NAME OF THE ORGANISM: Fusarium (anamorphic genus) (1FUSAG)

GENERAL INFORMATION ON THE PEST

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

Fusarium 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: Oil and fibre plants sector

If necessary, please list the species:

Fusarium spp, other than F. oxysporum f. sp. Lini, can cause non-specific symptoms on roots, leaf yellowing, and growth depression. More than 10 species of Fusarium are pathogen to Linum usitatissimum.
Is it justified that the pest is listed at a taxonomic rank below species level?

Not relevant
Conclusion:

* Candidate: Oil and fibre plants sector

Justification (if necessary):

In the RNQP Questionnaire, for the 'Oil and Fibre plant' Sector, no EU MS justified a listing at a higher level than the Species level. CZ proposed to only list Fusarium oxysporum f. sp. Lini on Linum usitatissimum. The Agricultural species SEWG considered that at least three species could infect Linum usitatissimum: Fusarium oxysporum f. sp. lini, Fusarium equiseti and Fusarium avenaceum.
For the 'Vegetable propagating and planting material (other than seeds)' Sector, FR is the only EU MS requiring, for Asparagus officinalis, to keep such a listing (without any justification). Experts agreed with this proposal for Asparagus officinalis, based on the publication by Gossmann et al. (2001) showing that more than 15 Fusarium species are involved. Nine of them are of phytopathological relevance: F. acuminatum [Gibberella acuminata], F. avenaceum [G. avenacea], F. culmorum, F. oxysporum, F. proliferatum, F. redolens [F. oxysporum var. redolens], F. sambucinum [G. pulicaris], F. solani and F. subglutinans [G. fujikuroi var. subglutinans. The listing at a higher level than the species level is justified on Asparagus officinalis by the difficulty to differentiate them soundly, unless by molecular tools. For cucurbits, there is generally one main Fusarium oxysporum forma specialis for each host species. In aubergine, it is mainly Fusarium oxysporum f. sp. melongenae. For cucurbits and aubergine the listing at a higher level than the species level is not justified.
For the 'Seed potato' Sector, experts agreed that, even F. solani var. coeruleum, F. sulphureum (=F. sambucinum) and F. avenaceum are the main encountered species in potato, there are many other species present in the soil (some are not pathogenic directly). More investigations and efforts to diagnose pest at the species level is needed. This would be necessary for a listing at the species level. Experts concluded that, as long as measures are only based on symptoms for this pest, a listing at the genus level is appropriate.
For the ornamental sector, no EU Member State considered this entry as important in the replies 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 Ornamental EU Marketing Directives. **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: Linum usitatissimum (LIUUT) for the Oil and fibre plants sector.

Origin of the listing:

3 - Oil and fibre plants sector: Council Directive 2002/57/EC
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:

Fusarium oxysporum f. sp. lini is a specific biotrophic pathotype. It infests soil for long term and survives saprophytically on the remaining plants. Seed transmission is rare and not considered to be significant. However the seed transmission of non-specific Fusarium [F. equiseti and F. avenaceum] is frequent. Experts considered that presence of the Fusarium complex on seeds is a significant pathway for the impact on seedlings. **5 - Economic impact:**
Are there documented reports of any economic impact on the host?

Yes
Justification:

Fusarium wilt of flax, caused by Fusarium oxysporum f. sp. lini (Fol), can infect flax at any growth stage and may result in 100% disease incidence in certain cultivars. Mycelial growth in the xylem interferes with water conduction, thus resulting in wilting of the plant. Depending on the plant growth stage, death of seedlings or premature death of plants can occur randomly or as distinct patches throughout the field. Plants grown from cracked or split seeds are more susceptible to wilting than intact seeds, whereas temperature and moisture level are considered to be the main factors affecting disease development (Edirisinghe, 2016). Fusarium spp, other than F. oxysporum f. sp. Lini, can cause non-specific symptoms on roots, leaf yellowing, and growth depression. They have a negative impact on seed emergence. These necrotrophic species are also slowly decaying the root bark, leading first to dry root rots before that roots are progressively decomposing. Destructive effects of these Fusarium spp. are observed later (in contrast with the biotrophic species F. oxysporum f. sp. Lini): infested plants do not bloom and stalks brown and dry prematurely.
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:

Impact is major on seedlings. **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?**

No

Conclusion:

Candidate by default
Justification:

 **CONCLUSION ON THE STATUS:**

Recommended for listing as an RNQP, by default. This analysis was complicated by the judgment that F. oxysporum f. sp. Lini, is the most damaging Fusarium on Linum, but also that this particular pathotype is not primarily spread on seed. Conclusion was that there is insufficient evidence to recommend changes from the current regulation and measures of Fusarium spp. on seed of L. usitatissimum. **8 - Tolerance level:**
Is there a need to change the Tolerance level:

Yes
Proposed Tolerance levels:

Basic and certified material:
(a) Seed treatment authorised for use against Fusarium spp. has been applied;
or
(b) Not more than 5% of seed affected with Alternaria linicola, Boeremia exigua var. linicola, Colletotrichum lini, Fusarium spp based on laboratory test of a representative sample. **9 - Risk management measures:**
Is there a need to change the Risk management measure:

No
Proposed Risk management measure:

Justification (if necessary):

The SEWG noted that some member states currently have additional requirements for thresholds for this pathogen in field inspection of Linum, and that effective seed treatments may be available [one reference suggests seed treatment reducing damage from Fusarium oxysporum f. sp. lini]. **REFERENCES:**

* Edirisinghe P V (2016) Characterization of Flax Germplasm for Resistance to Fusarium Wilt Caused by Fusarium oxysporum f. sp. Lini. Department of Plant Science. University of Saskatchewan. Saskatoon. Available from: <https://ecommons.usask.ca/bitstream/handle/10388/7844/EDIRISINGHE-THESIS-2017.pdf?sequence=1>;