Express – PRA[1)] for Syndrome „basses richesses“ (SBR)

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Initiation: Occurrence in Baden-Württemberg

Express - PRA	**Syndrome „basses richesses“ (SBR)**		
Phytosanitary Risk for Germany	**high** ☒	**medium** ☐	**low** ☐
Phytosanitary Risk for EU-MS	**high** ☒	**medium** ☐	**low** ☐
Certainty of Assessment	**high** ☐	**medium** ☐	**low** ☒
Conclusion	In 1991, the Syndrome „basses richesses“ was detected in Burgundy, France for the first time. In 2008, first infested sugar beets were found in Germany. In 2010, no infestations were detected, but in autumn 2011, there was a new outbreak. Only recently it was found that the γ-3-Proteobacterium *Candidatus* Arsenophonus phytopathogenicus is the main origin of the syndrome detected in France. The same is assumed for Germany. The bacterium is transmitted by the planthopper *Pentastiridius leporinus*. Until now the pest is neither listed in the Annexes of Directive 2000/29/EC nor by EPPO. Further spread of *Candidatus* Arsenophonus phytopathogenicus within Germany and possibly introduction to other Member States is most likely in the case that infested areas were tolerated and infested plant material was transported, especially as the vector *P. leporinus* is widespread. *Candidatus* Arsenophonus phytopathogenicus might cause severe damage on sugar beets in Germany as well as in other EU Member States where sugar beets are cultivated. Thus, measures on the control and for the prevention of further introduction and spread of *Candidatus* Arsenophonus phytopathogenicus and its vector *Pentastiridius leporinus* should be met according to § 4a of the German Plant Inspection Order (PBVO). A monitoring should be conducted in the infested area. In infested sites a suitable control program (f. e. application of different methods like use of insecticides, change in crop rotation, reduced tillage) with the aim of containment or eradication should be applied.		
Taxonomy[2)]	The Syndrome „basses richesses“ is associated with the phytopathogenic bacterium *Candidatus* Arsenophonus phytopathogenicus“ (γ-3 Proteobacterium; Enterobacteriaceae) (Bressan, 2011). The vector of the bacterium, *Pentastiridius leporinus*, belongs to the family of planthoppers (Cixiidae, Hemiptera).		
Trivial names	--		
Synonyms	--		
Does a relevant earlier PRA exist?	no		

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Biology	*Candidatus* Arsenophonus phytopathogenicus: The bacterium forms long rods within its vector, *P leporinus.* It is often thread-shaped and infests the cytoplasm of cells that form reproductive organs, salivary glands, intestine and fatty tissue (Bressan, 2012). Vector *Pentastiridius leporinus*: The nymphs feed below ground on the roots of sugar beets. After overwintering the nymphs finish their development in the following spring by feeding on the roots of winter wheat. Thus they are exceptionally well adapted to the crop rotation winter wheat – sugar beet (Bressan *et al.*, 2009). The adults feed above ground and are the main source for further spread. The cicada transmits the bacterium via sucking on host plants.
Is the pest a vector?[3)]	no
Is a vector needed?[4)]	Yes, a cixiid planthopper (Cixiidae), *Pentastiridius leporinus*, which is widespread in Europe.
Host plants	Bacterium: sugar beets (*Beta vulgaris*); strawberries (*Fragaria*; Bressan, 2012), (only little and unclear information available); vector: also other plants, f. e. reed (*Phragmites australis*) and winter wheat (*Triticum aestivum*).
Symptoms[5)]	Yellowing and sweeping of old leaves and new growth of central leaves which are chlorotic, lanceolar and asymmetric. The beets have lower sugar content than non-infested plants (Gatineau *et al.*, 2002). In the case of the infestation in Germany also reduced growth and a necrotic vascular system within sugar beets were detected.
Presence of host plants in Germany[6)]	Sugar beets and winter wheat can be found throughout Germany (sugar beet cultivation app. 25 M tons, see Eurostat, 2012).
Presence of host plants in the MS[7)]	Sugar beets and winter wheat are cultivated throughout the Member States (especially in France, sugar beet growing app. 35 M tons, followed by Germany, Poland, Great Britain; Eurostat, 2012).
Known infested areas[8)]	France (first detection in 1991 in Burgundy, Gatineau *et al.*, 2002), Italy (?), Japan (?) (Bressan *et al.*, 2012), Germany.
Pathways[9)]	Presumably the bacterium was introduced into Germany by natural spread via the vector from France where an infestation near the German border exists. It is not known how it was introduced into France.
Natural spread[10)]	Via the vector which is able to fly and via anemochory.
Expected establishment and spread in Germany[11)]	As the bacterium is introduced with the vector and the vector and the host plants are widespread, further establishment and spread have to be expected, especially in the main cultivation areas of sugar beets and winter wheat.
Expected establishment and spread in the MS[12)]	As the bacterium is introduced with the vector and the vector and the host plants are widespread, further establishment and spread have to be expected, especially in the main cultivation areas of sugar beets and winter wheat in France and Poland, but also in

