NAME OF THE ORGANISM: Plasmopara halstedii (PLASHA)

GENERAL INFORMATION ON THE PEST

Name as submitted in the project specification (if different to the preferred name):

Pest category:

Chromista **1- Identity of the pest/Level of taxonomic listing:**
Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?

Yes
Is the pest defined at the species level or lower?:

Yes
Can listing of the pest at a taxonomic level higher than species be supported by scientific reasons or can species be identified within the taxonomic rank which are the (main) pests of concern?

* Not relevant: Oil and fibre plants sector, Ornamental sector

Is it justified that the pest is listed at a taxonomic rank below species level?

Not relevant
Conclusion:

* Candidate: Oil and fibre plants sector, Ornamental sector

**2 – Status in the EU:**

Is this pest already a quarantine pest for the whole EU?

No
Presence in the EU:

Yes
List of countries (EPPO Global Database):

Austria (1993); Bulgaria (1993); Croatia (1996); Czech Republic (2016); Estonia (1992); France (1993); Germany (1995); Greece (2008); Hungary (2014); Italy (1992); Netherlands (2015); Romania (2011); Slovakia (1994); Spain (1996)
Conclusion:

candidate
Justification (if necessary):

Data of the presence of this pest on the EU territory are available in EPPO Global Database (<https://gd.eppo.int/>).

HOST PLANT N°1: Helianthus annuus (HELAN) for the Oil and fibre plants sector.

Origin of the listing:

IIA2AWG
Plants for planting:

Seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

No
Conclusion:

Evaluation continues **4 - Are the listed plants for planting the main\* pathway for the "pest/host/intended use" combination? (\*: significant compared to others):**

Yes
Conclusion:

Candidate

Justification:

With respect to the primary infection, P. halstedii is a soil-borne pathogen. Its oospores serve as primary inoculum to underground tissues of young sunflower seedlings. It may also be windborne, causing secondary infection of leaves and/or inflorescence however the significance of windborne sporangia in disease initiation has long been regarded to be low. The fungus is also seedborne: the affected seeds carrying mycelium and/or oospores internally and seed tests are available to detect infection. Oospores develop mainly in root and lower stem tissues of mildewed plants, with or without visible symptoms and, with plant residues of the preceding sunflower crop, they come incorporated into the soil. Oospores are long-lived and are able to survive for at least 6-8 years. It is found that the fungus was present in a significant percentage of seeds from naturally infected plants and seeds gave rise to apparently healthy seedlings with no typical symptoms (latent type of infection) but the pathogen sporulated more often on the roots of these symptomless plants from infected seed. In dry years the number of pathogen-contaminated seeds is very low and may not exceed several in one thousand, but may be much higher after a cool and humid period. For example, in one case nearly 10% of seeds from a field in Germany were contaminated and another under favorable experimental conditions, observed fungal structures in 28% of the seeds examined (CABI, 2016).
Seed is a significant pathway, including for exchange of strains which overcome control measures (resistant varieties and metalaxyl fungicide treatments). **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

When climate conditions are conducive, the potential impact in the absence of management measures is high: P. halstedii is capable of causing yield losses of up to 100% (total loss of contaminated plants). With suitable management measures, in particular the use of varieties resistant to pathogen populations, the economic impact can be estimated (on the basis of the French situation) to be, on average, a 3.5% yield loss for the PRA area (EU COM, 2016; ANSES,2013). Other management measures are seed treatments, fungicides, rotation of crops and removal or ploughing in of infected debris etc.
The majority, if not all, of systemically infected plants either die prematurely or hardly produce viable seed, they make no contribution to yield and reduction in seed yield may also be due to pre- or post-emergence damping-off of severely mildewed seedlings under very favorable conditions. The incidence of downy mildewed sunflowers in a field may range from traces to nearly 50% or even up to 95% (CABI, 2016).
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Major
Is the economic impact due to the presence of the pest on the named host plant for planting, acceptable to the propagation and end user sectors concerned?

