https://doi.org/10.17221/135/2018-PPS

First report of *Dasineura oxycoccana* in Lithuania – Short Communication

Elena Survilienė [1,2], *Sonata Kazlauskaitė* [2]*

[1]*Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry, Kaunas distr., Lithuania;* [2]*Vytautas Magnus University Agriculture Academy, Kaunas distr., Lithuania*

**Corresponding author: sonata.kazlauskaite@vdu.lt*

Citation: Survilienė E., Kazlauskaitė S. (2019): First report of *Dasineura oxycoccana* in Lithuania – Short Communication. Plant Protect. Sci., 55: 218–221.

Abstract: Damage by the blueberry gall midge *Dasineura oxycoccana* (Johnson) (Diptera: Cecidomyiidae) was found on different cultivars of highbush *Vaccinium corymbosum* L. at different localities of Lithuania. *D. oxycoccana* is a serious insect pest of blueberries in North America. In 1996, unusual damage on blueberries was observed in Europe. This is the first report of the blueberry gall midge occurrence in blueberry plantations in Lithuania.

Keywords: blueberry pest; blueberry gall midge; Cecidomyiidae; new country record

Blueberry gall midge *Dasineura oxycoccana* (Johnson, 1899) (Diptera: Cecidomyiidae) is a major insect pest of *Vaccinium* spp. (Steck *et al*. 2000; Sampson *et al*. 2006; Roubos & Liburd 2010, 2013; Hahn & Isaacs 2012; Rhodes *et al*. 2014; Hahn & Isaacs 2015). However, recent studies revealed that blueberry and cranberry are injured by two cryptic species (Fitzpatrick *et al*. 2013).

According to Dernisky *et al*. (2005), *D. oxycoccana* is the most important insect pest of blueberries in the United States. The decrease of blueberry production could reach 20–85% and economic losses due to the pest may exceed up to 20 million USD annually. The gall midge is widespread in the United States (Rhodes *et al*. 2014), however it spreads rapidly in various countries of Europe (Bosio *et al*. 1998; Collins & Eyre 2010; Plažanin *et al*. 2012; Seljak 2013; NPPO of the Czech Republic 2016; NPPO of Germany 2018).

Adult blueberry gall midge is tiny and tender, body length reaches 2–3 mm (Steck *et al*. 2000; Roubos & Liburd 2010). Larvae are legless about 1 mm in length and 0.3 mm in width. The colour varies from yellowish to reddish (Steck *et al*. 2000). Other authors found blueberry gall midge third instar larvae which were approximately 2 mm in length (Hahn & Isaacs 2012).

The gall midge *D. oxycoccana* is recognised as a multivoltine species having five to six generations per year (Steck *et al*. 2000). An adult female lays five to ten eggs in vegetative buds just after bud swell. Hatching takes two or three days and several larvae might be observed in one bud. When the terminal bud on a shoot is injured or killed, the shoot elongation growth may be inhibited by later excessive branching occurring just below the damaged terminal bud. After feeding, larvae drop to the ground and pupate in the soil (Bosio *et al*. 1998; Steck *et al*. 2000; Roubos & Liburd 2010; Rhodes *et al*. 2014). The life cycle of the species takes 12–28 days (Steck *et al*. 2000; Sampson *et al*. 2006). The sex ratio of the gall midge was found not to be significantly different from 1:1 (Roubos & Liburd 2010).

The larvae cause damage to tips of growing vegetative shoots (Bosio *et al*. 1998; Steck *et al*. 2000; Hahn & Isaacs 2012, 2015; Roubos & Liburd 2013; Rhodes *et al*. 2014). Witches' broom is formed as a deformity in blueberries due to damage caused by

https://doi.org/10.17221/135/2018-PPS

blueberry gall midge, since the apical meristem of the vegetative shoot is injured and lateral shoots start to grow (Steck *et al*. 2000; Hahn & Isaacs 2015).

