

Washington Blueberry Commission Research Proposal

Title: Development of Pollinator Safe Aphid Programs in Blueberry

Year Initiated: 2024 **Current Year:** 2024 **Terminating Year:** 2026

Principal Investigator:

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Cooperator:

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Dalila Rendon, USDA-ARS Horticultural Crops Disease and Pest Management Unit

Justification and Background: There are multiple aphid species that feed on blueberries with the species composition changing during the growing season. *Ericaphis fimbriata* (no common name) and green peach aphid (*Myzus persicae*) are two of the more commonly found species. *Ericaphis* is thought to be a species complex and this question is under investigation by the Canadian blueberry industry. Both species are now known to vector viral diseases in blueberry, particularly the blueberry scorch virus.

Historically, aphid control on blueberries has been a relatively simple process. After bloom time and bees were removed from the field, fields with higher levels of aphids were treated with one of the many highly effective aphicides available to blueberry growers. Aphids were not considered a major pest of the crop. One of the reasons that aphids were not considered as much of a problem as in other crops is that they were not associated with transmissions of diseases. Historically, there have been two viruses associated with blueberry in Washington, shock and scorch. Shock is transmitted by pollen and is commonly found in northwest Washington. Scorch, the more serious of the two viruses, was relatively uncommon but recently has been found more widely spread. Dr. Tom Walter is leading an effort to identify these fields in Washington and has found 11 fields infected with blueberry scorch virus. The scorch virus is vectored by aphids and will cause blueberry plants to decline and die although the rate at which a berry field will decline is variable depending upon the variety. Varieties such as Berkeley and Duke decline very quickly, while varieties such as Bluecrop decline much more slowly. Recently two new viruses, a luteovirus called blueberry virus L and a carlavirus, blueberry virus S, were detected in Washington (and Oregon). Blueberry virus L is widespread throughout most Washington fields, and blueberry virus S has been detected in two fields in Washington. The blueberry virus L is more widespread. It is not yet known how significantly blueberry viruses L and S will impact Washington fields. However, it is known that once infected there is no cure. Growers have two options: control aphids to prevent transmission, and rogue infected plants/removal of the entire field.

Due to the detection of new blueberry viruses and recent spread of the scorch virus, controlling vectors to prevent viral transmission has fundamentally changed control of aphids. Aphids now must be controlled at first detection and whenever they become present which includes during pollination. Blueberry viruses have made effective, pollinator-safe aphid management essential to blueberry production. While blueberries have more than a dozen effective aphid

insecticides registered, including sulfoxaflor (Transform), thiamethoxam (Actara, Platinum), imidacloprid (Admire Pro), malathion, diazinon, methomyl (Lannate), Cormoran (thiamethoxam, novaluron), phosmet (Imidan) and tolfenpyrad (Bexar), these all have label restrictions preventing use during pollination and or when bees are present. A review of registered insecticides with known aphicidal activity that have residual control yields Sivanto, Assail, and possibly Knack (aphids are on its label but pyriproxyfen is not thought of having aphid activity). None of these three products have been screened for aphid efficacy during bloom time on blueberries. Additionally, there are other products that have aphid efficacy but are not registered on blueberries. Of particular interest is flonicamid (Beleaf) which is considered bee safe, is very selective for aphids and also has activity against thrips; and isocycloseram which has activity against aphids, worms, and gall midge. Both products are in the registration process via the IR-4 Project. Another product of interest is spirotetramat (Movento) which was recently registered on blueberry. The label language states: *This product is potentially toxic to honeybee larvae through residues in pollen and nectar, but not to adult honeybees. Exposure of adult bees to direct treatment or residues on blooming crops can lead to effects on honeybee larvae. See the "Directions for Use" section of this label for specific crop application instructions that minimize risk to honeybee larvae.* However, under directions for use on the label specific to blueberry it states *Do not apply until after petal fall* and you can apply it up to three times at the maximum rate which means it is not a label violation to apply it during pollination. Apparently, it is toxic for bees for three hours making it suitable for nighttime application.

Although blueberry viruses have not been detected in eastern Washington, it is considered only a matter of time (and someone to spend the effort to look for them) before they are detected. Certainly, the vectors for the disease are commonly present in eastern Washington. The majority of blueberries in eastern Washington are organically managed and little to nothing is known about aphid control in organic blueberries.

We propose to conduct aphid efficacy trials in western and eastern Washington including organic and conventional aphicides that are considered safe to pollinators. Dr. Tom Walters is being supported by the WBC and the NW Small Fruit Research Center to identify the infected fields and would be a cooperator on this project.

This project is being conducted in partnership with a larger effort to identify and manage viruses and their vectors with several members of the scientific community in Canada and Oregon.

Relationship to WBC Research Priority(s): This project directly addresses priority number 8 in the WBC Request for Proposals.

- Management of viruses and their vectors.

Procedures: Project Description

The WBC has access to a three acre blueberry research site that has one acre of organic blueberries and two acres of conventional blueberries in eastern Washington and a one acre research site in western Washington for this trial. We propose to screen a series of registered and unregistered organic and conventional insecticides for control of aphids. The list of products to be screened include but are not limited to Sivanto, Assail, Knack, Beleaf, plinazolim, Cinnerate, and Aza-Direct + Pyganic. Additional products will be included in the trial. The trials will be replicated four times using a RCB design. These results will be used to determine comparative efficacy for conventional and organic aphid management.

Additionally, we will collect aphids from our trials and other locations and send them to Dr. Dalila Rendon, a Research Associate working for Dr. Jana Lee at the USDA ARS Horticultural Crops Disease and Pest Management Unit in Corvallis, OR. They are working with Dr. Dimitre Mollov, a virologist working on blueberry aphids at USDA Corvallis. They will analyze the aphids for various blueberry viruses.

Describe how this research will benefit Washington blueberry growers: Washington blueberry growers need additional tools to control aphids during pollination. Current known products are inadequate to manage virus vectoring aphids. Finding additional tools to control aphids that are bee safe will allow growers to have season long protection from aphids and protection from viral diseases.

Budget: This trial will be accomplished in three years or less.

	2024	2025	2026
Salaries ^{1/}	\$ 3,000	\$ 3,000	\$ 3,000
Time-Slip	\$ 1,000	\$ 1,000	\$ 1,000
Operations (goods & services)	\$	\$	\$
Travel ^{2/}	\$ 800	\$ 800	\$ 800
Meetings	\$	\$	\$
Other	\$ 8,000	\$ 8,000	\$ 8,000
Equipment ^{3/}	\$	\$	\$
Benefits ^{4/}	\$ 1,050	\$ 1,050	\$ 1,050
Total	\$13,850	\$13,850	\$13,850

^{1/}Type of Personnel, Agricultural Researcher

^{2/} Travel to fields to collect make application and count aphids

^{3/} Other: the \$6,000 is for Dr. Walters to make the applications and counts and \$2,000 for land rent at the Mt Vernon location. This will be a crop destruct trial, and this will include the cost of the berries.

^{4/} Benefits 35%

The PI has submitted a proposal to the Washington Commission on Integrated Pest Management for \$16,000. We place a value of \$3,000 for the trial site in eastern Washington and that includes the cost of the berries since this will be a crop destruction trial.