No
Conclusion:

Candidate
Justification:

 **6 - Are there feasible and effective measures available to prevent the presence of the pest on the plants for planting at an incidence above a certain threshold (including zero) to avoid an unacceptable economic impact as regards the relevant host plants?**

Yes

Conclusion:

candidate
Justification:

Visual examination, uprooting of all plants with symptoms from the infected field. **7- Is the quality of the data sufficient to recommend the pest to be listed as a RNQP?**

Yes

Conclusion:

Candidate
Justification:

 **CONCLUSION ON THE STATUS:**

Recommended for listing as an RNQP, based on data. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Zero tolerance, based on the following measures. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

Yes
Proposed Risk management measure:

For all categories of material:
(A) The seeds originate in areas known to be free from Plasmopara halstedii;
OR
(B) No symptoms of Plasmopara halstedii have been observed at the production site in at least two inspections at appropriate times during the growing season;
OR
(C) (a) The production site has been subject to at least two inspections at appropriate times during the growing season;
and
(b) No more than 5% of plants have shown symptoms of P. halstedii during these inspections, all plants showing symptoms of Plasmopara halstedii have been removed and destroyed immediately after inspection;
and
(c) At the final inspection no plants have been found showing symptoms of Plasmopara halstedii;
OR
(D) (a) The production site has been subject to at least two inspections at appropriate times during the growing season;
and
(b) All plants showing symptoms of P. halstedii have been removed and destroyed immediately after inspection;
and
(c) At the final inspection, no plants have been found showing symptoms of P. halstedii, and a representative sample from each lot has been tested and found free from Plasmopara halstedii;
OR
(E) The seeds have been subjected to an appropriate treatment which has been demonstrated to be effective against all known strains of Plasmopara halstedii.
Justification (if necessary):

Symptoms are easy to see. The disease is easily managed with visual examination, a good drainage, and appropriate seed treatment. An early infection will stop the development of flowers and seeds. Inspections are aimed at preventing late systemic infections that could reach the seeds and present a risk for the final use of the material. Even with an appropriate treatment, the race can be resistant. Moreover the treatment (e.g. with methalaxyl) is not efficient on oospores present inside the seeds. The SEWG agreed to propose an option with treatment in case of future demonstration of the existence of an efficient product. **REFERENCES:**

* ANSES (2013) Opinion of the French Agency for Food, Environmental and Occupational Health & Safety (Anses) concerning "performance of a pest risk analysis on downy mildew of sunflower (Plasmopara halstedii)";
* CABI (Centre for Agricultural Bioscience International), online, 2012. Datasheets Plasmopara halstedii (downy mildew of sunflower). Invasive species compendium. CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/41911>;
* EU COM (2016) Recommendation of the Working Group on the Annexes of the Council Directive 2000/29/EC – Section II – Listing of Harmful Organisms as regards the future listing of Plasmopara halstedii (Farlow) Berlese & de Toni;

HOST PLANT N°2: Helianthus annuus (HELAN) for the Ornamental sector.

Origin of the listing:

IIA2AWG
Plants for planting:

Seeds **3 - Is the pest already listed in a PM4 standard on the concerned host plant?**

No
Conclusion:

Evaluation continues **4 - Are the listed plants for planting the main\* pathway for the "pest/host/intended use" combination? (\*: significant compared to others):**

Yes
Conclusion:

Candidate

Justification:

With respect to the primary infection, P. halstedii is a soil-borne pathogen. Its oospores serve as primary inoculum to underground tissues of young sunflower seedlings. It may also be windborne, causing secondary infection of leaves and/or inflorescence however the significance of windborne sporangia in disease initiation has long been regarded to be low. The fungus is also seedborne: the affected seeds carrying mycelium and/or oospores internally and seed tests are available to detect infection. Oospores develop mainly in root and lower stem tissues of mildewed plants, with or without visible symptoms and, with plant residues of the preceding sunflower crop, they come incorporated into the soil. Oospores are long-lived and are able to survive for at least 6-8 years. It is found that the fungus was present in a significant percentage of seeds from naturally infected plants and seeds gave rise to apparently healthy seedlings with no typical symptoms (latent type of infection) but the pathogen sporulated more often on the roots of these symptomless plants from infected seed. In dry years the number of pathogen-contaminated seeds is very low and may not exceed several in one thousand, but may be much higher after a cool and humid period. For example, in one case nearly 10% of seeds from a field in Germany were contaminated and another under favorable experimental conditions, observed fungal structures in 28% of the seeds examined (CABI, 2016).
Plants for planting are a host and plants grown for ornamental cut flower production from infected seed could be infected. Seed is a significant pathway, including for exchange of strains which overcome control measures (resistant varieties and metalaxyl fungicide treatments). **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

