Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments

Pest categorization

Blueberry fruit drop-associated virus

BFDaV

Canada

Table of contents

Background....3
Identity of organism....4
Presence in the PRA area....4
Regulatory status....5
Potential for establishment and spread in the PRA area....5
Potential for economic and environmental consequences in the PRA area....6
Conclusion....7
References....8

Background

The purpose of this categorization is to determine whether *Blueberry fruit drop-associated virus* (BFDaV) has the potential to satisfy the criteria in the definition for a quarantine pest. The method used by the CFIA to initiate and conduct this categorization is consistent with international guidelines set by the International Plant Protection Convention (IPPC). Definitions follow those listed in the IPPC's *Glossary of phytosanitary terms*.

Initiation point(s): This categorization was identified via a Commodity Risk Assessment on blueberry plants from Canada to the UK for the Jens-Georg Unger Plant Health Fellowship project, funded by the European and Mediterranean Plant Protection Organisation (EPPO). This project was led by a visiting scientist from the UK Department for the Environment, Food and Rural Affairs, utilising the tools and templates of the Canadian Food Inspection Agency and coordinating with experienced Canadian risk assessors.

Identification of the PRA area: The PRA area is all of the UK.

Current regulatory status: *Blueberry fruit drop-associated virus* is not currently regulated as a pest in the UK or in any member country of EPPO (EPPO 2022).

Identity of organism

Name: *Blueberry fruit drop-associated virus* (BFDaV) (Caulimoviridae)

Synonyms: N/A

English common names: Blueberry fruit drop disease

French common names: N/A

1. **Is the organism clearly a single taxonomic entity and can it be adequately distinguished from other entities of the same rank?**

Yes	**Go to 2**
If no	Go to 11

Given the genome size, organisation and phylogenetics of BFDaV, this virus was identified in 2016 as the new and largest member of the Caulimoviridae family (Diaz-Lara and Martin 2016).

Symptoms were first reported around 20 years ago (Sweeney *et al.* 2004). These symptoms include the reddening of young leaves and flowers, and the development of smaller fruit that then drops several weeks before harvest. As time passes, the leaves return to their normal colour. Without fruit, these plants stand noticeably upright (Martin *et al.* 2006)

Presence in the PRA area

2. **Does the organism occur in the PRA area?**

If yes	Go to 3
No	**Go to 5**

3. **Is the organism widely distributed in the PRA area?**

If yes	Go to 11
If no	Go to 4

Regulatory status

4. Is the organism under official control in the PRA area or is it a potential candidate for official control?

If yes	Go to 5
If no	Go to 11

Potential for establishment and spread in the PRA area

5. Does the PRA area have climatic conditions suitable for establishment and spread of the organism?

Yes	**Go to 6**
If no	Go to 11

6. Does the PRA area have ecological conditions suitable for establishment and spread of the organism?

Yes	**Go to 7**
If no	Go to 11

The distribution of this virus is very limited, recently being only reported in one field in northwest Washington of the United States (U.S.) and in two fields in British Columbia, Canada. These identifications have been on the cultivar Bluecrop of highbush blueberry (*Vaccinium corymbosum*) (Diaz-Lara and Martin 2016). This *Vaccinium* species is present in urban areas (e.g. gardens) in the UK and in cultivated areas such as fields, nurseries, and garden centres, that could enable the establishment and spread of this virus (GBIF 2022; RHS 2022).

In the past, blueberry fruit drop symptoms have also been reported in New York and Oregon in the U.S. (Martin *et al.* 2008). Although these reports have not been verified as being caused by BFDaV, this virus was identified on a singular asymptomatic plant, of the highbush blueberry cultivar Aron, from germplasm in Oregon (Martin and Tzanetakis 2018). The latter finding suggests that the virus may be more widely spread than previously believed.

The method of viral establishment and spread is not currently known. All recent attempts of mechanical transmission have failed, though blueberry fruit drop disease could be transmitted to other blueberry plants via grafting (Diaz-Lara and Martin 2016; Martin *et al.* 2008). It can be reasonably assumed that spread is currently very limited, given that none of the surrounding plants growing nearby to the recent findings in Washington and British Columbia exhibited symptoms or tested positive for this virus (Diaz-Lara and Martin 2016; Martin and Tzanetakis 2018). However, the rate of spread appears to vary year by year with the number of symptomatic plants either remaining constant or increasing noticeably, for example by 50-60 plants in a field (Martin *et al.* 2006).

