NAME OF THE ORGANISM: Ustilago avenae (USTIAV)

GENERAL INFORMATION ON THE PEST

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

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?:

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: Cereals (including rice) sector

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

Not relevant
Conclusion:

* Candidate: Cereals (including rice) sector

**2 – Status in the EU:**

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

No
Presence in the EU:

Yes
Conclusion:

candidate
Justification (if necessary):

This pest is present worldwide, including Europe (CABI 2016).

HOST PLANT N°1: Avena nuda (AVENU) for the Cereals (including rice) sector.

Origin of the listing:

RNQP Questionnaire
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):**

No
Conclusion:

Not candidate

Justification:

Avena nuda (small naked oat, hulless oat) is not listed as a host by CABI (CABI, 2016) although one reference to Ustilago avenae on this species was found, "on Avena nuda cv. Adam" (Voženílková, 1993). Avena nuda was not given in a list of species resistant or susceptible to Ustilago spp. (Bogachkov et al., 1990). With no other records since, the SEWG considered that Avena nuda is not a main pathway for the pest/host/intended use combination. No economic impact is foreseen on A. nuda.
Remark: It is not justified to extrapolate from A. sativae, unlike the case for C. purpurea which has human and animal health impacts and where a precautionary approach was taken for the host status of A. nuda. **CONCLUSION ON THE STATUS:**

Disqualified: only one reference available for U. avenae on Avena nuda. Experts considered that there are uncertainties about the host status of A. nuda, and that plants for planting should not be considered as a significant pathway. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

Not recommended for the RNQP status. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Not recommended for the RNQP status. **REFERENCES:**

* Bogachkov VI, Smishchuk NG, Miroshnichenko AI, Shirokov AI & Maslenkova LI (1990) Source material and the breeding of midseason varieties of oats resistant to diseases in western Siberia. Selektsiya i semenovodstvo zernofurazhnykh kul'tur v Sibiri i na Dal'nem Vostoke, 21-33;
* Voženílková B (1993) Biological protection of spring barley and naked oats under organic production systems. Sbornik - Jihoceska Univerzita Zemedelska Fakulta, Ceske Budejovice. Fytotechnicka Rada 10, 59-68;
* CABI (Centre for Agricultural Bioscience International), online, 2016. Datasheets Ustilago avenae (loose smut of oats). Invasive species compendium. CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/55931>;
* EPPO (2002) Good plant protection practice PP 2/24 (1) Oat. Bulletin OEPP/EPPO Bulletin 32, 367–369;

HOST PLANT N°2: Avena sativa (AVESA) for the Cereals (including rice) sector.

Origin of the listing:

RNQP Questionnaire
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:

Ustilago avenae causes loose smut on oats and seed is a pathway. On emergence, the ears of infected plants are totally transformed into a black powdery spore mass of teliospores which are released in great number during flowering, spread by the wind to infect new grains, or during threshing. During germination seedlings are systemically infected by spores carried on the outside of the seeds. (It is not inside the embryo of the seed). To avoid the disease it is important to use disease-free certified seed or fungicide-treated seed (EPPO, 2002). Avena sativa was listed as a host species which was the least resistant to Ustilago spp. (Bogachkov et al., 1990).
The EU Directive 66/402 has a requirement for the seed producing crop that Ustilaginaceae shall be at the lowest possible level, but no seed-testing requirements are given and no seed test is described by ISTA.
Volunteer plants grown from spilt contaminated seed from the previous year could in theory act as a disease source but this appears to be very rare because no references to this could be found. It is concluded seed can be considered as a significant pathway for the pest. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

Losses from loose smut in oats generally average less than 1%, but losses of up to 40% have been recorded. A formula can be used to calculate losses from loose smut and the percentage of infected ears is directly proportional to grain loss. The risk of serious loss of in-crop yield from sowing seed saved from certified and treated seed is considered to be low but of high risk where seed is saved repeatedly without treatment. The risk to adjacent crops of oats is negligible unless used for seed (Paveley et al., 1996). In Canada in 1992-1994 the percentage of fields affected by smuts ranged from 2% in 1994 to 23% in 1992, with means of 0.1% or fewer infected plants (Thomas and Menzies, 1997). The disease is now practically unknown in intensive cereal cultivation in Europe due to the use of disease-free certified seed or fungicide-treated seed. However, in low intensive areas with untreated farmer-saved seed it can be still a problem (EPPO, 2002). For example, in 2015 in Bosnia, infection symptoms were found on 55% of the oats acreage, and in 2016 on 43% (Delalić, 2016).
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Medium
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:

Generally yield losses are low 1% but can be as high as 40%. The percentage of infected ears is directly proportional to grain loss. Spores from infected ears are wind blown onto healthy plants and contaminate the caryopsis and glumes, re-establishing the disease in the next generation of seed produced. Some infestation may also occur during threshing. Potential for the disease to multiply within a few years is great if seed sown untreated. **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:

