NAME OF THE ORGANISM: Columnea latent viroid (CLVD00)

GENERAL INFORMATION ON THE PEST

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

Pest category:

Viruses and viroids **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: Vegetable seed sector, Vegetable propagating and planting material (other than seeds) sector

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

Not relevant
Conclusion:

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

Justification (if necessary):

Species discrimination is based on sequence similarity level (less than 90% sequence identity of the total viroid genome) and on distinctive biological properties. Pospiviroid detection is done by using RT-PCR with generic primers for broad but specific amplification of pospiviroids. In addition other molecular
methods, including (i) Northern blot hybridisation assays using species-specific probes that to a lower extent also show cross-hybridization with other members of the genus, (ii) RT-PCR and (iii) real-time RT-PCR, allow reliable detection of pospiviroids. Sequence analysis of RT-PCR products permits identification of pospiviroid species. Overall, methods for reliable detection and identification/discrimination of pospiviroids are available, although their high sensitivity implies the risk of false-positive reactions because of cross-contamination. These techniques are already widely used by EU MS, as indicated in the replies to the questionnaire sent by EFSA (EFSA PLH, 2011). **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):

Denmark (2010); France (2010); Italy (2011)
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/>). The pest is no longer present in Denmark (EFSA PLH, 2011). The pest is present in France, Italy, and the Netherlands. It has been eradicated in Belgium and United Kingdom (EFSA PLH, 2011; EPPO, 2016). This suggests that CLVd is not really established in Europe. This pest could also be regulated as a quarantine pest.

HOST PLANT N°1: Solanum lycopersicum (LYPES) for the Vegetable seed sector.

Origin of the listing:

EFSA PRA (EFSA PLH, 2011)
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:

Transmission of CLVd through seed has not been proven in tomato (EFSA-PLH, 2011) although seed transmission was linked to several outbreaks of CLVd in the UK (Sansford and Morris, 2010). Nevertheless, behaviour is assumed by analogy with those viroid species that are seed transmissible: For CLVd seed transmission, a high probability rating is suggested by analogy, but this rating is associated with a high uncertainty. There is experimental and circumstantial evidence that CLVd can be spread between crops by mechanical transmission in tomato (EFSA-PLH, 2011) and thus any infection arising from seed will likely spread rapidly to neighbouring susceptible plant species in the nursery. Therefore seeds as plants for planting are considered a significant pathway for this pest/host/intended use combination by extrapolation from other pospiviroïds. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

All pospiviroids cause similar symptoms in tomato, independent of the viroid species. Symptom severity may vary both within and between species but also with the tomato cultivar. As fruit production generally stops on infected plants, yield loss is strongly dependent on the age at which plants become infected. Early infection, before fruit setting, will result in close to 100% loss, while losses associated with later infections are more variable, since fruits initiated before the onset of foliar symptoms may still develop to a marketable size. Very variable infection rates have been observed in pospiviroids outbreaks in glasshouses, inducing in turn very variable yield losses when assessing them at the glasshouse level (EPPO, 2016). At one site in the UK, 50-60% of tomato plants appeared to be infected at the end of the season and the grower estimated financial losses at £250,000 (Sansford and Morris, 2010). Overall there is sufficient evidence that significant yield losses may result from pospiviroid infections in tomato and the impact is therefore expected to be major, with low uncertainty (EPPO, 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:

Overall there is ample evidence that significant yield losses may result from pospiviroid infections in tomato and the impact is therefore expected to be major, with low uncertainty (EFSA-PLH, 2011). The economic impact is evaluated as unacceptable on Tomato. **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:

There is no management option that can prevent infestation other than exclusion and avoiding the use of infected plants (EFSA-PLH, 2011). Visual examination and testing in case of symptoms should be an effective measures. This position is reinforced by risk management measures set up for PSTVd that significantly reduced the incidence of this pathogen. **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. In absence of proof for seed transmission in tomato, this pathway is assumed to be significant based on circumstantial evidence (Defra PRA) and extrapolation from other pospiviroïds. The pest should be first evaluated as a candidate for the Quarantine pest status. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

Yes
Proposed Tolerance levels:

Zero tolerance approach, 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:

Seeds:
(a) The seeds have been produced from mother plants which have been maintained in isolation from other potential sources of infection, including host plants which may be latently infected;
and
(b) No symptoms of Columnea latent viroid have been observed on mother plants at the site of production since the beginning of the last complete cycle of vegetation, or if symptoms have been seen, then the symptomatic plants have been tested and found free from Columnea latent viroid.
Justification (if necessary):

Experts considered that the Pest free area option is not reliable because of the risk linked to ornamentals constantly marketed in the area. They also commented that available data do not justify testing of seed lots for pospiviroids: only very few outbreaks of solanaceous pospiviroids have been reported that may be related to infested/contaminated seed while various outbreaks could be related to pospiviroid infestations in ornamentals. In addition, no seed transmission was found in recent experiments carried out in the Netherlands with ca 100.000 seeds from commercial seed lots infested with various solanaceous pospiviroids. However very low initial infestation rates lead in some cases to an unacceptable economic impact. Isolation from ornamentals (for CEVd, CLVd, TASVd and TCDVd) and aubergine (for CEVd) is necessary for the production of reproductive material. **REFERENCES:**