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	Great Britain, the Netherlands, Belgium etc. (Eurostat 2012) .
Known damage in infested areas[13)]	Massive losses to the sugar production industry may be caused by the reduction of sugar content in sugar beets. F. e. in 1992, in France, losses up to 50% were registered in this sector (Gatineau *et al.*, 2002).
Limitation of the endangered area in Germany	Beet root cultivation areas rotating with winter wheat (Eurostat, 2012); possibly also strawberry cultivation areas but there is only little information available on this.
Expected damage in the endangered area in Germany[14)]	Since growing of sugar beet is an important sector and the vector is widespread, comparable damage as in France has to be expected.
Expected damage in the endangered area in MS[15)]	Damage has to be expected where sugar beets (possibly also strawberries) are cultivated.
Control feasibility and measures[16)]	Control is carried out via containment of cicada populations. Infestations may be reduced or contained via crop rotation as the vector depends on sugar beets and winter wheat. It was shown by experiments that by replacing of winter wheat with barley a reduction of app. 80 % of the nymphs and adults of *P. leporinus* could be achieved. Reduced tillage may also contribute to a reduction of the nymph populations. Furthermore, the invasion of adults into sugar beet fields may be reduced by the use of insecticides, but with limited success – while combining of all three methods probably leads to a successful control (Bressan, 2009).
Detection and diagnosis[17)]	Examination of the infested plants and the vector *Pentastiridius leporinus* on *Ca*. A. phytopathogenicus by means of PCR (Bressan *et al.*, 2011). In 2012, Bressan *et al.* used also fluorescence *in situ* hybridization procedures for the detection of the bacterium in plants and in the vector.
Remarks	The security of the assessment of this pest is low due to lack of information. F. e. it is not known how the pest was introduced into France. It seems that further pathogens are involved in the Syndrome basses richesses, nevertheless the described bacterium seems to be the most important with the largest impact. Also in respect to the relevance for strawberries, high uncertainty exists.
Literature	Bressan, A. 2009. Agronomic practices as potential sustainable options for the management of Pentastiridius leporinus (Hemiptera: Cixiidae) in sugar beet crops. Journal of Applied Entomology 133: 760–766 Bressan, A., Holzinger, W. E., Nusillard, B., Sémétey, O.; Gatineau, F.; Simonato M.; and Boudon-Padieu, E. 2009. Identifcation and biological traits of a planthopper from the genus *Pentastiridius* (Hemiptera: Cixiidae) adapted to an annual cropping rotation. European Journal of Entomology 106: 405-413. Bressan, A., Moral García, F. J., Boudon-Padieu, E. 2011. The Prevalence of '*Candidatus* Arsenophonus phytopathogenicus' Infecting the Planthopper *Pentastiridius leporinus* (Hemiptera: Cixiidae) Increase Nonlinearly With the Population Abundance in

sugar Beet Fields. Environmental Entomology 40 (6): 1345-1352.

Bressan, A., Terlizzi, F., Credi, R. 2012. Independent origins of vectored plant pathogenic bacteria from arthropod-associated *Arsenophonus* endosymbionts. Microbial Ecology 63: 628-638.

Eurostat, 2012. http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&plugin=1&language=en&pcode=tag00106 (Website accessed on 11-07-2012).

Gatineau, F., Jacob, N., Vautrin, S., Larrue, J., Lherminier, J., Richard-Molard, M., Boudon-Padieu, E. 2002. Association with the Syndrome “Basses Richesses” of sugar beet of a phytoplasma and a bacterium-like organism transmitted by a Pentastiridius sp. Phytopathology. 92: 384-392.

Explanations

1) Compilation of the most important directly available information allowing a first preliminary estimation of the phytosanitary risk. This short assessment is necessary for the decision on a notification to EU and EPPO as well as the preparation of a complete risk analysis, for the information of the countries and as a basis for the possible initiation of eradication measures. Regarding the phytosanitary risk especially the possibility of the introduction into and spread in Germany and the Member States as well as possible damage are taken into account.

2) Taxonomic classification – also subspecies; in case that the taxonomical classification is uncertain the JKI-scientist initiates the taxonomic classification, as far as possible.

3) If so, which organism (which organisms) is (are) transmitted and does it (do they) occur in Germany / the MS?

4) If so, which organism serves as a vector and does it occur in Germany / the MS?

5) Description of the pattern of damage and the severity of the symptoms/damage on the different host plants

6) Presence of the host plants in protected cultivation, open field, amenity plantings, forest.
Where, in which regions are the host plants present and to which extent?
How important are the host plants (economical, ecological,..)? Possible origin

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How important are the host plants (economical, ecological,..)? Possible origin

8) f. e. acc. to CABI, EPPO, PQR, EPPO Datasheets

9) Which pathways are known for the pest and how important are they for the possibility of introduction? Primarily the transport of the pest over long distances is meant, normally with infested traded plants, plant products or other contaminated articles. This does not comprise the natural spread resulting from introduction.

10) Which pathways are known for the pest and of which relevance are they in respect of the possibility of spread? In this case the natural spread resulting from introduction is meant.

11) under the given prevalent environmental conditions

12) under the given prevalent environmental conditions (native areas and areas of introduction)

13) Description of the economic, ecological/environmental relevant and social damage in the area of origin resp. areas of occurrence up to now

14) Description of the economic, ecological/environmental relevant and social damage to be expected in Germany, as far as possible and required, differentiated between regions

15) Description of the economic, ecological/environmental relevant and social damage to be expected in the EU/other Member States, as far as possible and required, differentiated between regions

16) Can the pest be controlled? Which possibilities of control are given? Are plant health measures conducted in respect to this pest (in the areas of current distribution resp. by third countries)?

17) Description of possibilities and methods for detection. Detection by visual inspections? Latency? Uneven distribution in the plant (sampling)?