

Michigan State Horticultural Society

FY18 Proposal Cover Sheet (Proposal must not exceed three pages)

Proposal Title:

Blueberry stem gall wasp management in Michigan blueberries

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Type of Project (check one)

Continuation –
Year project began: 2017
 New

Classification

Research
 Extension

Co-Investigators: Philip Fanning, Steve Van Timmeren, Carlos Garcia-Salazar, and Mark Longstroth

Introduction; Priority Addressed:

This project will address the blueberry stem gall wasp (BSGW) that has become a high priority issue for the Michigan blueberry industry. This pest causes kidney-shaped galls that are 5-55 mm across. It is particularly damaging to fields of Jersey that is our dominant cultivar and Liberty cultivar that is one of the new ones released by MSU. These galls stunt bush growth and can cause severe economic loss to growers of infested fields and processors. The galls are also a contamination risk for machine-harvested fields, leading to lost sales by processors (Fig 1).



Figure 1. Kidney shaped galls formed by the blueberry stem gall wasp (BSGW) and contaminated fruit.

With funding from Project GREEN over the last two years, MSU research and Extension programs have partnered with growers and commodity leaders to develop solutions to managing BSGW. This research has resulted in better understanding of how insecticides can control this pest, greater understanding of the role of biological control, and a much better sense of the serious challenge this pest causes for the blueberry industry. This pest is the #1 production concern of Michigan growers, because of the economic impact, potential for further spread, and the lack of a very effective IPM program for its control. Growers are incurring significant expense in their spraying and also in pruning this pest out of their fields. Long-term solutions are urgently needed.

Recently we were awarded funding by the USDA Specialty Crop Block program to investigate this pest, and the proposed objectives described below are complementary to that new project. This proposed research will enhance our ability to respond to the increase in gall wasp and will support improved control.

Objectives, hypotheses, and methods to be employed (by Objective):

1. Compare registered and new insecticides for control of BSGW when pollinators are present. *H1 Greater control can be achieved with targeted sprays that have low toxicity to bees.*

We conducted insecticide trials in the laboratory in the winter and spring of 2017. These trials were conducted using a Potter spray tower and utilized gall wasps reared out from galls collected from infested fields. Gall wasp adults were exposed to residues of various insecticides or were sprayed directly with the insecticides. The results of the trials indicate several insecticides have efficacy against the wasp, including the newer selective insecticides flupyradifurone (Sivanto) and *Beauveria bassiana* (balEnce).

Insecticide trials were conducted during the summer of 2017 at the Trevor Nichols Research Center (TNRC) in Fennville, MI and at grower cooperator farms around west Michigan. Trials were conducted investigating the effectiveness of applying Sivanto or balEnce during bloom. Full trial assessments now that the leaves have fallen off the bushes. Preliminary assessments of a trial investigating the use of Sivanto during bloom indicate no significant reduction in the number of galls per bush, however, these Preliminary experiments on Sivanto as an active ingredient, showed some efficacy when sprayed and allowed to accumulate in plant tissues prior to the emergence of BSGW. *In 2018, trials will focus on further exploration of optimal timing of these pre-bloom and bloom time sprays. Additional products with low bee toxicity will be tested, if available in 2018.*

2. Evaluate high coverage spray strategies for BSGW control at commercial farms. *H2. Growers can reduce the number and size of galls on bushes spraying effective insecticides at higher gallons per acre.*

In spring 2017, grower collaborators continued to adapt higher gallonage to increase coverage in post-bloom sprays targeting BSGW with a range of adjuvants used by different growers. Evaluations at farms are ongoing, while previous trends of reduced gall size and numbers are evident in preliminary results; effective control is still limited by the availability of effective insecticides. *In 2018, we will work with grower collaborators to test the insecticides and adjuvants pairings that should the highest efficacy in 2017. In addition, we will continue to work in other blocks to assess new potential adjuvants and synergists to improve coverage and penetration of insecticides into newly forming galls.*

3. Determine the yield loss caused by BSGW in Michigan blueberries. *H3 Heavily infested bushes have lower yields than bushes not infested.*

During the summer of 2017, experiments were conducted at TNRC and at commercial farms to determine the effects of gall wasp on yield and fruit quality. Full trial assessments will be made in winter 2017/2018 after the leaves have fallen off the bushes. In one trial, fruit quality was measured on bushes experiencing low, medium, and high levels of gall wasp pressure. Initial assessments indicate berries on high pressure bushes had significantly lower brix levels than berries on low or medium pressure bushes (Table 1). **Additional measures of bush health will be made this winter and again in 2018.**

Table 1. Fruit quality measures of ripe fruit samples collected from ‘Jersey’ blueberry bushes with low (<15 galls per bush), medium (25-40 galls per bush), and high (>100 galls per bush) blueberry gall wasp pressure.

Gall Pressure	Brix	Berries Per Cluster	Grams Per Berry
Low	15.5 ± 0.2 a	4.4 ± 0.2 a	0.54 ± 0.06 a
Medium	15.7 ± 0.3 a	4.2 ± 0.3 a	0.51 ± 0.03 a
High	14.0 ± 0.3 b	4.7 ± 0.2 a	0.42 ± 0.04 a
Statistics:	ANOVA df=2, 27 F=11.3 P<0.0001	ANOVA df=2, 27 F=1.6 P=0.22	ANOVA df=2, 27 F=2.1 P=0.14

Justification and impacts on the Michigan industry:

The blueberry stem gall wasp has rapidly become the key insect pest of highbush blueberry in Michigan over the past few years. This native insect causes damage when eggs are laid in growing shoots, and as the larva feeds on plant tissue, it stimulates the plant to form galls that harden and kill the developing shoot. This pest was kept in check by pest management programs that included Guthion, a broad spectrum insecticide that was traditionally applied after bloom. However, that insecticide was banned by the US-EPA in 2012, and we have seen a resurgence of BSGW since that time. The pest has become so bad in the past few years that up to 300 galls may be found on a single bush in some regions, and the older galls have become a contamination risk for harvested blueberries. Old galls can be shaken off the bushes when the berries are harvested, leading to the potential for galls being found in harvested fruit. This contamination of processed berries caused increased processing costs, and in some severe cases, it also caused multi-million dollar contracts to be lost by Michigan blueberry processors.

BSGW is on the rise, has an increasing economic impact, and has few economic control options. It is mostly an issue for Michigan growers, putting them at a competitive disadvantage compared to other regions and it has become a high priority pest management concern (#1 crop management issue listed by the Michigan Blueberry Advisory Committee in 2015). We propose the research project described below to give Michigan growers the answers they need to be able to control this devastating pest.