NAME OF THE ORGANISM: Verticillium (anamorphic genus) (1VERTG)

GENERAL INFORMATION ON THE PEST

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

Verticillium spp.
Pest category:

Fungi **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?:

No
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?

* Yes: Vegetable propagating and planting material (other than seeds) sector, Ornamental sector

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

Not relevant
Conclusion:

* Candidate: Vegetable propagating and planting material (other than seeds) sector, Ornamental sector

Justification (if necessary):

When answering to the RNQP Questionnaire, for the Vegetable reproductive and planting material (excluding seeds) Sector, no EU Member State identified this entry as important and justified to keep Verticillium listed at a higher level than the species level. No EU Member State proposed to replace this entry by pests listed at the Species level.
According to the review of the genus, based of phylogenetic analyses on isolates and ITS GenBank records, proposed by Inderbitzin and Subarrao (2014), Verticillium sp. is a small genus including ten species: V. albo-atrum, V. alfaalfae, V. dahliae, V. isaacii, V. klebhanii, V. longisporum, V. nonalfaalfae, V. nubilum, V. tricorpus, V. zaregamsianum. These Verticillium species have different hosts:
• V. dahliae - Asterales, Brassicales, Cucurbitales, Fabales, Lamiales and Solanales orders;
• V. albo-atrum sensu lato is spitted in three species and one of them (V. nonalfaalfae) is related to vegetable crop (spinach, tomato)
• V. longisporum - Brassicaceae
• V. klebhani - artichoke (Cynara scolymus) and lettuce (out of the EU territory)
• V. isacii – artichoke, Brassica sp., lettuce, spinach and tomato
• V. tricorpus - lettuce and tomato
• V. zaregamsianum - lettuce and tomato
In the past literature, there was confusion about the identification and distinction between the two main species (V. dahliae and V. albo-atrum) (Inderbitzin and Subarrao, 2014). On the basis of the available literature, as the old literature is difficult to relate to the new one, and as Verticillium species causes similar symptoms on the host, experts proposed to evaluate the pest at genus level, except for C. Pepo on which the main species of concern is V. dahliae.
Remark: However a specific analysis is also proposed for some specific pest/host combinations.

For the Ornamental sector, DE and FR are the only countries which identified this entry as important (for Malus, Prunus and Pyrus), arguing that 'Several species of pests are important and cause similar damage and have an unacceptable economic impact. Listing at this level allows decision on visual inspection instead on sampling and testing/identification'. FR also considered that this entry is also important on Pelargonium, as it includes many soil born diseases. Among the two Verticillium species susceptible to attack ornamental plants, V. dahliae is the most common, particularly in France. V. albo-atrum is also associated to ornamentals. Unlike the previous species, it does not form microsclerotia and its thermal optima are lower. Evaluation continues for these specific species. **2 – Status in the EU:**

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

No
Presence in the EU:

Yes
Conclusion:

candidate

HOST PLANT N°1: Chrysanthemum x grandiflorum (Dendranthema x grandiflorum) (CHYHO) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

Verticillium albo-atrum and V. dahliae are implicated in wilt disease in chrysanthemum (EPPO, 1998; PM 4/06).
Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material are not considered to be the main pathway. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. Moreover Dendranthema is almost only soilless cultivated in FR so appears to be less concerned by this disease. On this herbaceous crop, symptoms may occur very quickly, contrary to woody crops. The substantially free from requirement, as proposed for other soil-borne diseases that induce root or seedling rots, is considered to be sufficient. **CONCLUSION ON THE STATUS:**

Disqualified: plants for planting of this host is not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* EPPO (1998) PP 2/13(1) Good plant protection practice. Ornamental Plants under Protected Cultivation. Bulletin OEPP/EPPO Bulletin 28, 363–386;

HOST PLANT N°2: Cucumis melo (CUMME) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

2 - Vegetable seedling sector: Commission Directive 93/61/EC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

On the basis of the literature reported, C. melo resulted affected by at least the two main Verticillium species that cause similar symptoms on the host (V. albo-atrum and V. dahliae). Other minor species (V. tricorpus and V. nigrescens) are associated to the disease in Tunisia (Jabnoun-Khiareddine et al., 2006).
V. dahliae causes wilting and sometimes death of plants. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds (EFSA, 2014)).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material (transplants) are not considered to be the main pathway. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **CONCLUSION ON THE STATUS:**

