Express – PRA[1)] for *Pseudococcus viburni*

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Initiation: Occurrence in Baden-Württemberg in the open field, according to notification at least since 2010

Express - PRA	***Pseudococcus viburni* (Signoret)**		
Phytosanitary Risk for Germany	**high** ☐	**medium** ☒	**low** ☐
Phytosanitary Risk for EU-MS	**high** ☐	**medium** ☒	**low** ☐
Certainty of Assessment	**high** ☐	**medium** ☒	**low** ☐
Conclusion	The mealybug *Pseudococcus viburni* is endemic in the neotropics. In 2010, it was detected for the first time in Germany in the open field in Baden-Württemberg. For some time it occurs in the indoor green plants in Germany. Up to now the pest is neither listed in the annexes of Directive 2000/29/EC nor by EPPO. The range of host plants of *P. viburni* comprises at least 296 host plants from 87 families. The mealybug can spread via infested host plant material, tools and machines. Natural spread in the open field occurs only to a minor degree via nymph stages on the plant and in the crop. Damage occurs on ornamentals in glasshouses and on indoor green plants as well as in outdoor crops, mainly due to quality loss caused by suction damage, secretion of honeydew, establishment of mould and weakening of plants (f. e. on apples and pears in South Africa) as well as by transmission of the leaf-roll disease of grape vine. Due to the establishment in the open field in the central Neckar region in Baden-Württemberg the damage potential by mealybugs and associated viruses has significantly increased on outdoor crops, especially in fruit production and viticulture. Based on this risk analysis it must be assumed that *Pseudococcus viburni* will establish in Germany and further EU MS also in the open field and might cause considerable damage. A reliable assessment of the economic importance is currently not possible because of lack of data. In case of an occurrence in the open field, measures to eradicate the infestation and prevent the spread of *P. viburni* should, in general, meet § 4a of the Plant Inspection Order (PBVO). Because of the occurrence in indoor spaces and in some other EU Member States while the pest has only a minor damage potential, the applied measures should regard some commensurability. In the concrete case, the fruit and vine crops in the central Neckar region are especially endangered and the still limited extent of the infestation allows effective measures on the eradication of this outbreak. Appropriate measures should be taken, as removal and destruction of the infested plants and furthermore the use of		

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	suitable insecticides for the preventive control in the area.
Taxonomy[2)]	Insecta; Hemiptera; Sternorrhyncha; Pseudococcidae
Trivial names	Affinis-mealybug, Obscure mealybug , Tomatenwolllaus
Synonyms	*Dactylopius affinis* *Pseudococcus affinis* *Pseudococcus capensis* *Pseudococcus longispinus* var. latipes *Pseudococcus malacearum* *Pseudococcus obscurus* (CABI 2012a) *Pseudococcus indicus* *Pseudococcus nicotianae* *Pseudococcus malacearum* *Pseudococcus latipes* (Gimpel and Miller 2009)
Does a relevant earlier PRA exist?	No
Biology	Sexually dimorph, females have three nymph stages and keep the shape, males have another pupae stage and are winged as adults. Eggs are protected from enemies by a wax layer. Depending on the temperature several overlapping generations per year are possible. (Bettencourt & Simoes 2008). Parthenogenesis seems unusual (Waterworth *et al*. 2011). The first nymph stage is the most agile. In the course of further development of females the stages are more sedentary. Usually there is no diapause (Daane *et al*. 2012). The minimal and maximal development temperature in South Africa are 16 °C and 27 °C, respectively. The optimum for the development is given with 25 °C. The duration of the development of the females is 132 days at 18 °C and 48 days at 25 °C (Mudavanhu 2009). Temperatures below 15 °C and above 30 °C severely reduce the development or increase the mortality rate (Santa-Cecilia *et al*. 2011).
Is the pest a vector?[3)]	Yes, for GLRa V -3, the causal agent of the leafroll disease on *Vitis vinifera* (Charles *et al*. 2008); Grapevine virus A (Vitivirus, GVA); Grapevine virus B (Vitivirus, GVB) (Anonymous 2008)
Is a vector needed?[4)]	No
Host plants	*P. viburni* is polyphagous with 296 host plants from 87 plant families (Ben-Dov 2002), f. e. Aceraceae, Brassicaceae, Rosaceae and Solanaceae. Relevant host plants in the open field mainly are apple, plum, pear and grape as well as tomato, citrus and orchids under glass (Scalenet 2013).
Symptoms[5)]	Wax layered hatches of eggs and adult females on the plants, and the development of honeydew can be observed (University of California, accessed on 05-03-2013). *P. viburni* is a vector of the leafroll disease on grapevine. The symptoms are the rolling and colouring of the leaves.
Presence of host plants in Germany[6)]	*P. viburni* is able to infest many plants of different families. This includes plants in protected cultivation under glass as well as plants in the open field. A widespread occurrence of the host plants in Germany must be assumed.
Presence of host plants in the MS[7)]	The polyphagy of *P. viburni* it leads to the assumption that host plants are present almost everywhere in the Member States (see

