



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Pest categorization

Hemadas nubilipennis (Ashmead) (Hymenoptera:
Pteromalidae)

Blueberry stem gall wasp



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Background

The purpose of this categorization is to determine whether *Hemadas nubilipennis* (blueberry stem gall wasp) 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: 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: *Hemadas nubilipennis* is not currently regulated as a pest in the UK. However, it is regulated in Chile as a quarantine pest (EPPO 2022).

Identity of organism

Name: *Hemadas nubilipennis* (Ashmead) (Hymenoptera: Pteromalidae)

Synonyms: *Megorismus nubilipennis* Ashmead

English common names: Blueberry stem gall wasp

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

If no

Go to 2

Go to 11

Hemadas nubilipennis is identified by having red-brown legs and basal segments of the antennae, brownish posterior femora (the third leg segment), and a broad and flat abdomen. It also has clear wings with a brown blotch enclosing the marginal vein and stigma. Wing veins are brown and the knob of the stigma vein is toothed (Ashmead 1887).

This species has been identified as responsible for causing the formation of pinkish, kidney-shaped, multi-chambered stem galls on the blueberry plant, in which the *Hemadas nubilipennis* larvae hatch, overwinter and pupate (Hayman *et al.* 2003; McAlister and Anderson 1932).

Presence in the PRA area

2. Does the organism occur in the PRA area?

If yes

No

Go to 3

Go to 5

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

If yes

If no

Go to 11

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 blueberry stem gall wasp has been reported in eastern Canada and the US (see Figure 1). It does not appear to have spread to other countries beyond its native range (GBIF 2022). This aligns with what has been reported previously; that natural dispersal of *Hemadas nubilipennis* is very slow (McAlister and Anderson 1932). This could be attributed to the fact that adults oviposit within minutes of leaving their stem galls (West and Shorthouse 1989). They have been observed to hop very short distances, and can fly so the wind may help dispersing the adults (Isaacs *et al.* 2020; McAlister and Anderson 1932). However, this pest is capable of spreading significant distances on infested plant material, as shown in northeast USA (Carlos Garcia-Salazar, Michigan State University, pers. comm., Jul. 09, 2022).

Predation of *Hemadas nubilipennis* in its native range by birds and small mammals has been noted, however it is not likely to have a significant impact on pest numbers. A lack of natural parasitic species (such as *Macroneura vesicularis*, *Habrocytus* sp., *Eurytoma solenozopheriae*, *Ormyrus vacciniicola*,

Sycophila vacciniicola, and *Tetrastichus* sp, most of which are not present in the UK) may allow stem gall wasp populations to increase (GBIF 2022; Isaacs *et al.* 2020; Shorthouse *et al.* 1990).

This wasp attacks lowbush blueberry (*Vaccinium angustifolium*), velvet-leaved blueberry (*V. myrtilloides*) and highbush blueberry (*V. corymbosum*) (Driggers 1927; McAlister and Anderson 1932). These *Vaccinium* species are present in urban areas (e.g. gardens) in the UK and/or in cultivated areas such as fields, nurseries, and garden centres, that could enable the establishment and spread of this pest (GBIF 2022; RHS 2022a; RHS 2022b).

Studies on the optimum environmental conditions for this pest could not be found, however temperature was shown to have an impact on survival. Overwintering wasp survival was enhanced when the galls were exposed to milder winter temperatures, though high temperatures brought about by field burning significantly reduced survival without destroying gall tissues (Hayman 2004). Given that the UK has milder temperatures than Canada and the US, it seems likely that the spread and establishment of this insect in the UK could occur.