Disqualified: No EU Member State considered this entry as important in the answers to the RNQP Questionnaire and gave justification(s) for a listing at a higher level than the species level. This entry will be covered by the 'Substantially free from' requirement that will remain in the Vegetable propagating and planting (excluding seeds) EU Marketing Directives. This is confirmed by the fact that plants for planting are not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Bletsos F, Thanassoulopoulos C (2002) The effect of Verticillium and Fusarium wilts on the growth of four melon (Cucumis melo L.) cultivars. Phytopathologia Mediterranea 41, 279–284;
* Çürük S, Dasgan Y H, Mansuroglu S, Kurt S, Mazmanoglu M, Antaklı O & Tarla G (2009) Grafted eggplant yield, quality and growth in infested soil with Verticillium dahliae and Meloidogyne incognita. Pesquisa agropecuaria brasileira 12, 1673-1681. <http://dx.doi.org/10.1590/S0100-204X2009001200017>;
* EFSA Panel on Plant Health (PLH) (2014) Scientific opinion on the pest categorisation of Verticillium dahliae Kleb. 12, 3928;
* EPPO Global Database (2017) Data Sheets on Quarantine Pests Verticillium spp. on hops . Available online: <https://gd.eppo.int/taxon/VERTAH/documents>. Accessed June, 23rd 2017;
* EPPO (2004) Good plant protection practice. PP 2/32(1). Cucurbits under protected cultivation. OEPP/EPPO Bulletin 34, 101-108;
* Jabnoun-Khiareddine H, Daami-Remadi M, Ayed F, Mahjoub M (2006) First report of Verticillium wilt of melon caused by Verticillium dahliae in Tunisia. New Disease Reports 14, 36;
* Inderbitzin P & Subbarao KV (2014) Verticillium systematics and evolution: how confusion impedes Verticillium wilt management and how to resolve it. Phytopathology 104, 564–574;
* Jabnoun-Khiarredine A, Remadi Daami M, Ayed F, Jebari H, El Mjoub M (2007) Incidence of Verticillium wilt of Melon in Tunisia. The African Journal of Plant Science and Technology 1, 10-15;

HOST PLANT N°3: Cucumis sativus (CUMSA) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

2 - Vegetable seedling sector: Commission Directive 93/61/EC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

On the basis of the literature reported, C. sativus resulted affected by at least the two main Verticillium species that cause similar symptoms on the host (V. albo-atrum and V. dahliae). Verticillium spp. causes wilting and sometimes death of plants. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds (EFSA, 2014)). Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material (transplants) are not considered to be the main pathway. Once, established, the pest can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **CONCLUSION ON THE STATUS:**

Disqualified: No EU Member State considered this entry as important in the answers to the RNQP Questionnaire and gave justification(s) for a listing at a higher level than the species level. This entry will be covered by the 'Substantially free from' requirement that will remain in the Vegetable propagating and planting (excluding seeds) EU Marketing Directives. This is confirmed by the fact that plants for planting are not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Correll JC (1988) Vegetative Compatibility and Pathogenicity of Verticillium albo-atrum. Phytopathology 78, 1017-1021;
* EPPO (European and Mediterranean Plant Protection Organization) (2017) EPPO Global database. Data Sheets on Quarantine Pests Verticillium spp. on hops . Available online: <https://gd.eppo.int/taxon/VERTAH/documents>;
* EPPO (European and Mediterranean Plant Protection Organization) (2004) PP 2/32(1) Good plant protection practice. Cucurbits under protected cultivation. OEPP/EPPO Bulletin 34, 101-108;
* EFSA Panel on Plant Health (PLH) (2014a) Scientific opinion on the pest categorisation of Verticillium dahliae Kleb. EFSA Journal 12, 3928;
* EFSA Panel on Plant Health (PLH) (2014b) Scientific Opinion on the pest categorisation of Verticillium albo-atrum sensu stricto Reinke and Berthold, V. alfalfae Inderb., HW Platt, RM Bostock, RM Davis & KV Subbarao, sp. nov., and V. nonalfalfae Inderb., HW Platt, RM Bostock, RM Davis & KV Subbarao, sp. nov. EFSA Journal 12, 3927;
* Inderbitzin P & Subbarao KV (2014) Verticillium systematics and evolution: how confusion impedes Verticillium wilt management and how to resolve it. Phytopathology 104, 564–574;
* Peresse M (2014) Réactions de défense du Concombre (Cucumis sativus L.) aux attaques du Verticillium dahliae Kleb. Bulletin de la Société Botanique de France 115, 1968 - Issue sup1, 70-74;
* Naraghi L, Heydari A, Rezaee S, Razavi M & Afshari-Azad H (2010) Biological control of Verticillium wilt of greenhouse cucumber by Talaromyces flavus. Phytopathol. Mediterr. 49, 321−329;
* Roustaee A., Baghdadi A (2007) Study of interaction between plant nutrition (N,P,K and Ca) and verticillios wilt disease (Verticillium dahliae) in cucumber. Commun Agric Appl Biol Sci. 72, 1017-22;