Some authors predicate that losses due to blueberry gall midge might reach up to 20–100% (Lyrene & Payne 1992; Steck *et al*. 2000; Sampson *et al*. 2002). The severity of damage tends to be dependent on milder climatic conditions with higher temperatures during winter seasons (Steck *et al*. 2000).

The gall midge *D. oxycoccana* seems to be a scarce flier and the wind is a very important factor in the pest dissemination (Roubos & Liburd 2010; Hahn & Isaacs 2012). The soil is recognised as a major means of the transmission for the pest due to its pupating there (Bosio *et al*. 1998).

Blueberry gall midge *D. oxycoccana* originates from eastern North America (Bosio *et al*. 1998; Sampson *et al*. 2006). Some insect species as natural enemies of the blueberry gall midge have been investigated by US scientists (Sampson *et al*. 2002; Roubos & Liburd 2013; Rhodes *et al*. 2014). Most cultivars of *V. corymbosum* are susceptible to the meristem loss due to blueberry gall midge, despite their good flower bud resistance (Steck *et al*. 2000).

MATERIAL AND METHODS

Specimens of *D. oxycoccana* and damaged shoot tips of various cultivars of blueberry plants were collected from several blueberry plantations situated in different localities of Lithuania.

Adults of *D. oxycoccana* were detected in yellow sticky traps which were used for monitoring purposes. Several yellow sticky traps were placed within the canopy of bushes and regarding the height of the plant they were raised in such a way that traps had to be positioned near vegetative shoots. Traps were observed regularly and replaced each week. All the content was carried to the laboratory and inspected under the microscope.

30 shoots indicative of blueberry gall midge damage symptoms were collected from each plantation and taken to the laboratory where they were dissected with forceps (Valiuškaitė & Duchovskienė 2013). Detected larvae were examined under the stereomicroscope.

Specimens were collected and later identified in the laboratory using the Cecidomyiidae identification key (Gagné 1981).

RESULTS AND DISCUSSION

Suspicious symptoms on blueberry plants were observed in June-August 2018 at different localities of Lithuania: Alytus district 54°20'41.8''N 23°50'15.8''E and 54°24'12.5''N 24°08'13.4''E, Kaunas district 54°51'20.8''N 23°44'51.9''E, Kėdainiai district 55°17'12.4''N 23°45'11.7''E, Mažeikiai district 56°20'17.4''N 22°23'54.8''E, Prienai district 54°41'14.1''N 24°03'05.3''E, Zarasai district 55°51'46.2''N 26°02'46.2''E. A few vegetative shoots were injured on some plants of various highbush

