

Root Weevil Management in Strawberries

There seemed to be resurgence in root weevil problems this past spring and several growers had serious crop losses because of this pest. No doubt the mild, frost-less winter was largely responsible but the lack of registered insecticides for black vine weevil or strawberry root weevil, the two most damaging root weevil species, would also have played a role.

I was fortunate to catch a seminar by Dr. Richard Cowles from the Connecticut Agricultural Experiment Station, one of the foremost experts on black vine weevil management in strawberry, and I think it would be useful to review the highlights (in italicized print) of his talk:

Beginning with the life cycle of black vine weevil, adults are known to overwinter but larvae form the bulk of the overwintering individuals, feeding on roots and crown tissue in the fall and spring. Pupation occurs in the spring when soil temperatures reach 13 °C. Typically, adults emerge in the middle of harvest, feed for 3-4 weeks and then start laying eggs.

There are significant varietal differences to black vine weevil (BVW). Annapolis is relatively tolerant or resistant to BVW while Kent and Honeoye are very susceptible. These differences appear to be largely due to foliage differences (eg. possibly leaf hair or pubescence differences) and not due to root differences, although varieties with small root systems cannot tolerate root weevil feeding as much as a variety that has a large root system. Also, excessive tissue nitrogen appears to correlate with high weevil numbers and damage.

*For biological control of root weevil larvae there are a number of beneficial insect-parasitic nematodes available. One species, *Steinernema carpocapsae* is surface active while the other species, including the *Heterorhabditis* spp. are deep searching, moving through the soil as a film on the surface of water droplets in the soil. Nematodes are advantageous for control of root weevil in that they are exempt from registration requirements, are safe to the environment, and able to seek out and actively multiply in their hosts.*

For best results with insect-parasitic nematodes the following conditions must be met:

- 1. Soil must be moist,*
- 2. Apply with a boom sprayer with screens removed from spray nozzles,*
- 3. Do not use a piston pump as this kills the nematodes,*
- 4. Irrigate while applying,*
- 5. Apply during a cloudy day/evening – nematodes will only survive a few minutes in direct sunlight,*
- 6. Apply 1 billion/treated acre*

In a research trial comparing an early May timing with a mid-June, and mid-Aug timing, only the early May timing gave a significant larvae reduction in October compared to the untreated control plots. In the early May treatment there was only 30-40% infection of overwintering larvae but this increased the beneficial nematode population such that there was 90% infection of new weevil larvae in August and September resulting in very low larvae counts in October.

Here in Nova Scotia, we have had poor results with spring applications of beneficial nematodes, but this is for control of the overwintering larvae prior to harvest, and effects on fall populations of larvae have not been determined. Another factor in the success of these nematodes is the soil temperature at the time of application. The warmer the soil, the better the nematodes work and about 14 °C appears to be the threshold below which these nematodes become inactive. This is an important consideration if you are planning a late season application when soil temperatures are declining. My gut feeling is that applications beyond mid-September would have very little effect on overwintering larvae populations and ideally growers should target mid- to late August for best results. As indicated above, late spring applications may also be beneficial for reducing fall larvae counts but should not be expected to solve a weevil problem prior to harvest.

More from Dr. Cowles (in italicized print):

What about chemical control options?

There are two strategies for chemical control – 1) target adults while they are feeding on plant foliage and 2) target larvae while they are feeding on the strawberry roots. In strawberries we have tended to target adults with generally poor results but in other crops (eg. nursery crops) targeting larvae seems to work much better. Moreover, black vine weevil is very difficult to kill with relatively benign insecticides and growers have been turning to increasingly toxic products that tend to be broad spectrum and eradicate beneficial insects such as ground beetles which are known to be ferocious predators of root weevil. As such, targeting adults as a control strategy appears to be very misplaced. Unfortunately, there are currently no insecticides registered for soil application for larvae control in Canada. A product called Coragen (a.i. rynaxypyr) is being trialed with encouraging results in the U.S. but is not available in Canada.

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