HOST PLANT N°4: Cucurbita pepo (CUUPE) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

2 - Vegetable seedling sector: Commission Directive 93/61/EC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

V. dahliae is reported on C. pepo in Italy (Stravato et al., 2009) and, out of Europe, in Trinidad (Rampersad, 2008).
V. dahliae causes wilting and sometimes death of plants. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds (EFSA, 2014)).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material (transplants) are not considered to be the main pathway. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **CONCLUSION ON THE STATUS:**

Disqualified: No EU Member State considered this entry as important in the answers to the RNQP Questionnaire and gave justification(s) for a listing at a higher level than the species level. This entry will be covered by the 'Substantially free from' requirement that will remain in the Vegetable propagating and planting (excluding seeds) EU Marketing Directives. This is confirmed by the fact that plants for planting are not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* EPPO (2004) PP 2/32(1). Good plant protection practice. Cucurbits under protected cultivation. OEPP/EPPO Bulletin 34, 101-108;
* EFSA Panel on Plant Health (PLH) (2014) Scientific opinion on the pest categorisation of Verticillium dahliae Kleb. EFSA Journal 12, 3928;
* Inderbitzin P & Subbarao KV (2014) Verticillium systematics and evolution: how confusion impedes Verticillium wilt management and how to resolve it. Phytopathology 104, 564–574;
* Rampersad SN (2008) First Report of Verticillium dahliae Causing Wilt in Pumpkin in Trinidad. Plant disease 92, 1136. <https://doi.org/10.1094/PDIS-92-7-1136A>;
* Stravato VM, Carannante G, Moretti C & Cappelli C (2009) First Report of Verticillium dahliae on Squash (Cucurbita pepo) in Italy. Plant disease 93, 765. <https://doi.org/10.1094/PDIS-93-7-0765A>;

HOST PLANT N°5: Gerbera (1GEBG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

Only V. dahliae appears to be implicated in wilt disease in gerbera, as a minor host (CABI, 2008).
Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material are not considered to be the main pathway. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. Moreover Gerbera is more and more frequently soilless cultivated (e.g. in FR) so appears to be less subject to this pest damages. On this herbaceous crop, symptoms may occur very quickly, contrary to woody crops. The substantially free from requirement, as proposed for other soil-borne diseases that induce root or seedling rots, is considered to be sufficient. **CONCLUSION ON THE STATUS:**

Disqualified: plants for planting of this host is not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* CABI (Centre for Agricultural Bioscience International) (2008) Datasheet Gerbera jamesonii (African daisy). CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/25005>;
* EPPO (1998) PP 2/13(1) Good plant protection practice. Ornamental Plants under Protected Cultivation. Bulletin OEPP/EPPO Bulletin 28, 363–386;

HOST PLANT N°6: Malus (1MABG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

?
Conclusion:

Candidate

Justification:

Verticillium spp. e.g. V. dahliae and V. alboatrum, are known to attack many hosts, including Malus, and Verticillium spp. are included in the EPPO PM 4 Standard. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Growing ornamental Malus directly in soil remains an important mode of cultivation in many countries (otherwise cultivated mainly in pots/containers). Because of the wide host range and longevity of inoculum sources in the environment, importance of plants for planting as a pathway is questionable. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

No
Justification:

Verticillium is a vascular wilt parasite, invading the vascular system causing wilting. Woody ornamental crops with chronic Verticillium infections usually show general decline, as exhibited by sparse canopies consisting of undersized, off- coloured leaves, poor growth and vigor, and branch dieback. Plant death can be slow or sudden, depending upon the extent of infection and general plant health. However no references on impact on Malus could be found though some authors (University of California, march 1981) pretend that Malus species are naturally resistant to V. dahliae, but not to European strains of V. albo-atrum. No more precisions are available.
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

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?

Is there unacceptable economic impact caused to other hosts (or the same host with a different intended use) produced at the same place of production due to the transfer of the pest from the named host plant for planting?