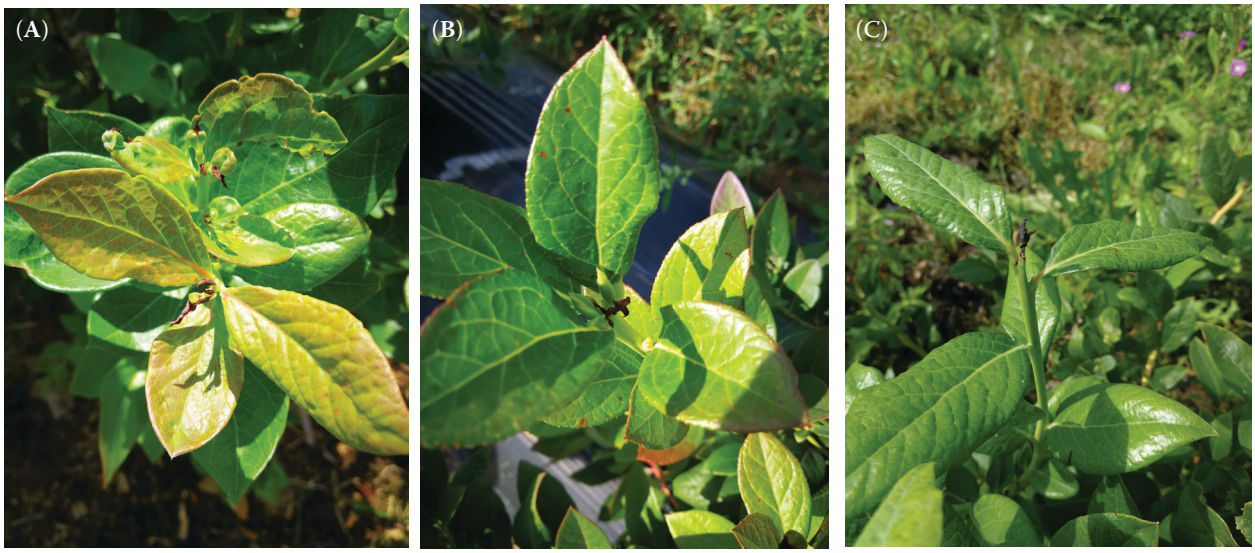

Figure 1. Vegetative shoots of different cultivars of highbush blueberries damaged by *Dasineura oxycoccana*: Bluecrop (**A**), Aurora (**B**), and Patriot (**C**)

https://doi.org/10.17221/135/2018-PPS

Figure 2. *Dasineura oxycoccana* larva from a damaged vegetative shoot dissected with forceps

blueberry cultivars: Aurora, Blue Crop, Bluejay, Bluegold, Duke, Elizabeth, Liberty, Northland, Patriot, Reka, Shandler, Sierra, Spartan, and Toro. Damaged leaf buds are characterised by misshapen leaves and blackened and distorted shoot tips. After morphological examinations of collected gall midge specimens and damaged blueberry vegetative shoots, the gall midge responsible for the blueberry injuries was identified as *D. oxycoccana* (Figures 1 and 2). Therefore, this record should be considered as the first occurrence of blueberry gall midge *D. oxycoccana* on *V. corymbosum* in the Republic of Lithuania.

According to EPPO (2018) data, *D. oxycoccana,* the key pest of *V. corymbosum,* was detected for the first time in Europe in 1996. Then the species was observed in Italy in a nursey in Piemonte (Bosio *et al*. 1998). Current distribution of the blueberry gall midge on the continent is scattered. In 2000, it was recorded in Latvia and after four years of damage it was identified in Slovenia (Ljubljana and Maribor) (Seljak 2013). The blueberry gall midge was found in the United Kingdom for the first time in 2007, in a nursery in the Midlands. Now it is widespread in the country (Collins & Eyre 2010). Plažanin *et al*. (2012) reported the presence of the pest in a blueberry plantation in Croatia near Zagreb. In 2016, *D. oxycoccana* was found on *V. corymbosum* in the Czech Republic in the Central Bohemian region (NPPO of the Czech Republic 2016). The pest damaged blueberries which grew in containers outdoors in a nursery and up to 75% seedlings were infested. In 2018, blueberry gall midge was detected for the first time in Germany in Brandenburg in a *Vaccinium* fruit production site (NPPO of Germany 2018).

References

Bosio G., Bogetti C., Brussino G., Gremo F., Scarpelli F. (1998): *Dasineura oxycoccana*, nuovo ospite del mirtillo gigante americano in Italia. Informatore Fitopatologico, 48 (11): 36–41.

Collins D., Eyre D. (2010): FERA plant pest factsheet: Blueberry gall midge (*Dasineura oxycoccana*). Available at https://www.hortweek.com/fera-plant-pest-factsheet-blueberry-gall-midge-dasineura-oxycoccana/fresh-produce/article/1021351 (accessed Sept 12, 2018).

Dernisky A.K., Evans R.C., Liburd O.E., Mackenzie K. (2005): Characterization of early floral damage by cranberry tipworm (*Dasineura oxycoccana* Johnson) as a precursor to reduced fruit set in rabbiteye blueberry (*Vaccinium ashei* Reade). International Journal of Pest Management, 51: 143–148.

EPPO (2018): *Dasineura oxycoccana* (DASYVA). EPPO Global Database. Available at https://gd.eppo.int/taxon/DASYVA/ (accessed Sept 12, 2018).