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	above).
Known infested areas[8)]	The mealybug is endemic in the neotropics (Daane 2012) and occurs in New Zealand (Biosecurity Australia 2006), Australia and Chile (Agriculture, Fisheries and Forestry Australia 2003), as well as in parts of Peru and of the USA (U.S. Department of Agriculture 1997). Furthermore, it was found in Northern Iran (Abbasipour & Taghavi 2007) and in Europe in France, Italy, Portugal and Slovenia (CABI 2013b, Franco & Marotta 2001, Mazzeo *et al.* 2008, Seljak 2008). Its occurrence is also described in the Turkish part of Northern Cyprus & Ülgentürk 2010) and in a region in Brazil (Culik *et al.* 2009). According to Scalenet (2013) it is already spread worldwide, with occurrence in the USA, South America, Australia and New Zealand and in large parts of Asia and Europe. On indoor green plants in Germany, it is widespread and occurs often (Anonymous 2012).
Pathways[9)]	The mealybugs can be spread by humans, machines and equipment. A transport over long distances is possible via the import and export of infested plants.
Natural spread[10)]	Natural spread rarely occurs by nymph stages on the plant or in the crop, since the adult females are mostly sedentary. Especially the first nymph stage is agile and it actively searches plants for feeding.
Expected establishment and spread in Germany[11)]	It is assumed that a large-scale establishment in the open field in Germany is rather unlikely because of the thermophile requirements.
Expected establishment and spread in the MS[12)]	*P. viburni* is already present in the Mediterranean region. The likelihood of establishment in Northern European countries can be compared with the likelihood of establishment in Germany.
Known damage in infested areas[13)]	Damage is caused by nymphs as well as by adults. They cause mainly a weakening of young plants and the falling of unripe fruits as well as a quality loss of the plants and fruits. Furthermore, a secondary infestation with dark mildew might occur. *P. viburni* is a widespread and severe pest on apples and pears in South Africa (Mudavanhu 2009). In viticulture, additional damage is possible caused by the transmission of the virus complex causing leaf roll disease (Daane *et al.* 2012).
Limitation of the endangered area in Germany	Because of the widespread host plants on the one hand and the thermophile requirements on the other hand an exact limitation of the endangered outdoor area is not possible. In any case glasshouse crops throughout Germany are endangered, the likelihood of an establishment in the open field is presumably limited to warmer regions (f. e. Rhine valley, Kaiserstuhl, mid Neckar region).
Expected damage in the endangered area in Germany[14)]	Damage on ornamentals in glasshouses and on indoor green plants occurs time and again. At the moment the economic importance cannot be estimated because of lack of data. Especially a quality loss of infested plants and fruits due to suction damage, the secretion of honeydew and the