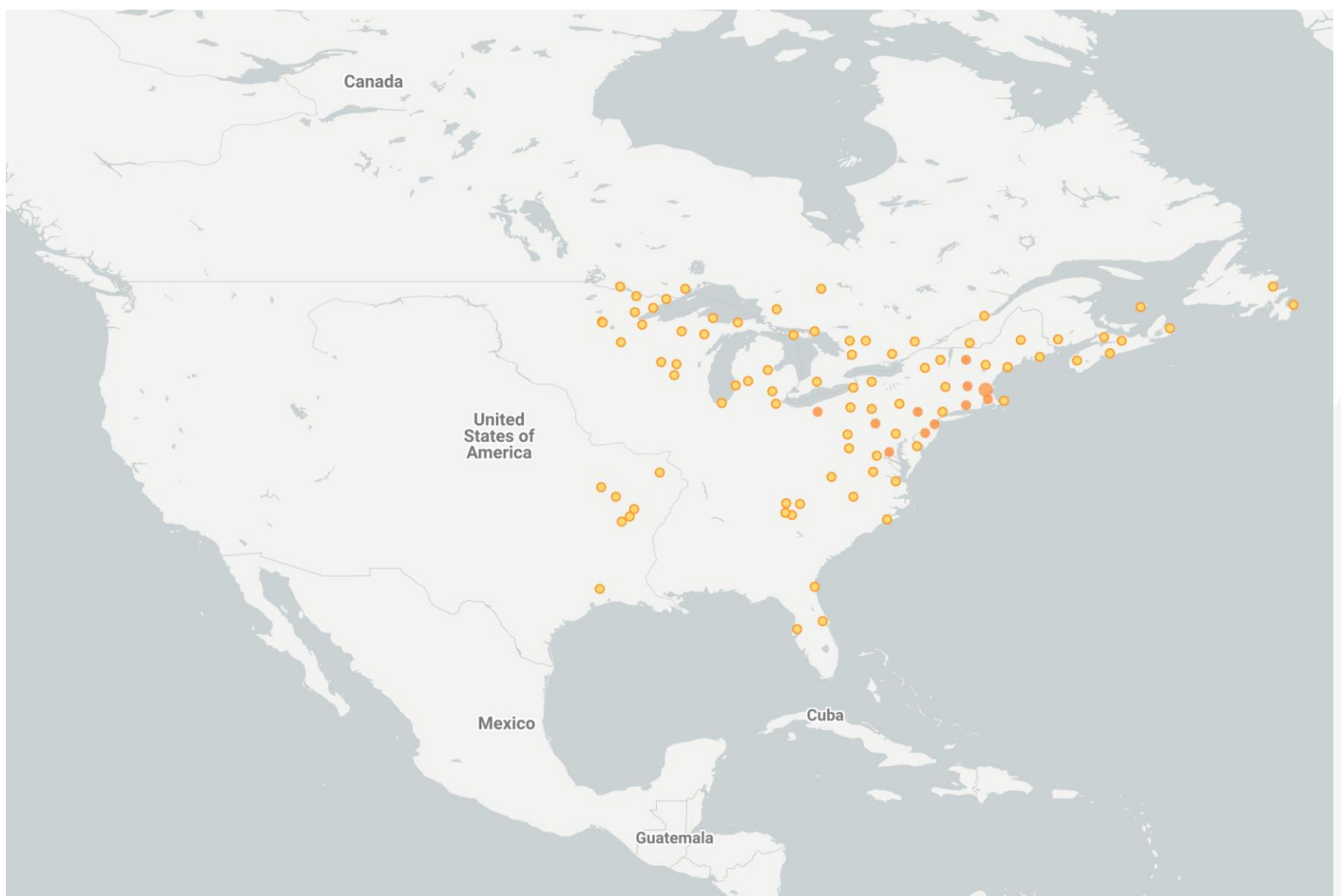


Figure 1: Distribution of *Hemadas nubilipennis* (GBIF 2022)

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**

Female wasps attack the blueberry plant by laying eggs in new vegetative shoots, resulting in the formation of stem galls (Shorthouse *et al.* 1986). Galls have been found to severely reduce shoot vigour, resulting in lighter, shorter shoots with lighter leaves and stems, though the impact depended on the position of the gall (Hayman *et al.* 2003; Pritts *et al.* 1992).

Galls also reduce berry production with a conservative estimate of 3% berry loss (Hayman 2001). However, this rate is expected to be significantly larger as the infestation increases over the years due to the gall destroying the apical meristem of new vegetative shoots (Carlos Garcia-Salazar, Michigan State University, pers. comm., Jul. 09, 2022). As flowering buds develop on vegetative shoots (Blatt and Hall 1972; Pritts *et al.* 1992), this destruction prevents any further growth of the plant's fruiting surface and damages the associated future yield (Carlos Garcia-Salazar, Michigan State University, pers. comm., Jul. 09, 2022; McAlister and Anderson 1932). Blueberry production from highly susceptible varieties would be destroyed by the 6th year of infestation (Carlos Garcia-Salazar, Michigan State University, pers. comm., Aug. 03, 2022).

