NAME OF THE ORGANISM: Clavibacter michiganensis subsp. insidiosus (CORBIN)

GENERAL INFORMATION ON THE PEST

Name as submitted in the project specification (if different to the preferred name):
 
  
Pest category:
 
Bacteria **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: Fodder plant seed sector

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

* Candidate: Fodder plant seed sector

Justification (if necessary):
 
C. michiganensis is subdivided into six subspecies. All strains of C. michiganensis pathogenic on Medicago sativa (lucerne/alfalfa) are grouped in the subspecies insidiosus. Within C. michiganensis subsp. insidiosus, no infradivisions, such as pathovars or races, have been proposed, making this subspecies a relatively homogeneous pathogen. This pest is a clear, distinguished taxonomic entity. It is the causal agent of bacterial wilt of lucerne (EFSA PLH, 2014). As a consequence, a listing below the species level is justified. **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):
 
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: Medicago sativa (MEDSA) for the Fodder plant seed 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:
 
Lucerne is the principal host under natural conditions, but there are other hosts in the Fabaceae family, such as M. lupulina, M. albus, Trifolium subsp. and other wild species or plants with minor economic importance, which are widely distributed in the EU. It is not known if other natural hosts of C. michiganensis subsp. insidiosus can serve as inoculum sources. There is no doubt that the bacterium is seed-borne, but there is no absolute evidence that the disease is seed-transmitted. Data on translocation of C. michiganensis subsp. insidiosus from infected seed to plantlets are missing. The only indirect and partial evidence of seed transmission is the patchy distribution of diseased plants in naturally infested fields, which could reflect the presence of only a few infected seeds throughout the seed lot or the presence of infected plant debris on or in the soil. Infection of seeds is reported as infrequent. Samac et al. (1998) reported that less than 1 % of the seed produced in greenhouse and field trials contained the bacterium when harvested from artificially infected plants. Erwin and Kahn (1987), however, reported a seed infection rate of 5 % in California, USA. The bacterium can persist in dried plant material for up to 10 years but not if it is left in contact with the soil where the ability of the pathogen to compete with soil microflora seems to be low. There is no information available on the role of dried hay and dried plant debris as inoculum sources. Infection occurs through stem and root wounds. The bacterium is carried by water and benefits from mowing, freezing and thawing wounds (Koehler and Jones, 1932). Feeding wounds, such as those made by nematodes and insects, also favour bacterial penetration in plants. Nematode transmission by Ditylenchus dipsaci has been shown. Incidence of infection is increased in the presence of this nematode and Meloidogyne hapla, however, there is no evidence that M. hapla is a carrier of the pathogen. It is also reported that imagoes of Sitona lineatus can spread the bacteria between stands of lucerne (EU COM, 2016). Although several uncertainties are highlighted by the EFSA opinion in respect to the pathway, as seeds might be an important pathway of distribution, the SEWG concluded that seeds should still be considered as a significant pathway. **5 - Economic impact:**  
Are there documented reports of any economic impact on the host?
 
Yes  
Justification:
 
There are a number of reports from all over the world, that Cmi can cause high crop losses. However there are no exact yield reduction figures for the EU and in major production areas of the EU the pest is considered to be eradicated. It has been noticed in many EU and non-EU Member States, that the disease decreased by the use of resistant cultivars (EU COM, 2016). In response to a questionnaire on the incidence of the bacterial wilt, NPPOs of the EU MS indicated that, currently, the disease is widespread only in the UK, where lucerne is not an important crop. It is possible (apart from use of resistant cultivars) that other management measures, including the use of pathogen-free seed and hygiene, have also resulted in a rapid decrease in the number of outbreaks (EFSA 2016). In the replies to the RNQP Questionnaire BE indicated that incidence on alfalfa seed is very low, and confirmed that resistant cultivars are now commonly used in countries where the pathogen is known to occur.  
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:
 
The SEWG concluded that the pest is almost not occurring in the EU and this is why no economic impact is observed in the EU. Impacts are major in USA, Australia, Iran etc. **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:
 
Measures are listed in Annex IVA of the Council Directive 2000/29/EC. **7- Is the quality of the data sufficient to recommend the pest to be listed as a RNQP?**
 
Yes
 
Conclusion:
 
Candidate  
Justification:
 
However uncertainties remain on the relative contribution of seed transmission in comparison to other pathways. **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 Risk management 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 Clavibacter michiganensis spp. Insidiosus;  
OR  
(B) (a) The crop has been grown on land on which no previous Medicago sativa crop has been present during the last three years prior to sowing; and  
(b) No symptoms of Clavibacter michiganensis ssp. insidiosus have been observed during field inspection at the place of production or on any Medicago sativa crop adjacent to it, during the last complete cycle of vegetation;  
OR  
(C) (a) The crop belongs to a variety recognised as being highly resistant to Clavibacter michiganensis ssp.  
insidiosus; and  
(b) The content of inert matter does not exceed 0,1 % by weight.  
Justification (if necessary):
 
The pathogen can overwinter in the roots and crowns of diseased plants (Jones & McCulloch, 1926). Normally, under field conditions the pathogen survives poorly free in soil, with a reported maximum survival time of 31 days (Nelson & Neal, 1974). Only in frozen soil and in dry soil (wilting point) was a long survival time, of up to 169 days, found (Nelson & Semeniuk, 1963). In excised lucerne roots buried in moist warm soil the pathogen could not be recovered after one month (Nelson & Neal, 1974). However, if excised roots were kept in dry soil or at a constant low temperature of –5 to 5 °C the pathogen could persist for 50 weeks (Nelson & Neal, 1974). In lucerne production areas soil temperatures will be higher and soil moisture conditions will fluctuate. It is therefore assumed that soil-borne inoculum may play a part in initiation of disease only if no proper crop rotation is applied. The bacterium survives in seeds for up to three years (Erwin, 1990, reported in EPPO, 1997). Histological studies showed that the pathogen can be present on the surface of seeds as a contaminant or in the seed coat of mature seeds up to the aleurone layer of the endosperm (Cormack and Moffatt, 1956). **REFERENCES:**

* EFSA PLH Panel (EFSA Panel on Plant Health) (2014) Scientific Opinion on the pest categorisation of Clavibacter michiganensis subsp. insidiosus (McCulloch) Davis et al. EFSA Journal 2014;12(12):3910, 30 pp. doi:10.2903/j.efsa.2014.3910 <http://www.efsa.europa.eu/en/efsajournal/doc/3910.pdf>;
* 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 Clavibacter michiganensis subsp. insidiosus (McCulloch) Davis et al.;