



Nematodes are countering alfalfa-killing beetles

THE alfalfa snout beetle is a devastating insect of alfalfa, often resulting in a 25 percent loss of income due to lower yields elevating feed costs. The good news is that it's currently found in only nine counties in New York plus portions of southern Ontario.



Thomas

The snout beetle is flightless, but it is an ambitious walker that can travel on farm equipment, within hay bales where it can survive for six weeks, and on tile drainage equipment. Since the 1990s, three additional counties have become infested and the infestation has exploded in southern Ontario.



Wiersma

This insect now infests more than 500,000 acres, frequently kills an alfalfa stand in one year, and there's no registered insecticide that will control it. In fact, its life cycle precludes effective control by current insecticides.

Alfalfa snout beetles are native to Europe but were introduced into Oswego, N.Y., prior to 1896 in sailboat ballast.

The snout beetle has a two-year life cycle. The beetles emerge from the soil in May and feed on alfalfa and clover foliage for about a month before laying up to 500 eggs. The larvae hatch in June and spend the rest of the summer and fall feeding on alfalfa roots. In November, the larvae burrow 18 to 24 inches into the soil.

Alfalfa plants die from larval root feeding, typically after the final alfalfa harvest during September through November. The only time farmers notice snout beetles is once every two years when the beetles can be found walking from one field to another, often in such tremendous numbers that they cover roads and can result in slick conditions when squashed by vehicle tires.

"Friendly" nematodes

After more than 25 years of research on the insect, Cornell University entomologist Elson Shields has developed a low-cost biological control program for alfalfa snout beetle. The vast majority of this research was funded by the Northern New York Agricultural Development Program (NNYADP), with some assistance from the New York

Farm Viability Program to fund a pilot program to move the biological control program to the field.

The basis of the biological control program is the use of two native entomopathogenic (insect-attacking) nematode species. These nematode species are introduced into fields and once inoculated persist for many years, attacking the larvae of alfalfa snout beetle and other soil insects.

These native nematodes can be reared on the farm by interested farmers or purchased directly from Cornell University. Rearing procedures are available online at http://on.hoards.com/Shields_ASBP.

During the 2015 growing season more than 55 farmers inoculated fields with these insect-attacking nematodes, treating approximately 5,000 acres. Over 60 billion nematodes were purchased from Cornell University.

Field application is usually made two weeks after harvest. This timing is so alfalfa regrowth shades the ground, allowing the nematodes to enter the soil while protected from ultraviolet light. Application is made through a pesticide sprayer that's slightly modified by removing all screens and filters and blocking two out of every three nozzles. The entire field is driven over and the nematodes are applied in concentrated streams separated by about 6 feet.

Over the next 60 days the nematodes fill in the zones between the application streams. To encourage farmers to apply nematodes, NNYADP is funding a 50 percent cost-sharing program. Treatment costs are in the \$10 per acre range, not including application costs.

Is it working?

Are the biocontrol nematodes effective?

Absolutely!

Before the application of biocontrol nematodes, farmers would often see between 1 and 2.5 million beetles per acre, resulting in the loss of entire alfalfa fields by the end of the first production year. Early-adopting

farmers who applied nematodes in 2008 to 2009 have reported drastic reductions in insect numbers and enhanced alfalfa stand retention on their farms.

With the dramatic reduction of alfalfa snout beetle, numerous farmers have returned to growing clear-seeded alfalfa. Within three to five years after a farmer applies biocontrol nematodes to multiple fields in an area, adult alfalfa snout beetle population reduction is noticeable.

Resistant alfalfa varieties

A second, complementary tool to control alfalfa snout beetles is the development of snout beetle-resistant alfalfa. In a joint research effort between the Cornell Forage Breeding Lab headed by Don Viands and Shields' lab, over 200,000 seedlings have been greenhouse-screened for resistance, with the surviving plants cross-pollinated to improve resistance. In 2008, resistant lines were planted in the field to test the resistant lines against the existing field population.

The first variety released from this breeding program was Seedway 9558 SBR, with moderate resistance to alfalfa snout beetles. However, if this variety is planted without first reducing the snout beetle area population with biocontrol nematodes, the insect population will overrun the moderate resistance level. Breeding efforts are continuing to enhance resistance levels.

The long-term strategy for controlling alfalfa snout beetles is the deployment of both the biocontrol nematodes and planting resistant alfalfa varieties. Since breeding efforts may never achieve a high enough level of resistance in the alfalfa plant to be deployed alone, the current recommendation is to first apply biocontrol nematodes to reduce the snout beetle population. Then, plant alfalfa varieties with high levels of disease and insect resistance which can grow vigorously and help maintain the insect population at subeconomic levels. 🐄



THIS FIELD IN ST. LAWRENCE COUNTY, N.Y., produced five harvests of alfalfa in 2014. The photo, taken in late summer 2015, shows what the alfalfa snout beetle can do to an alfalfa stand in one year, as yellow spots indicate completely killed alfalfa.

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