los controles resistentes o con menor índice de enfermedad deben considerarse resistentes.  Las variedades entre los controles susceptibles y los resistentes deben considerarse susceptibles.  Si los resultados no son claros, se recomienda encarecidamente recurrir a la estadística. |
| Resistencia a Fom: 1-2:    **9 – Presencia de resistencia**  **1 – Ausencia de resistencia**      Nx: número de plantas en la clase x    *Gráfico 1: fórmula del índice de enfermedad (DI,* disease index*)* | | |

Revisión de los caracteres 70.1 a 70.5 “Resistencia a *Podosphaera xanthii* (Px) - razas 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** |  | 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 |

## Revisión de las explicaciones Ads. 70.1 a 70.3 y 71 “Resistencia a *Podosphaera xanthii* (Px), Resistencia a la raza 1 de *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*) (oídio) Gc (Ec)” de la sección 8.2 “Explicaciones relativas a caracteres individuales”

Ads. 70.1 a 70.5: Resistencia a las razas 1, 2, 3, 5, 3.5 de *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea*) (oídio)(Px: 1, 2, 3, 5, 3.5)

Ad. 71: Resistencia a la raza 1 de *Golovinomyces cichoracearum* (*Erysiphe cichoracearum*) (oídio) Gc (Ec)

|  |  |  |
| --- | --- | --- |
| 1. | Agentes patógenos | Oídio:razas 1, 2, 3, 5 y 3.5 de *Podosphaera xanthii* (ex *Spaerotheca fuliginea*)  Raza 1 de *Golovinomyces cichoracearum (Erysiphe cichoracearum)* |
| 2. | Estado de cuarentena | no |
| 3. | Especies huéspedes | melón (Cucumis melo L.) |
| 4. | Fuente del inóculo | GEVES (FR)[[7]](#footnote-8) |
| 5. | Aislado | p. ej., una cepa de referencia validada en un ensayo interlaboratorios[[8]](#footnote-9)  Px: 1   * Cepa Sm 3   = MAT/REF/04-07-03-01 3  Px: 2   * Cepa S87-7   = MAT/REF/04-07-03-02 3  Px: 3   * Cepa 00Sm39   = MAT/REF/04-07-03-04-02 3  Px: 5   * Cepa 98Sm65   = MAT/REF/04-07-03-03-01-02 3  Px: 3.5   * Cepa 04Sm2   = MAT/REF/04-07-03-05-01 3    Gc: 1   * Cepa GEVES   = MAT/REF/04-07-02-01)[3](mailto:contact@geves.fr) |
| 6. | Establecimiento de la identidad del aislado | en variedades diferenciales (cuadro 1) |

Cuadro 1:

Razas de *Podosphaera xanthii* (Px) y *Golovinomyces cichoracearum* (Gc), J. McCreight y M. Pitrat