Conclusion:

Not candidate
Justification:

The Malus genus for the ornamental sector includes many hybrids selected for tree habits, non-bearing fruit, color of flowering, etc. Host resistance may be different between cultivars, but very few data are available. Indirect economic impact depends on the sensibility to the concerned Vegetative Compatibility Group (VCG) of other potential hosts, and the concerned species (albo-atrum or dahliae). **CONCLUSION ON THE STATUS:**

Disqualified: no data of unacceptable economic impact on this host plant. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* University of California (1981) Plants resistnt or susceptible to Verticillium wilt. Division of Agricultural Sciences. Available from: <http://depts.washington.edu/hortlib/resources/ucdavis_verticillium.pdf>;

HOST PLANT N°7: Pelargonium (1PELG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

Verticillium albo-atrum and V. dahliae are implicated in wilt disease in pelargonium (CABI, 2008; PM 4/3).
Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material are not considered to be the main pathway. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. Moreover Pelargonium is almost only soilless cultivated so it appears to be less concerned by this disease. On this herbaceous crop, symptoms may occur very quickly, contrary to woody crops. The substantially free from requirement, as proposed for other soil-borne diseases that induce root or seedling rots, is considered to be sufficient. **CONCLUSION ON THE STATUS:**

Disqualified: plants for planting of this host is not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* CABI (Centre for Agricultural Bioscience International), online, 2008. Datasheet Pelargonium (pelargoniums). CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/39448>;
* EPPO (1998) PP 2/13(1) Good plant protection practice. Ornamental Plants under Protected Cultivation. Bulletin OEPP/EPPO Bulletin 28, 363–386;

HOST PLANT N°8: Prunus (1PRNG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

?
Conclusion:

Candidate

Justification:

Verticillium spp. e.g. V. dahliae and V. alboatrum, are known to attack many hosts, including Prunus, although Verticillium spp. are not included in the EPPO PM 4 Standard. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Growing ornamental Prunus directly in soil remains an important mode of cultivation in many countries (otherwise cultivated mainly in pots/containers). Because of the wide host range and longevity of inoculum sources in the environment, importance of plants for planting as a pathway is questionable. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

Prunus includes stone fruit trees, such as peach, apricot, plum, cherry and almond, and these species are all susceptible to Verticillium diseases, mainly caused by V. dahliae, which may cause economical yield losses especially in young orchards. Disease symptoms caused by Verticillium are partially common in the different tree species (Colella et al. 2004). In Italy, forest cherry (P. avium) vascular wilts are described as very serious (Anselmi, 1999).
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

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?

Yes
Is there unacceptable economic impact caused to other hosts (or the same host with a different intended use) produced at the same place of production due to the transfer of the pest from the named host plant for planting?

Conclusion:

Not candidate
Justification:

The Prunus genus for the ornamental sector includes many hybrids selected for tree habits, non-bearing fruit, color of flowering, etc. Host resistance may be different between cultivars, but very few data are available. **CONCLUSION ON THE STATUS:**

Disqualified: no data of unacceptable economic impact on this host plant. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Anselmi N (2001) Main diseases of high quality timber broadleaves. Annali - Accademia Italiana di Scienze Forestali, 79-99;
* Colella C, Amenduni M & Cirulli M (2004) Verticillium diseases in stone fruits. Informatore Fitopatologico 54, 14-26;
* EFSA Panel on Plant Health (PLH) (2014) Scientific Opinion on the pest categorisation of Verticillium dahliae Kleb. EFSA Journal 2014;12(12):3928, 54 pp. doi:10.2903/j.efsa.2014.3928. <http://www.efsa.europa.eu/en/efsajournal/doc/3928.pdf>;

HOST PLANT N°9: Pyrus (1PYUG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

?
Conclusion:

Candidate

Justification:

Verticillium spp. e.g. V. dahliae and V. alboatrum, are known to attack many hosts, including Pyrus, and Verticillium spp. are included in the EPPO PM 4 Standard. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Growing ornamental Pyrus directly in soil remains an important mode of cultivation in many countries (otherwise cultivated mainly in pots/containers). Because of the wide host range and longevity of inoculum sources in the environment, importance of plants for planting as a pathway is questionable. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

No
Justification:

Verticillium is a vascular wilt parasite, invading the vascular system causing wilting. Woody ornamental crops with chronic Verticillium infections usually show general decline, as exhibited by sparse canopies consisting of undersized, off- coloured leaves, poor growth and vigor, and branch dieback. Plant death can be slow or sudden, depending upon the extent of infection and general plant health. However no references on impact on Pyrus could be found though some authors (University of California, march 1981) pretend that Pyrus species are naturally resistant to V. dahliae, but not to European strains of V. albo-atrum. Pyrus pyrifolia (Japanese pear) was susceptible in New Zealand but no details of its significance compared to the three other pathogens studied were given (Pullford et al., 1992).
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

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?