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	establishment of sooty mould as well as a weakening of plants have to be expected. Relating to the transmission of the leaf roll virus in viticulture, a further vector would be added to the list of mealybugs which already occur in Germany and are capable to transmit the virus (Hoffmann 2002). Due to the establishment in the open field in the central Neckar region in Baden-Württemberg a new damage potential on outdoor crops emerges, especially for fruit production and viticulture.
Expected damage in the endangered area in MS[15)]	As in Germany, mainly a quality loss of infested plants and fruits due to suction damage, the secretion of honeydew and the establishment of sooty mould as well as a weakening of infested plants have to be expected. Damage has to be expected on the most relevant crops like apple, pear, grape, tomato but also on ornamentals.
Control feasibility and measures[16)]	The detection of the pest in the crop at an early stage is essential for the control, possibly the use of pheromone traps is useful (Daane *et al*. 2012). In cultivation under glass as well as in warmer climatic regions the use of beneficial organisms is possible (Daane *et al*. 2012, Kreiter *et al*. 2005, Richter 2009, Sandanayaka 2009), the use in the open field under the given climatic conditions cannot be assessed at the moment. Different insecticides show an efficacy against *P. viburni* (Daane *et al*. 2012, Mudavanhu 2009). The efficacy of agents which are approved in Germany cannot be assessed at the moment. The use of paraffin or mineral oils in fruit production and viticulture could be an option.
Detection and diagnosis[17)]	A morphological identification of the species is only possible on adult females. The identification by means of barcodes is possible (Abd-Rabou *et al*. 2012, Correa *et al*. 2012, Daane *et al*. 2011).
Remarks	The estimation of the risk is uncertain because there is only little information available on the establishment and spread potential of the mealybugs under the climatic conditions in Germany. An adaption to the prevalent climate can be assumed because of the fact that the mealybugs already hibernated several times in Baden-Württemberg, the extent cannot be estimated at the moment.
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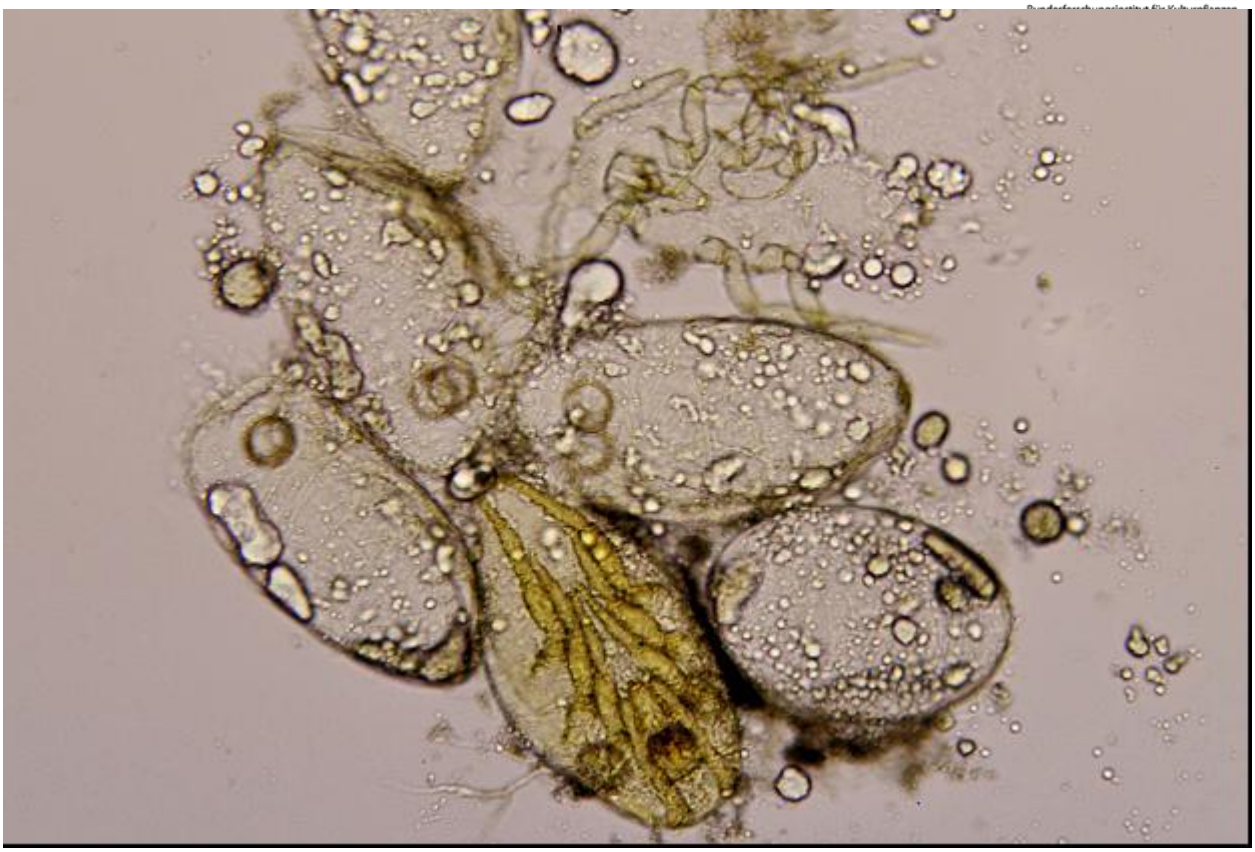
Adult female (Foto: Jack Kelly Clark)



Eggs and larvae (Photo: Catalpa, Klaus Schrameyer)

Explanation

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 to and spread in Germany and the Member States as well as possible damage are taken into account.

2) Taxonomic classification - also subspecies - in the 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 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, ...)?

7) 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

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, plants 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 probability of the 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 and social damage in the area of origin resp. areas of occurrence up to now

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

15) Description of 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)?