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | *Podosphaera xanthii* | | | | | | *Golovinomyces cichoracearum* | |
|  | Raza 0 | Raza 1 | Raza 2 | Raza 3 | Raza 4 | Raza 5 | Raza 3.5 | Raza 0 | Raza 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. | Establecimiento de la capacidad patógena | utilizar variedades de melón susceptibles |
| 8. | Multiplicación del inóculo |  |
| 8.1 | Medio de multiplicación | plántulas de melón |
| 8.2 | Variedad para la multiplicación | variedad susceptible (por ejemplo, Védrantais)  Para aislados superiores como 3.5 o 5, se recomienda una variedad con resistencia vencida para mantener el aislado puro. |
| 8.3 | Estado de desarrollo en el momento de la inoculación | cotiledón |
| 8.5 | Método de inoculación | Sembrar en sustrato, por ejemplo tierra o turba desinfectada, en un invernadero en miniatura cerrado. Desprender los cotiledones de la planta cuando se hayan extendido. Desinfectar los cotiledones sumergiéndolos durante 3 minutos en una solución de cloruro de mercurio al 0,05% o en una solución de hipoclorito de sodio. Enjuagarlos con agua esterilizada. Secar los cotiledones con una toalla de papel esterilizado y colocarlos en placas Petri con el medio siguiente:  sacarosa 10 g  manitol 20 g  agar 5 g  agua destilada 1 litro  Esparcir las conidias en los cotiledones y soplar sobre ellos o depositar las conidias en la superficie de los cotiledones. Incubar los cotiledones inoculados en placas Petri, por ejemplo a 23°C durante 14 horas con luz y a 18°C durante 10 horas en la oscuridad o a 17°C permanentemente bajo una intensidad lumínica muy reducida. De 9 a 11 días después de la inoculación, los cotiledones estarán cubiertos por conidias y podrán utilizarse como inóculo. |
| 8.6 | Cosecha del inóculo | esporulación en los cotiledones |
| 8.8 | Período de conservación/viabilidad del inóculo | de 1 a 1,5 meses después de la inoculación como máximo |
| 9. | Formato del examen |  |
| 9.1 | Número de plantas por genotipo | 20 plantas como mínimo de cada variedad y control, 5 en el caso de otras variedades diferenciales |
| 9.2 | Número de réplicas | - |
| 9.3 | Variedades de control |  |
|  |  | Para la raza 1 de *Podosphaera xanthii* (Px), resistencia:   * ausente o baja: Védrantais * intermedia: Escrito * alta: Arum     Para la raza 2 de *Podosphaera xanthii* (Px), resistencia:   * ausente o baja: Védrantais * intermedia: Escrito, Pendragon * alta: Arum     Para las razas 3, 5 y 3.5, de *Podosphaera xanthii* (Px), resistencia:   * ausente o baja: Védrantais * intermedia: Arago, Durango * alta: Arum     Para la raza 1 de *Golovinomyces cichoracearum* (Gc), resistencia:   * ausente o baja: Védrantais * intermedia: Anasta * alta: Cézanne |
| 9.4 | Diseño del ensayo | Incluir variedades diferenciales para validar la raza (5 plantas como mínimo de cada variedad diferencial) y comparar el grado de esporulación. |
| 9.5 | Instalación del ensayo | cámara climatizada o invernadero |
| 9.6 | Temperatura | 20-24°C |
| 9.7 | Luz | 12 horas como mínimo |
| 10. | Inoculación |  |
| 10.1 | Preparación del inóculo | - |
| 10.2 | Cuantificación del inóculo | - |
| 10.3 | Estado de desarrollo en el momento de la inoculación | Plantas enteras con 3 o 4 hojas verdaderas totalmente desplegadas. Inoculación de las hojas 2 y 3, según se indica en el diagrama siguiente:    Cedido por la SNES del GEVES en el marco del proyecto Harmores de la OCVV. |
| 10.4 | Método de inoculación | Tomar esporas de un cotiledón ya cubierto de conidias y depositarlas en una hoja. Se pueden evaluar distintos aislados en una misma planta (o una misma hoja) si los depósitos locales están bien separados entre sí y se señala la localización de cada depósito con una marca. |
| 10.7 | Observaciones finales | La fecha de notación debe elegirse en función de los síntomas previstos de los tres controles. La esporulación debe manifestarse con claridad en el control susceptible. |
| 11. | Observaciones |  |
| 11.1 | Método | observación visual de la esporulación |
| 11.2 | Escala de observación |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Clase 1: no se desarrolla el hongo (no hay micelio o está muerto) o no hay esporulación | Clase 3: esporulación débil | Clase 5: esporulación moderada | Clase 9: esporulación intensa |
| Ejemplo de contaminación por el entorno en el control susceptible (ensayo no validado) | | | |

Cedido por la SNES del GEVES en el marco del proyecto Harmores de la OCVV.