Yes
Is there unacceptable economic impact caused to other hosts (or the same host with a different intended use) produced at the same place of production due to the transfer of the pest from the named host plant for planting?

Conclusion:

Not candidate
Justification:

The Pyrus genus for the ornamental sector includes only a few cultivars (e.g. Pyrus calleryana ‘Chanticleer’) selected for tree habits, non-bearing fruit, color of flowering, etc. Host resistance may be different between cultivars, but very few data are available. **CONCLUSION ON THE STATUS:**

Disqualified: no data of unacceptable economic impact on this host plant. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Pulford WM, Pyke NB & Morgan CGT (1992) Incidence of disease-related tree death on three Japanese pear varieties. Orchardist of New Zealand 65, 23-24;
* University of California (1981) Plants resistnt or susceptible to Verticillium wilt. Division of Agricultural Sciences. Available from: <http://depts.washington.edu/hortlib/resources/ucdavis_verticillium.pdf>;

HOST PLANT N°10: Rheum (1RHEG) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

2 - Vegetable seedling sector: Commission Directive 93/61/EC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

Verticillium genus is reported on Rheum spp. in very few documents (Mc Cain et al., 1981; Farr et al., 1996) **CONCLUSION ON THE STATUS:**

Disqualified: No EU Member State considered this entry as important in the answers to the RNQP Questionnaire and gave justification(s) for a listing at a higher level than the species level. This entry will be covered by the 'Substantially free from' requirement that will remain in the Vegetable propagating and planting (excluding seeds) EU Marketing Directives. This is confirmed by the fact that plants for planting are not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* Farr DF, Bartolome Esteban H & Palm ME (1996) Fungi on Rhododendron: A World Reference. Parkway Publishers. <https://books.google.it/books?id=nV2y_pr9ypwC&dq=rheum+verticillium&hl=it&source=gbs_navlinks_s>;
* EPPO (2017) EPPO Global database. Available on line (<https://gd.eppo.int/taxon/RHERH/pests>);
* McCain AH, Raabe RD, Wilhelm S (1981) Plants resistant or susceptible to verticillium wilt. University of California. Agriculture and Natural Resources. 6701 San Pablo Avenue. Oakland, California 94608-1239. 10 pp. <http://depts.washington.edu/hortlib/resources/ucdavis_verticillium.pdf>;

HOST PLANT N°11: Rosa (1ROSG) for the Ornamental sector.

Origin of the listing:

Commission Directive 93/49/EEC
Plants for planting:

Plants intended for planting **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):**

?
Conclusion:

Candidate

Justification:

Verticillium spp. are known to attack many hosts, including roses, and V. dahliae and V. alboatrum are included in the pm4, with a small tolerance at PSII and nursery stage. [The EPPO PM 4 Standard for rose is applicable to all species, hybrids and cultivars of Rosa spp., so can be used for ornamental varieties or species also.]
Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds) (EFSA, 2014).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, importance of plants for planting as a pathway is questionable. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

A vascular wilt parasite, invading the vascular system causing wilting and eventually dying of infected ornamental hosts (EPPO, 1998). Experts considered that Rosa is highly susceptible to V. dahliae.
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

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:

Economic impact is difficult to evaluate and that the best way to decrease the incidence of the pest is to use resistant varieties **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:

 **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:**

Not recommended for listing as an RNQP: Even though there are uncertainties about the main pathway, experts considered that V. dahliae would qualify for the RNQP status on Rosa. However the requirement for absence of visual symptoms on the traded material (current general 'Substantially free from' requirement in the EU) was considered to be sufficient. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* EPPO (1998) PP 2/13(1) Good plant protection practice. Ornamental Plants under Protected Cultivation. Bulletin OEPP/EPPO Bulletin 28, 363–386;
* Hammett KRW (1971) Symptom differences between rose wilt virus and Verticillium wilt of roses. Plant Disease Reporter 55, 916-920;

HOST PLANT N°12: Solanum lycopersicum (LYPES) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

2 - Vegetable seedling sector: Commission Directive 93/61/EC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