Fitzpatrick S., Gries R., Khaskin G., Peach D., Iwanski J., Gries G. (2013): Populations of the gall midge *Dasineura oxycoccana* on cranberry and blueberry produce and respond to different sex pheromones. Journal of Chemical Ecology, 39: 37–49.

Gagné R.J. (1981): Cecidomyiidae. In: McAlpine J.F., Peterson B.V., Shewell G.E., Teskey H.J., Vockeroth J.R., Woods D.M. (eds): Manual of Nearctic Diptera, Vol. 1. Research Branch Agriculture Canada. Monograph No. 28, Ottawa: 257–292. .

Hahn N., Isaacs R. (2012): Distribution and phenology of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in Michigan blueberries. Environmental Entomology, 41: 455–462.

Hahn N., Isaacs R. (2015): Assessing the economic importance of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in northern highbush blueberries. Journal of Economic Entomology, 108: 1910–1914.

Lyrene P.M., Payne J.A. (1992): Blueberry gall midge: A pest on rabbiteye blueberry in Florida. Proceedings of the Florida State Horticultural Society, 105: 297–300.

NPPO of the Czech Republic (2016): First report of *Dasineura oxycoccana* in the Czech Republic. EPPO Reporting Service No. 10. Available at https://gd.eppo.int/reporting/article-5935 (accessed Sept 12, 2018).

NPPO of Germany (2018): First report of *Dasineura oxycoccana* in Germany. EPPO Reporting Service No. 8. Available at https://gd.eppo.int/reporting/article-6353 (accessed Sept 12, 2018).

Plažanin M., Čuljak T.G., Juran I. (2012): Blueberry gall midge, *Dasineura oxycoccana* Johnson, 1899 (Diptera:

https://doi.org/10.17221/135/2018-PPS

Cecidomyiidae), a new blueberry pest in Croatia. Journal of Food, Agriculture & Environment, 10: 521–526.

Rhodes E.M., Benda N.D., Liburd O.E. (2014): Field distribution of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) adults, larvae, pupae, and parasitoids and evaluation of monitoring trap designs in Florida. Journal of Economic Entomology, 107: 310–318.

Roubos C., Liburd O. (2010): Evaluation of emergence traps for monitoring blueberry gall midge (Diptera: Cecidomyiidae) adults and within field distribution of midge infestation. Journal of Economic Entomology, 103: 1258–1267.

Roubos C., Liburd O. (2013): Parasitism of *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in North Central Florida. Environmental Entomology, 42: 424–429.

Sampson B., Stringer S., Spiers J. (2002): Integrated pest management for *Dasineura oxycoccana* (Diptera: Cecidomyiidae) in blueberry. Environmental Entomology, 31: 339–347.

Sampson B.J., Rinehart T.A., Liburd O.E., Stringer S.J., Spiers J.M. (2006): Biology of parasitoids (Hymenoptera) attacking *Dasineura oxycoccana* and *Prodiplosis vaccinii* (Diptera: Cecidomyiidae) in cultivated blueberries. Annals of the Entomological Society of America, 99: 113–120.

Seljak G. (2013): The dynamics of introduction of alien phytophagous insects and mites into Slovenia. Acta Entomologica Slovenica, 21: 85–122.

Steck G.J., Lyrene P.M., Payne J.A. (2000): Blueberry gall midge, *Dasineura oxycoccana* (Johnson) (Insecta: Diptera: Cecidomyiidae). IFAS EDIS Ext. Publ. EENY-136. Gainesville, University of Florida.

Valiuškaitė A., Duchovskienė L. (2013): Uoginių augalų apsaugos nuo kenkėjų ir ligų tyrimo metodika. In: Sasnauskas A., Tilvikienė V., Mašalaitė R. (eds): Mokslinės metodikos inovatyviems žemės ir miškų mokslų tyrimams. Kaunas, Lututė: 190–197.

Received: September 12, 2018
Accepted: February 18, 2019
Published online: February 28, 2019