

GROWING KNOWLEDGE

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Pest control for Christmas trees

Evaluating new and old insecticides, and beneficial insects, for aphid control

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Aphid control on Christmas tree and other conifer plantings can be a yearly headache for growers. This is especially true for growers of grand fir which, for some reason, seems especially “tasty” to aphids.

Over the past four years, we have been evaluating a wide variety of aphid control options. These options run the gamut from releasing predatory insects, encouraging plantings that will attract beneficial insects, and testing some little-used or new insecticides.

There are a number of aphid species that feed on Christmas trees. The prominent aphid on grand fir is called the twig aphid (*Mindarus abietinus*), though all the aphids feed on needles along twigs. Twig aphids rarely kill the tree, although their feeding can often result in a tree that is unsaleable due either to the twisted/stunted foliage or the black, sooty mold that forms on needles. Often both are visible at harvest time.

Our study

The study reported here outlines aphid control results evaluating six insecticides (listed below) in a replicated trial at a grand fir field outside of Oregon City, Oregon.

Though there is no standard insecticide, Lorsban® is likely the most commonly used product. It is also a “restricted use” product and one of the insecticides under a great deal of scrutiny from various regulatory groups. In that regard, growers are looking at alternative insecticides to see if others might be effective.

Altus™ — also sold as Sivanto® — and



Movento®/Ultror® are both newer insecticides. Like many newer products they are more expensive per acre, not a “restricted use” product, have a safer use profile for applicators, and are touted to be safer around beneficial insects.

M-Pede® and Grandevo® are products that are both Organic Materials Review Institute (OMRI)-Listed for use in organic production. Few growers have reported using these products, so both were included in this trial.

WE-440 Superior Spray Oil is a crop oil produced by Wilbur-Ellis. Oils are one of the older control products for aphids. Only a few are registered for use in Christmas trees. Oils have little residual aphid control following application.

Products tested and rates used

Lorsban® (Chlorpyrifos): An organophosphate based insecticide from Cortiva

that is commonly used for aphid control in Christmas trees. Applied at 32 fl. oz./acre.

Altus® (Flupyradifurone): A newer Bayer product recently labeled for Christmas tree use. Useful with integrated pest management (IPM) programs. Applied at two rates — 7 and 10 fl. oz./acre

Movento HL® (Spirotetramat): Another Bayer product, also sold under the name Ultror®. This is the 2017 formulation, two-times concentration. Requires a methylated seed oil (MSO) surfactant for needle penetration. Highly systemic and used in IPM programs. Applied at 7 fl. oz./acre.

M-Pede® (Potassium salts): Potassium salts of fatty acids designed for soft bodied pests with minimal toxicity to non-target pests. Produced by the Gowan Company. OMRI-Listed for organic production. Applied at 2 percent volume to volume.

Grandevo® (*Chromobacterium subtsugae* Strain PRAA4-1): An isolated strain >>

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Previous page: Figure 1: Green lacewing eggs on a tree needles. Figure 2: Researchers count aphids on Christmas trees. PHOTO COURTESY OF OREGON STATE UNIVERSITY

of entomopathogenic bacterium from Marrone Bio Innovations. OMRI-Listed for organic production. Applied at 3 lbs./acre.

WE-440 Superior Spray Oil: Applied at 2 percent volume to volume.

Treatments	Average Tree Damage (1-3)	Average live aphid Count	Average number of twigs with aphid signs (out of 20)	Average live aphid count within tree
Altus 10	0.8	0.00	4.1	0.2
Altus 7	0.8	0.00	4.3	0.0
Movento-HL	0.6	0.00	4.6	0.2
Lorsban	0.8	0.00	4.7	0.0
No Treatment (UTC)	0.9	0.70	5.2	1.4
WE-440	1.1	0.03	5.3	0.5
M-Pede	1.0	0.07	6.1	0.5
Grandevo	1.2	0.03	7.1	1.4

Table 1: Aphid control by treatment.

The test site and the application

The 24 blocks (1A-7C) used in the trial (Figure 2) each contained 80 trees. Measurements were made on 10 inner trees in each block. There was a pre-treatment evaluation of the plots on June 12, 2017, sprays were applied on June 20 and the final evaluation was made on July 21. The pre-treatment live aphid counts and damage ranking were similar in all blocks, yet not identical.

It's one thing to spray an insecticide on a tree with aphids and get an "impression" if it works (or not). It's quite another to quantify the impact of a given insecticide on aphids on specific trees. Aphids do not attack trees uniformly across a plantation,

nor does each tree respond the same way. Additionally, aphids are quite small, requiring a hand lens to see them. Dead aphids look similar to live aphids.

Nevertheless, we did attempt to quantify the impact of insecticides on aphid populations (Table 1). To explain the measurement column headings-

Average tree damage (1-3): Here we evaluated the entire trees for signs of aphids. A score of 1 indicates a tree with no damage, 2 indicated moderate visible damage, 3 indicated severe damages.

Average live aphid count: A two-inch long branch segment was selected on the bottom of the trees where aphids were suspected. Live aphids were counted.

Average number of twigs with aphid signs (out of 20): A total of 20 twigs in the upper one-third of the tree on the south-facing side were tallied for aphid presence.

Average live aphid count within tree: A beating sheet was placed in the tree and the branches above the sheet were shaken. Live aphids knocked onto the sheet were tallied.

Findings: Aphid control

Precise statistical confidence is difficult to determine in this type of trial. However, given the range of data points, it is illustrative to use the No Treatment — or under these conditions (UTC) — blocks as a midpoint. The Altus, Movento and Lorsban



Treatments	Beneficial Insects - Total
No Treatment (UTC)	52
Grandevo	34
Altus 10	17
Altus 7	16
M-Pede	13
Movento HL	12
W-E 440	10
Lorsban	10

Table 2: Tally of beneficial insects by treatment.

spray treatments all showed fewer aphids and less tree damages than the UTC blocks. The WE-440 oil, M-Pede, and Grandevo treatments however, had damage ratings and aphid counts that were similar to or worse than the UTC blocks.

Findings: Beneficial insects

Beneficial insects control aphid populations in a variety of ways, so preserving their populations is helpful for aphid control.

We tallied the beneficial insects we found in the evaluations. There was a wide assortment of beneficial insects including lady beetles (adults), hoverflies (adults and larvae), green lacewings (adults, larvae and eggs), pirate bugs, damsel bugs, assassin bugs, wasps and bees (Table 2). No attempt was made to determine if one species or life stage of an insect was better for aphid control.

As expected, the UTC blocks had the highest number of beneficial insects followed by Grandevo. The Grandevo appeared to have little impact on either the aphids or beneficial insects. The Lorsban and oil (WE-440) appeared to be the most damaging on the beneficial insects.

Conclusion

On this test site with pre-harvest trees, the beneficial insects alone were

likely sufficient to provide control without sprays. In a harvest year, the Altus, Movento or Lorsban sprays would be needed to produce a clean and saleable tree. All of these sprays will diminish the beneficial insect populations. ☺

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