Given that most Caulimoviridae viruses are transmitted by insect vectors, it is possible that this virus could be similarly transmitted (Alfredo Diaz-Lara, Tecnológico de Monterrey, pers. comm., May 05, 2022). No climate conditions for virus survival have been identified, yet considering the similar climate conditions between the UK and Canada, it is likely that that the UK would be suitable for the establishment of this virus.

Potential for economic and environmental consequences in the PRA area

7. Is the organism a known pest in its area of current distribution?

Yes	**Go to 9**
If no	Go to 8

8. Does the organism have intrinsic attributes that indicate that it could cause significant harm to plants?

If yes	Go to 9
If no	Go to 11

9. With specific reference to the plants or habitats which occur in the PRA area, could the organism by itself, or acting as a vector, cause significant damage or loss to plants leading to negative economic, environmental, societal or export market impacts?

If yes	Go to 10
No	**Go to 11**

Blueberry species, such as *Vaccinium corymbosum*, are cultivated in the UK and are at risk of this pathogen. The value of the blueberry-growing economy in Great Britain is currently valued at £32 million ex-farm (Jack Evans, British Summer Fruits, pers. comm., Jun. 10, 2022). Blueberry plants are

also grown as ornamental plants in gardens (RHS 2022). Finally, native *Vaccinium* species, such as *Vaccinium vitis-idaea* and *Vaccinium myrtillus* in the wild, could also be affected by this virus though their host status is unknown. These native species are already under pressure from pathogens like *Phytophthora ramorum*.

In the affected fields in Washington and British Columbia, infected bushes drop nearly 100% of their fruit when they are about 3 to 5mm in diameter (Martin *et al.* 2006). However, only one cultivar, Bluecrop, has been affected and the infested area is limited to a few fields (Diaz-Lara and Martin 2016). In addition, only approximately 11% of plants in the affected fields exhibited fruit drop symptoms (Ioannis Tzanetakis, University of Arkansas, pers. comm., August 18, 2022). There is also no record of *Blueberry fruit drop-associated virus* expanding its current range and causing any significant damage, although there is some uncertainty regarding the spread of this virus to the singular plant in the Oregon germplasm.

Conclusion

10. This organism has the potential to satisfy the definition of a quarantine pest.
11. This organism does not fulfill all of the criteria for a quarantine pest.

Blueberry fruit drop-associated virus is currently believed to be absent from the UK. The impact of this virus in its current range, causing yield losses via fruit drop, suggests that it could cause similar damage in the UK. However, given the very limited range and spread of this virus, it seems unlikely to spread far or cause a significant impact to blueberry production. It is possible that an insect vector influences viral spread, however a species has not been identified yet. Therefore, it does not fulfil all of the criteria for a quarantine pest.

This categorization may need to be re-evaluated if new information on the spread of BFDaV, such as the presence of a vector, becomes available.

References

Diaz-Lara, A. and Martin, R. 2016. *Blueberry fruit drop-associated virus*: A new member of the family Caulimoviridae isolated from blueberry exhibiting fruit-drop symptoms. Plant Disease 100(11):2211-2214.

EPPO. 2022. EPPO Global Database. EPPO, Paris, France, https://gd.eppo.int/.

GBIF. 2022. Global Biodiversity Information Facility. [Online] Available: https://www.gbif.org/ [May. 31, 2022].

Martin, R., Sweeney, M., Tzanetakis, I. and Wegener, L. 2006. A virus associated with blueberry fruit drop disease. Acta horticulturae 715.

Martin, R. and Tzanetakis, I. 2018. High risk blueberry viruses by region in north america; implications for certification, nurseries, and fruit production. Viruses 10(7):342.

Martin, R., Tzanetakis, I., Caruso, F. and Polashock, J. 2008. Emerging and reemerging virus diseases of blueberry and cranberry. Proc. IX International Vaccinium Symposium 810.

RHS. 2022. *Vaccinium corymbosum* [Online] Available: https://www.rhs.org.uk/plants/18670/vaccinium-corymbosum-(f)/details [June. 21, 2022].

Sweeney, M., Wegener, L., Martin, R. and Tzanetakis, I. 2004. A virus associated with blueberry fruit drop disease. Proc. VIII International Symposium on Vaccinium Culture 715.