On the basis of the literature reported, Solanum lycopersicum resulted affected by several Verticillium species that cause similar symptoms on the host.
V. dahliae causes wilting and sometimes death of plants. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds (EFSA, 2014)).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material (transplants) are not considered to be the main pathway.
Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **CONCLUSION ON THE STATUS:**

Disqualified: No EU Member State considered this entry as important in the answers to the RNQP Questionnaire and gave justification(s) for a listing at a higher level than the species level. This entry will be covered by the 'Substantially free from' requirement that will remain in the Vegetable propagating and planting (excluding seeds) EU Marketing Directives. This is confirmed by the fact that plants for planting are not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* EFSA Panel on Plant Health (PLH) (2014a) Scientific opinion on the pest categorisation of Verticillium dahliae Kleb. EFSA Journal 12, 3928;
* EFSA Panel on Plant Health (PLH) (2014b) Scientific Opinion on the pest categorisation of Verticillium albo-atrum sensu stricto Reinke and Berthold, V. alfalfae Inderb., HW Platt, RM Bostock, RM Davis & KV Subbarao, sp. nov., and V. nonalfalfae Inderb., HW Platt, RM Bostock, RM Davis & KV Subbarao, sp. nov. EFSA Journal 12, 3927;
* EPPO (2004a) PP 2/29(1) Good plant protection practice. Solanaceous crops under protected cultivation. Bulletin OEPP/EPPO Bulletin 34, 65–77;
* EPPO (2004b) PP 2/30(1) Good plant protection practice - Outdoor solanaceous crops. Bulletin OEPP/EPPO Bulletin 34, 79–90;
* EPPO (2017) EPPO Global Database. Available on-line <https://gd.eppo.int/>. Accessed June, 24th 2017;
* 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 Verticillium albo-atrum Reinke and Berthold;
* Inderbitzin P & Subbarao KV (2014) Verticillium systematics and evolution: how confusion impedes Verticillium wilt management and how to resolve it. Phytopathology 104, 564–574;

HOST PLANT N°13: Solanum melongena (SOLME) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

2 - Vegetable seedling sector: Commission Directive 93/61/EC
Plants for planting:

Plants intended for planting **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):**

No
Conclusion:

Not candidate

Justification:

On the basis of the literature reported, eggpant resulted affected by at least the two main Verticillium species that cause similar symptoms on the host (V. albo-atrum and V. dahliae).
V. dahliae causes wilting and sometimes death of plants. Verticillium wilt is a cool-weather disease and has a wide host range in natural areas. Verticillium spp. survives in soil, as long lived resting mycelium or microsclerotia, respectively, or in debris from infected plants (included weeds (EFSA, 2014)).
Control is by use of healthy planting material, resistant cultivars, prevention of movement of infected plants and infested soil, removal of diseased plants and plant debris, avoiding high nitrogen concentrations and soil disinfestation. Crop rotation can reduce losses, but not eliminate the pathogens because of the wide host range of Verticillium spp. (EPPO, 2004). Because of the wide host range and longevity of inoculum sources in the environment, planting material (transplants) are not considered to be the main pathway. Once, established, V. dahliae can be spread by infected asymptomatic weeds and weed seeds, by water and by human-assisted means. **CONCLUSION ON THE STATUS:**

Disqualified: No EU Member State considered this entry as important in the answers to the RNQP Questionnaire and gave justification(s) for a listing at a higher level than the species level. This entry will be covered by the 'Substantially free from' requirement that will remain in the Vegetable propagating and planting (excluding seeds) EU Marketing Directives. This is confirmed by the fact that plants for planting are not a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Delisting. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Delisting. **REFERENCES:**

* EFSA Panel on Plant Health (PLH) (2014a) Scientific opinion on the pest categorisation of Verticillium dahliae Kleb. EFSA Journal 12, 3928;
* EFSA Panel on Plant Health (PLH) (2014b) Scientific Opinion on the pest categorisation of Verticillium albo-atrum sensu stricto Reinke and Berthold, V. alfalfae Inderb., HW Platt, RM Bostock, RM Davis & KV Subbarao, sp. nov., and V. nonalfalfae Inderb., HW Platt, RM Bostock, RM Davis & KV Subbarao, sp. nov. EFSA Journal 12, 3927;
* EPPO (2004a) PP 2/29(1) Good plant protection practice. Solanaceous crops under protected cultivation. Bulletin OEPP/EPPO Bulletin 34, 65–77;
* EPPO (2004b) PP 2/30(1) Good plant protection practice - Outdoor solanaceous crops. Bulletin OEPP/EPPO Bulletin 34, 79–90;