|  |  |  |
| --- | --- | --- |
| 11.3 | Validación del ensayo | Validación a partir de los controles.    Información adicional sobre las respuestas previstas de los controles para *Podosphaera xanthii*:  Resistencia ausente o baja:   * plantas en la clase 9, o la mayor parte de las plantas en la clase 9 y unas pocas en la clase 5 (índice de enfermedad alto) * unas pocas plantas en la clase 3 pero, en este caso, todos los controles resistentes deben corresponder a la clase 1 y el control de resistencia intermedia a las clases 3 y 1 * ninguna planta en la clase 1   Resistencia intermedia:   * entre el control resistente y el susceptible * generalmente, plantas en las clases 3 y 5   Resistencia alta   * plantas en la clase 1, o la mayor parte de las plantas en la clase 1 y unas pocas en la clase 3 (índice de enfermedad muy bajo). * plantas en la clase 3 pero, en este caso, todos los controles susceptibles deben corresponder a la clase 9 * ninguna planta en las clase 5 o 9 |
| 11.4 | Fueras de tipo | - |
| 12. | Interpretación de los datos en función de los niveles de los caracteres de la UPOV | Interpretación de las variedades en función de los controles (gráfico 1)  Resistencia  nota 1 = ausente o baja  nota 2 = intermedia  nota 3 = alta    El análisis cuantitativo se basa en el índice de enfermedad Y en la distribución de las plantas por clases en comparación con los controles.    Información adicional en relación con los controles para *Podosphaera xanthii*:  Las variedades entre el control de resistencia intermedia y el resistente deben considerarse de resistencia intermedia (porque su resistencia no es suficiente para considerarlas resistentes).  Las variedades entre el control susceptible y el de resistencia intermedia deben considerarse susceptibles (porque su resistencia no es suficiente para considerarlas de resistencia intermedia). |
| Resistencia a Px:  **Entre** el control de resistencia intermedia y el de resistencia alta 🡪 **se considera de resistencia intermedia**  **Entre** el control de resistencia ausente o baja y el de resistencia intermedia 🡪 **se considera de resistencia ausente o baja**    ***No distinta*** *del control con resistencia alta 🡪* ***se considera de resistencia alta***  ***No distinta*** *del control con resistencia intermedia 🡪* ***se considera de resistencia intermedia***  ***No distinta*** *del control con resistencia ausente o baja 🡪* ***se considera de resistencia ausente o baja***  **3 – resistencia alta**  **2 – resistencia intermedia**  **1 – resistencia ausente o baja**      Nx: número de plantas en la clase x  Gráfico 1: fórmula del índice de enfermedad (DI, *disease index*) | | |
| 13. | Puntos de control esenciales | Para evitar la contaminación cruzada, se recomienda no producir inóculo de distintas razas en la misma sala. |

Inclusión de caracteres de la tabla de caracteres en el Cuestionario Técnico

Se propone incluir los siguientes caracteres en el cuestionario técnico (las propuestas de inclusión se indican como texto resaltado y subrayado):