Finally, galls can drop off the stem during harvesting and contaminate the finished product, resulting in more economic losses (Crozier 1997), though post-harvest processing of the crop can address this issue (Carlos Garcia-Salazar, Michigan State University, pers. comm., Jul. 09, 2022).

Historically, the impact of this pest was considered as being of very little economic importance as a pest of blueberry (McAlister and Anderson 1932). However, stem gall wasp populations have been increasing in recent years after the use of a pesticide against spotted wing drosophila (*Drosophila suzukii*) that also kills the biological controls of *Hemadas nubilipennis* (Isaacs et al. 2020). As a result, this wasp has become a substantial pest in some regions of commercial blueberry production with hundreds of galls developing on a single bush (Hayman et al. 2003; Isaacs et al. 2020; PMC 2020; Pritts et al. 1992). Without these biological controls suppressing pest numbers in the UK, damage from this wasp could be significant.

As a result of this pest, heavily-infested fields have been abandoned due to control costs becoming too great (Hayman 2004; Isaacs et al. 2020). The only long-term strategy to control this pest is to use resistant varieties (Isaacs et al. 2020). Consequently, 3000 acres of susceptible blueberry varieties have had to be removed in Ottawa County, Michigan, with another 4000 acres to be removed in future (Carlos Garcia-Salazar, Michigan State University, pers. comm., Jul. 09, 2022). The costs of replacing susceptible varieties is the most significant loss to growers in Michigan (Carlos Garcia-Salazar, Michigan State University, pers. comm., Aug. 03, 2022), perhaps unsurprising given that about half of the state blueberry acreage is over 40 years old (Longstroth and Hanson 2012).

Blueberry species, such as *Vaccinium corymbosum*, are cultivated in the UK. This industry is currently valued at £32 million ex-farm (Jack Evans, British Summer Fruits, pers. comm., Jun. 10, 2022) and could be at risk of this pest. However, commercially grown blueberry plants in Great Britain have an average turnover time of 5-10 years (Jack Evans, British Summer Fruits, pers. comm., Jul. 25, 2022). A short turnover is typical in non-native areas like the UK where soil amendments or soilless media must be used (as a decrease in productivity occurs after a certain time period) or to keep up with the market with new varieties (Carlos Garcia-Salazar, Michigan State University, pers. comm., Sept. 26, 2022). This production cycle would limit the impact of the pest as any affected varieties would be replaced within a few years anyway, though, depending on the timing of the infestation, yield could still be affected. In addition, none of the 7 main cultivars grown for commercial blueberry production in Great Britain have been identified as highly susceptible cultivars, though 2 cultivars are moderately susceptible (Isaacs et al. 2020; LoveFreshBerries 2022). It is expected that yield depletion in these moderately susceptible varieties would be slower than in highly susceptible varieties. Altogether, the potential impact of this pest on GB blueberry production does not appear to be significant.

Blueberry plants, including highly susceptible varieties, are also grown as ornamental plants in gardens (RHS 2022a). Finally, native *Vaccinium* species, such as *V. vitis-idaea* and *V. myrtillus* in the wild, could also be affected by this insect though their host status is unknown. These native species are already under pressure from pathogens like *Phytophthora ramorum*. However, no social or environmental impacts as a result of the stem gall wasp have been reported in its current geographical range.

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.

Hemadas nubilipennis is currently absent from the UK. Although there is no record of this insect expanding beyond its native range, it seems capable of establishing in UK blueberry plantations. Unfortunately, the impact of this pest on yield per cumulative year is not known. Given the relatively short production cycle of blueberries in Great Britain, and the use of non-highly susceptible varieties, it is believed that the introduction of this pest would not cause significant damage to the UK. To conclude, this organism does not fulfill all of the criteria for a quarantine pest.

Nevertheless, this categorization may need to be re-evaluated if highly susceptible varieties were identified or adopted in UK blueberry production, or if the production cycle lengthened considerably.

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