Express PRA for Barley stripe mosaic virus – Occurrence –

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Initiation: Detection of the virus in a composite sample of grain in Bavaria

Express-Risk analysis (PRA)	**Barley stripe mosaic virus**		
Phytosanitary risk for Germany	**high** ☐	**medium** ☐	**low** ☒
Phytosanitary risk for EU-Member States	**high** ☐	**medium** ☐	**low** ☒
Certainty of assessment	**high** ☐	**medium** ☒	**low** ☐
Conclusion	Barley stripe mosaic virus (BSMV) was initially detected in the USA. Thus far, it is not described in Germany although it already occurs in several EU-MS. It is not listed in the Annexes of Dir. 2000/29/EC and was deleted from the EPPO A2-list in 1999. BSMV mainly infests barley and increasingly also wheat. It is assumed that due to suitable climatic conditions BSMV could establish outdoors in Germany. An establishment in other EU-MS is also possible and happened already with limited distribution. BSMV possibly might cause considerable damage but in general, the virus is of minor economic significance. Based on this risk analysis it is assumed that Barley stripe mosaic virus is able to establish in Germany or another Member State where it does not yet occur and possibly would be able to cause damage. Generally, infected plants should be destroyed and the seeds from infected lots should not be marketed.		
Taxonomy	Family : Virgaviridae, Genus: Hordeivirus, Name: Barley stripe mosaic virus		
Trivial name	Barley false stripe virus, barley mild stripe virus, oat stripe mosaic virus, Streifenmosaikvirus Gerste.		
Synonyms	Barley stripe mosaic hordeivirus		
Does a relevant earlier PRA exist?	No		
Biology	RNA virus with three genomic RNAs enveloped by viral envelope protein, bacilliform; It is transmitted via seeds but also a mechanical transmission is		

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	possible. Symptoms are more distinct at higher temperatures. Storing and heat will not inactivate the virus within the seeds [1]. In the field, the virus mainly is transmitted via leaf contact of infected and healthy plants. A transmission via pollen could not be detected experimentally. [2]. The infection with BSMV inhibits the senescence of the leaves and the Chlorophyll biosynthesis [3]. BSMV infection also blocks the development of chloroplasts and the photosynthesis apparatus [4, 5].
Is the pest a vector?	No
Is a vector needed?	No
Host plants	Main host plants: Barley (*Hordeum vulgare*) and wheat (*Triticum* L.). Rarely oat (*Avena sativa*) [2, 6-8] Hosts subject of artificial infection: Maize (*Zea mais*), *Brachypodium*, spinach (*Spinacia oleracea*), *Nicotiana tabacum*, *Chenopodium* spp., beet (*Beta Vulgaris*), Poaceae [2, 9-11] (http://sdb.im.ac.cn/vide/descr061.htm)
Symptoms	Symptoms are yellow to white stripes, leaf mosaic, leaf necrosis and dwarfing. Seeds of BSMV-infected plants are small and shrivelled [12]. The number of the grains per spike, number of the spikes and the grain weight in infected plants are smaller than in healthy ones [12].
Presence of the host plants in Germany	Barley and wheat are the most important cereal crops in Germany. In 2016, barley was cultivated on a total of 1,618,000 ha and wheat on 3,216,000 ha [13].
Presence of the host plants in the Member States	Barley and wheat are the most important cereal crops in Central Europe. In 2016, wheat was cultivated on 26,898,000 ha and barley on 12,332,000 ha in the EU. The main production countries are France, Poland, Romania, Spain and UK [13].
Known infested areas	The virus occurs all over the world [6, 7, 14]. In Europe, it is present in Russia, Romania, Greece, Turkey, Hungary, Moldavia, Poland, Switzerland, Serbia, Slovakia, Slovenia and Ukraine, mostly with limited distribution. Bulgaria, Czech Republic, Denmark and Portugal notify only low occurrence of BSMV. Up to now, the presence is not known in Germany. (https://gd.eppo.int/taxon/BSMV00/distribution)
Pathways	As the virus can be transmitted via seeds a transmission via infected seeds is the most probable. Trading of infected plants

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	could also lead to transmission.
Natural spread	The natural spread happens via the propagation of infected seeds and the contact between healthy and infected plants in the field.
Expected establishment in Germany	The risk of establishment in Germany is high in case of non-controlled seeds.
Expected establishment and spread in the Member States	The virus does already occur in many Member States, however, mostly not wide spread.
Known damage in infested areas	Field tests in Germany and Wales showed yield loss up to 60% (no date indicated in source) [1]. In wheat crops BSMV may lead to a yield loss of 40-75 % [1] (no date indicated in source). In the USA BSMV was of economic importance in the states Montana and North Dakota [15]. In 1967, in Romania there was a yield loss of 16-27% [1]. From 2001 to 2005, BSMV was intensively examined in Poland [13]. BSMV was detected in 12 barley cultivars from 37 and in 35 from 105 breeding lines. In Korea BSMV was detected in 26% of the tested fields [16]. Despite of the possible damage BSMV is not of economic importance thus far.
Limitation of the endangered area in Germany	Due to the widespread cultivation of the host plants it is not possible to demarcate the endangered area.
Damage to be expected in endangered areas in Germany	Suitable climatic conditions and susceptible genotypes render possible the occurrence of BSMV. The virus can survive for several years in infected seeds.
Damage to be expected in endangered area in Member States	See above
Control and measures	Use of virus-free seeds (serological and molecular biological test methods available) [13, 17-19]. Confinement of the distribution by means of sterilisation of equipment and restricted access of infested areas. Removal and destruction of virus-infected plants and of infected seeds.
Detection and diagnosis	Serological detection via ELISA, PCR-based detection [14, 17, 18]. Exclusively visual inspection is not recommendable due to the possible latency.
Remarks	1. In 1983, BSMV was integrated in the EPPO A2 list. In 1991, it

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	was recommended to test seeds to grow virus-free plants. In 1999, the virus was deleted from the A2 list. 2. in plant research, BSMV is actively used as a tool for gene analysis [10] 3. Resistance genes are known [20] 4. BSMV is only listed as a quarantine in certain countries https://gd.eppo.int/taxon/BSMV00/categorization
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