|  |  |  |
| --- | --- | --- |
| **Carácter N.°** | **(\*)** | **Nombre del carácter** |
| 12 | (\*) | Inflorescencia: expresión del sexo (en plena floración) |
| 13 |  | Fruto joven: tonalidad del color verde de la piel |
| 14 | (\*) | Fruto joven: intensidad del color verde de la piel |
| 24 | (\*) | Fruto: longitud |
| 25 | (\*) | Fruto: diámetro |
| 28 | (\*) | Fruto: forma en sección longitudinal |
| 29 | (\*) | Fruto: color de fondo de la piel |
| 31 |  | Fruto: tonalidad del color de fondo de la piel |
| 32 |  | Fruto: densidad de los puntos |
| 36 | (\*) | Fruto: densidad de las manchas |
| 38 | (\*) | Fruto: verrugas |
| 43 | (\*) | Fruto: surcos |
| 45 |  | Fruto: profundidad de los surcos |
| 47 | (\*) | Fruto: rugosidad de la superficie |
| 48 | (\*) | Fruto: formación suberosa |
| 49 | (\*) | Fruto: grosor de la capa suberosa |
| 50 | (\*) | Fruto: distribución de la formación suberosa |
| 51 | (\*) | Fruto: densidad de la distribución de la formación suberosa |
| 54 | (\*) | Fruto: color principal de la pulpa |
| 60 | (\*) | Semilla: longitud |
| 62 |  | Semilla: forma |
| 63 | (\*) | Semilla: color |
| 68 | (\*) | Conservación post cosecha del fruto |
| 69.1 | (\*) | Resistencia al *Fusarium oxysporum* f. sp. *melonis* Raza 0 (Fom: 0) |
| 69.2 | (\*) | Resistencia al *Fusarium oxysporum* f. sp. *melonis* Raza 1 (Fom: 1) |
| 69.3 | (\*) | Resistencia al *Fusarium oxysporum* f. sp. *melonis* Raza 2 (Fom: 2) |
| 69.4 |  | Resistancia al *Fusarium oxysporum* f. sp. *melonis* Raza 1.2 (Fom: 1.2) |
| 70.1 |  | Resistancia a *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Oidio) Raza (Px: 1) |
| 70.2 |  | Resistancia a *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Oidio) Raza 2 (Px: 2) |
| 70.3 |  | Resistancia a *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Oidio) Raza 3 (Px: 3) |
| 70.4 |  | Resistancia a *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Oidio) Raza 5 (Px: 5) |
| 70.5 |  | Resistance to *Podosphaera xanthii* (Px) (ex *Sphaerotheca fuliginea)* (Oidio) Raza 3-5 (Px: 3.5) |
| 71 |  | Resistencia a *Golovinomyces cichoracearum (Erysiphe cichoracearum)* Raza 1 (Oidio) Race 1 (Gc: 1) |
| 72 |  | Resistencia a la colonización por *Aphis gossypii* |
| 73 |  | Resistencia al virus del mosaico amarillo del calabacín (ZYMV) |
| 74.1 |  | Resistencia al virus de la mancha anular del papayo (PRSV) Cepa Guadeloupe |
| 74.2 |  | Resistencia al virus de la mancha anular del papayo (PRSV) Cepa E2 |
| 75 |  | Resistencia al virus del cribado del melón (MNSV) Cepa 0 (MNSV: 0) |
| 76 |  | Resistencia al virus del mosaico del pepino (CMV) |

Los cambios detallados del TQ se indican como texto resaltado y subrayado (inserción) y ~~tachado~~ (eliminación) en el Anexo de este documento (sólo en inglés).

[Sigue el Anexo]

CAMBIOS PROPUESTOS RESALTADOS

(sólo en inglés)

## 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

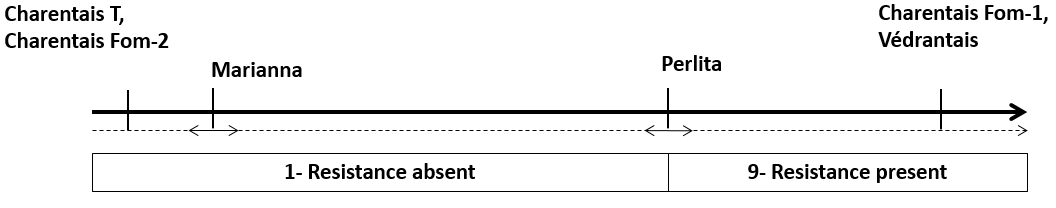
*Inconclusive result*

*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 1:

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 |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | ~~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~~ |

|  |  |  |
| --- | --- | --- |
|  |  | 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

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds). | | | |
|  | Characteristics | Example Varieties | Note |
| **5.1 (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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  | Characteristics | Example Varieties | Note |
| --- | --- | --- | --- |
| **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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  | 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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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[ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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 |  | [ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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 |  | [ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 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 |  | [ ] |

| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
| --- | --- | --- |
|  |  |  |

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

[Fin del documento]

1. celebrada en Antalya (Türkiye) del 1 al 5 de mayo de 2023. [↑](#footnote-ref-2)
2. [matref@geves.fr](mailto:matref@geves.fr) [↑](#footnote-ref-3)
3. Proyecto Harmores 3 de la OCVV (<https://cpvo.europa.eu/sites/default/files/documents/report_harmores_3_final_meeting_v0_0.pdf>) [↑](#footnote-ref-4)
4. ISF EG DRT – Resistencia a Fom: 2 en el melón (se incluirá un enlace, *no disponible aún*) [↑](#footnote-ref-5)
5. [matref@geves.fr](mailto:matref@geves.fr) [↑](#footnote-ref-6)
6. Proyecto Harmores 3 de la OCVV (<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. Proyecto Harmores 3 de la OCVV (<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)