* EFSA Panel on Plant Health (PLH) (2011) Scientific Opinion on the assessment of the risk of solanaceous pospiviroids for the EU territory and the identification and evaluation of risk management options. EFSA Journal 2011;9(8):2330 [132 pp.]. doi:10.2903/j.efsa.2011. 2330; www.efsa.europa.eu/efsajournal;
* EPPO (2016) Report of a Pest Risk Analysis for Columnea latent viroid;
* Faggioli F, Luigi M, Sveikauskas V, Olivier T, Virseck Marn M, Mavric Plesko I, De Jonghe K, Van Bogaert N & Grausgruber-Gröger S (2015) An assessment of the transmission rate of four pospiviroid species through tomato seeds. European Journal of Plant Pathology 143, 613-617;
* Sansford C & Morris J (2010) Fera Pest Risk Analysis for Columnea latent viroid. Version 3. Last accessed on 8 February 2011. The Food and Environemt Research Agency, York. United Kingdom.

HOST PLANT N°2: Solanum lycopersicum (LYPES) for the Vegetable propagating and planting material (other than seeds) sector.

Origin of the listing:

EFSA PRA (EFSA PLH, 2011)
Plants for planting:

Plants intended for planting, other than 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:

Transmission of CLVd through seed has not been proven in tomato (EFSA-PLH, 2011) although seed transmission was linked to several outbreaks of CLVd in the UK (Sansford and Morris, 2010). Nevertheless, behaviour is assumed by analogy with those viroid species that are seed transmissible: For CLVd seed transmission, a high probability rating is suggested by analogy, but this rating is associated with a high uncertainty. There is experimental and circumstantial evidence that CLVd can be spread between crops by mechanical transmission in tomato (EFSA-PLH, 2011) and thus any infection arising from seed will likely spread rapidly to neighbouring susceptible plant species in the nursery. Therefore plants for planting (arising from infected seed, or mechanical means from other hosts), are considered a significant pathway for this pest/host/intended use combination. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

All pospiviroids cause similar symptoms in tomato, independent of the viroid species. With PSTVd, severity may vary with the tomato cultivar. Symptoms are most conspicuous when plants become infected at early stages of development and when grown at high temperatures and light intensity. The first symptoms are growth reduction and chlorosis in the upper leaves, subsequently, this may develop into permanent stunting and bunchy growth. Occasionally, plants may either die or partially recover. Usually, symptoms are observed along rows in the fields and greenhouses, indicating that the viroid spreads mechanically during crop handling. Fruit production generally stops on infected plants, yield loss is strongly dependent on the age at which plants become infected. Early infection, before fruit setting, will result in close to 100% loss, while losses associated with later infections are more variable. Delay in fruit ripening, storage life and management costs are also likely (EFSA, 2011).
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:

Overall there is ample evidence that significant yield losses may result from pospiviroid infections in tomato and the impact is therefore expected to be major, with low uncertainty (EFSA-PLH, 2011). The economic impact is evaluated as unacceptable on Tomato. **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:

There is no management option that can prevent infestation other than exclusion and avoiding the use of infected plants (EFSA-PLH, 2011). Visual examination and testing in case of symptoms should be an effective measures. This position is reinforced by risk management measures set up for PSTVd that significantly reduced the incidence of this pathogen. **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. The pest should be first evaluated as a candidate for the Quarantine pest status. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

Yes
Proposed Tolerance levels:

Zero tolerance approach, 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:

Plants:
(a) The plants have been grown from seed that meet the requirements laid down; and have been maintained in isolation from other potential sources of infection, including host plants which may be latently infected;
and
(b) No symptoms of Columnea latent viroid have been observed on plants at the site of production since the beginning of the last complete cycle of vegetation.
Justification (if necessary):

Experts considered that the Pest free area option is not reliable because of the risk linked to ornamentals constantly marketed in the area. They also commented that available data do not justify testing of seed lots for pospiviroids: only very few outbreaks of solanaceous pospiviroids have been reported that may be related to infested/contaminated seed while various outbreaks could be related to pospiviroid infestations in ornamentals. In addition, no seed transmission was found in recent experiments carried out in the Netherlands with ca 100.000 seeds from commercial seed lots infested with various solanaceous pospiviroids. However very low initial infestation rates lead in some cases to an unacceptable economic impact. Isolation from ornamentals (for CEVd, CLVd, TASVd and TCDVd) and aubergine (for CEVd) is necessary for the production of reproductive material. **REFERENCES:**

* EFSA Panel on Plant Health (PLH) (2011) Scientific Opinion on the assessment of the risk of solanaceous pospiviroids for the EU territory and the identification and evaluation of risk management options. EFSA Journal 2011;9(8):2330 [132 pp.]. doi:10.2903/j.efsa.2011. 2330; www.efsa.europa.eu/efsajournal;
* EPPO (2016) Report of a Pest Risk Analysis for Columnea latent viroid;