Control through standards for field inspection and seed, and through seed treatment fungicides. These fungicides are not allowable for organic farming. **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:

Yes
Proposed Tolerance levels:

Tolerance level in the field (1 affected plant per 100m2), with an alternative option based on treatments or other approved physical technique. **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) Field inspection of a representative sample of the plants in the crop at an appropriate time at which not more than 1 affected plant per 100m2 is seen.
or, if this tolerance is not achieved at field inspection,
(b) Seed treatment with an approved fungicide or by an approved physical technique known to be effective against Ustilago avenae. **REFERENCES:**

* CABI (Centre for Agricultural Bioscience International), online, 2016. Datasheets Ustilago avenae (loose smut of oats). Invasive species compendium. CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/55931>;
* Delalić Z (2016) Smut of oats (Ustilago avenae) increasing problem in oats crops on the territory of Una-Sana Canton (B&H). Biljni Lekar (Plant Doctor) 44, 248-254;
* EPPO (2002) Good plant protection practice PP 2/24 (1) Oat. Bulletin OEPP/EPPO Bulletin 32, 367–369;
* Paveley ND, Rennie WJ, Reeves JC, Wray MW, Slawson DD, Clark WS, Cockerell V & Mitchell AG (1996) Cereal seed health and seed treatment strategies. HGCA Research Review 34, IV-131;
* Thomas PL & Menzies JG (1997) Cereal smuts in Manitoba and Saskatchewan, 1989-95. Canadian Journal of Plant Pathology 19, 161-165;

HOST PLANT N°3: Avena strigosa (AVESG) for the Cereals (including rice) sector.

Origin of the listing:

RNQP Questionnaire
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:

Avena strigosa (Black oat or Bristle oat) is not listed as a host by CABI (CABI, 2016), however Avena strigosa was listed as a species 'most resistant' to Ustilago, though it was unclear if infection had actually occurred (Bogachkov et al., 1990). No other references to U. avenae on this host species since then have been found. Experts concluded that A. strigosa is host to either U. avenae or U. hordei, but it is hard to distinguish spores, so records may not be correctly attributed.
Ustilago avenae is therefore considered to cause loose smut on Avena strigosa oats and seed is a pathway. On emergence, the ears of infected plants are totally transformed into a black powdery spore mass of teliospores which are released in great number during flowering, spread by the wind to infect new grains, or during threshing. During germination seedlings are systemically infected by spores carried on the outside of the seeds (It is not inside the embryo of the seed). To avoid the disease it is important to use disease-free certified seed or fungicide-treated seed (EPPO, 2002).
The directive 66/402 has a requirement for the seed producing crop that Ustilaginaceae shall be at the lowest possible level, but no seed-testing requirements are given and no seed test is described by ISTA. Volunteer plants grown from spilt contaminated seed from the previous year could in theory act as a disease source but this appears to be very rare because no references to this could be found. It is concluded seed can be considered as a significant pathway for the pest. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

The only reference found describes an evaluation of 11 varieties for resistance to Ustilago [segetum var.] avenae with the oat species most resistant to Ustilago being Avena byzantina, A. abyssinica, A. barbata and A. strigosa (Bogachkov et al., 1990). No further details were given and it is unclear if infection actually occurred. The SEWG considered that this plant is definitively a host of either U. avenae or U. hordei but it is hard to distinguish the spores of these two species, and their respective economic impact.
What is the likely economic impact of the pest irrespective of its infestation source in the absence of phytosanitary measures? (= official measures)

Medium
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:

After a last consultation, experts of the coreHEWGplus commented that Avena strigosa is mainly used in the EU for green manure. Therefore they concluded that impact should be considered as acceptable. **CONCLUSION ON THE STATUS:**

Disqualified: Avena strigosa is mainly used in the EU for green manure. Remark: A. strigosa is host to either U. avenae or U. hordei, but it is hard to distinguish spores, so records may not be correctly attributed. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

No
Proposed Tolerance levels:

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

No
Proposed Risk management measure:

 **REFERENCES:**

* Bogachkov VI, Smishchuk NG, Miroshnichenko AI, Shirokov AI & Maslenkova LI (1990) Source material and the breeding of midseason varieties of oats resistant to diseases in western Siberia. Selektsiya i semenovodstvo zernofurazhnykh kul'tur v Sibiri i na Dal'nem Vostoke 4, 21-33;
* CABI (Centre for Agricultural Bioscience International), online, 2016. Datasheets Ustilago avenae (loose smut of oats). Invasive species compendium. CABI, Wallingford, UK. Available from <http://www.cabi.org/isc/datasheet/55931>;
* EPPO (2002) Good plant protection practice PP 2/24 (1) Oat. Bulletin OEPP/EPPO Bulletin 32, 367–369;