Information on impact for cut flower ornamental crops is limited, however the flower heads may be discoloured, show white downy growth or "hunched" bearing of the flowers (ANSES, 2013). When climate conditions are conducive, the potential impact in the absence of management measures is high: P. halstedii is capable of causing yield losses of up to 100% (total loss of contaminated plants). The majority, if not all, of systemically infected plants either die prematurely or hardly produce viable seed, they make no contribution to yield. Reduction in seed yield may also be due to pre- or post-emergence damping-off of severely mildewed seedlings under very favorable conditions. With suitable management measures, in particular the use of varieties resistant to pathogen populations, the economic impact can be estimated (on the basis of the French situation) to be, on average, a 3.5% yield loss for the PRA area (EU COM, 2016; ANSES, 2013; CABI, 2016). Other management measures are seed treatments, fungicides, rotation of crops and removal or ploughing in of infected debris etc.
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Major
Is the economic impact due to the presence of the pest on the named host plant for planting, acceptable to the propagation and end user sectors concerned?

No
Conclusion:

Candidate
Justification:

Information of the impact on ornamental sunflowers is limited. When climate conditions are conducive, in the absence of management measures, the potential impact on sunflower for oil production is high. Impact on ornamental sunflowers can be extrapolated from that. **6 - Are there feasible and effective measures available to prevent the presence of the pest on the plants for planting at an incidence above a certain threshold (including zero) to avoid an unacceptable economic impact as regards the relevant host plants?**

Yes

Conclusion:

candidate
Justification:

Visual examination, uprooting of all plants with symptoms from the infected field. **7- Is the quality of the data sufficient to recommend the pest to be listed as a RNQP?**

Yes

Conclusion:

Candidate
Justification:

Data is available for sunflowers for agricultural production and impact on ornamental sunflowers can be extrapolated from that. **CONCLUSION ON THE STATUS:**

Recommended for listing as an RNQP, based on data. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Zero tolerance, based on the following measures. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

Yes
Proposed Risk management measure:

(A) The seeds originate in areas known to be free from Plasmopara halstedii;
OR
(B) No symptoms of P. halstedii have been observed at the seed production site in at least two inspections at appropriate times during the growing season;
OR
(C) (a) The seed production site has been subject to at least two inspections at appropriate times during the growing season;
and
(b) No more than 5% of plants have shown symptoms of P. halstedii during these inspections, all plants showing symptoms of Plasmopara halstedii have been removed and destroyed immediately after inspection;
and
(c) At the final inspection no plants have been found showing symptoms of Plasmopara halstedii;
OR
(D) (a) The seed production site has been subject to at least two inspections at appropriate times during the growing season;
and
(b) All plants showing symptoms of Plasmopara halstedii have been removed and destroyed immediately after inspection;
and
(c) At the final inspection, no plants have been found showing symptoms of P. halstedii, and a representative sample from each lot has been tested and found free from Plasmopara halstedii;
OR
(E) The seeds have been subjected to an appropriate treatment which has been demonstrated to be effective against all known strains of Plasmopara halstedii. **REFERENCES:**

* ANSES (2013) Opinion of the French Agency for Food, Environmental and Occupational Health & Safety (Anses) concerning "performance of a pest risk analysis on downy mildew of sunflower (Plasmopara halstedii)";
* CABI (Centre for Agricultural Bioscience International), online, 2012. Datasheets Plasmopara halstedii (downy mildew of sunflower). Invasive species compendium. CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/41911>;
* EU COM (2016) Recommendation of the Working Group on the Annexes of the Council Directive 2000/29/EC – Section II – Listing of Harmful Organisms as regards the future listing of Plasmopara halstedii (Farlow) Berlese & de Toni;