2019 NNY Alfalfa Snout Beetle and Corn Rootworm Biological Control Program: Nematode Cost and Rearing Opportunities

Background and Bio-Control: Alfalfa snout beetle remains the key limiting factor to alfalfa stand life in the Northern NY region and frequently kills out entire stands or large portions of stands in a single year. Since 2007, the Shields' Lab at Cornell University has assisted NNY farmers in inoculating alfalfa fields using insect-attacking nematodes (bio-control nematodes) to suppress the spread of this insect with the long-term support of the Northern New York Agricultural Development Program (NNYADP). Between 2007 and 2018, biocontrol nematodes have been applied to more than 20,000 acres on more than 120 farms. In 2018, a total of 2,800 acres were treated on 46 farms across Jefferson, Lewis, St Lawrence, Franklin, Clinton counties. For 2019, the Shields' Lab will continue to offer farmers the option to purchase bio-control nematodes or assist farmers interested in rearing their own nematodes on their own farm with their own labor.

Impact on Corn Rootworm (CRW): Recent field data are showing that the biocontrol nematodes being released against alfalfa snout beetle are also having an impact on CRW after the field is rotated from alfalfa into corn. In test plots on the Cornell Musgrave farm, biocontrol nematodes applied in 2014 in continuous corn production prevented CRW larval feeding damage in 2016 at the same level as the best BT-Rootworm traited corn. Even though the CRW populations were sub-economic in 2017 and 2018, the biocontrol nematodes continued to persist at levels where they can react to an economic population of CRW larvae. We are anticipating an economic population of CRW larvae in the research plots in 2019. Similar results were recorded in a cooperative study with Texas A&M in Dalhart, Texas under extremely heavy CRW pressure. Research against CRW continues in 2019 in NY, Texas, and Michigan with new cooperative research plots planned in Pennsylvania, Vermont and SW Kansas. Discussions are currently underway to also establish cooperative CRW- biocontrol nematode research in Western Nebraska and South Dakota.

Impact on Wireworms and White Grubs: Research on wireworms in the Hudson Valley and white grubs with the Cornell Turf program has shown reduction in the soil populations of these soil insects along with reduced root injury in areas where these biocontrol nematodes have been established. If the biocontrol nematodes are impacting these insects elsewhere in NY, we are confident that our dairy farmers who inoculate these biocontrol nematodes for control of alfalfa snout beetle or corn rootworm are also benefiting with the reduced populations of wireworms and white grubs insects.

Timing is Key: Farmers interested in applying biocontrol nematodes for alfalfa snout beetle control need to realize that this project is time-limited with about a 3-year window remaining. It requires 3-5 years to totally inoculate a farm with nematodes and reduce snout beetle populations to a manageable level. Most of the research involving alfalfa snout beetle is finished and the Shields' lab at Cornell University is turning its research focus on other problems.

Farmers interested in apply biocontrol nematodes to corn for corn rootworm control have the opportunity to participate in a NE SARE grant for the next 3-years. This grant is focused on the biological control of corn rootworm with persistent biocontrol nematodes. Participants will receive a reduced biocontrol nematode price for their first field entered into the program.

Agribusiness Development Opportunity: The Shields' Lab at Cornell University is very interested in assisting individuals interested in rearing biocontrol nematodes as a business so this biocontrol agent remains available to NNY farmers after 2021 since alfalfa snout beetle will remain a potential threat as long as alfalfa is raised in the region and corn rootworm is building resistance to the current management strategies.

Application Recommendations:

Alfalfa – Alfalfa Snout Beetle:

• In 2019, participating farms will not be limited to the number of acres they wish to treat. We recommend that bio-control nematodes should be applied on alfalfa fields in their seeding year, or 1st production year for the best economic impact. However, biocontrol nematodes can also be applied to corn fields based on recent information.

• If farmers choose to apply biocontrol nematodes to more established alfalfa fields for convenience, the biocontrol nematodes will establish and attack snout beetle larvae, wireworms and white grubs present, but will not assist with stand retention of the alfalfa stand due to the reduced rate of biocontrol nematode application.

• Nematodes should be applied using the "skip nozzle" method, leaving every third nozzle open and nematodes will be applied to 33% of the acreage covered by the application equipment (based on nozzle separation of 22-24").

• Nematode applications need to be made before September 15.

Corn – Corn Rootworm:

There are three different application strategies and cost structures to apply biocontrol nematodes on corn for corn rootworm in 2019.

- Nematodes should be applied using the "skip nozzle" method, leaving every third nozzle open and nematodes will be applied to 33% of the acreage covered by the application equipment (based on nozzle separation of 22-24"). This reduced rate strategy requires 2-3 growing seasons for the biocontrol nematodes to become fully distributed between the application streams and be fully effective. During those years, farmers should continue to plant Bt-CRW corn varieties unless the application is on a 1st year corn field. In a 1st year corn field, the lack of CRW pressure allows the planting of a non-Bt-CRW corn variety. The 2019 cost is $30/acre plus application costs ($15-$25 per acre).
- Application in liquid manure is being currently researched, but has advanced enough for interested farmers to participate. The biocontrol nematode rates of application are higher due to some death in the liquid manure and the application to the entire field (compared to the skip nozzle method). Nematode cost will be $90/acre but application costs are minimal since manure has to be spread anyway. For more information, contact Mike Hunter, CCE.
- Participate in the NE SARE grant focused on the Biological Control of CRW with Biocontrol Nematodes. Nematodes can either be applied with a sprayer or in liquid manure. The nematode rate will be the full rate (normally $90/acre) but participants will receive a discount for participating to $50/acre. Contact either Mike Hunter, CCE or Tony Testa, Cornell for more information.

Biocontrol nematode application in corn needs to be timed between pre-plant (soil temps~ 50^0F) and corn growth stage V-4.

Nematode Cost: Purchase from Cornell - Shields' Laboratory:

Alfalfa – Alfalfa Snout Beetle:

• Farmers will need to contact the Shields' Lab no later than **45** days prior to a planned application based on their cutting schedule.

• Nematode costs using the 33% skip nozzle application method in alfalfa will be **$30/acre,** if the nematodes are purchased from Cornell (Shields' Lab).

• Two discounts will be made available to all farmers participating this year:

- Cost of bio-control nematodes will be discounted **10%** for any farm who places an order and

has worms delivered for application by June 16.

- Cost of bio-control nematodes will be discounted **10%** for all participants who pay upon delivery of biocontrol nematodes.

• **Farmers interested in taking advantage of the bio-control nematode discount for worms ordered and delivered by June 15, need to contact the Shields' Lab at Cornell University, no later than May 3.**

Corn – Corn Rootworm:

- Farmers will need to contact the Shields' Lab no later than **45** days prior to a planned application.
- Nematode costs using the 33% skip nozzle application method in corn will be **$30/acre,** if the nematodes are purchased from Cornell (Shields' Lab).
- Full rate of Biocontrol Nematodes (for quicker control) will be $90/acre (either application method)
    - Participants in the NE SARE program will receive a discounted price of $50/acre for the Full Nematode Rate for their first field. Application can be made using either Manure or a Sprayer.

Nematode Cost: Farmer-Reared Nematodes:

• If growers choose to rear their own biocontrol nematodes on their farm using their own labor, cost can be reduced to around $18 per acre. Interested farmers will need to contact the Shields' Lab no later than **60**-days prior to a planned bio-control nematode application based on their cutting schedule to review the steps required to have a successful rearing and application process.

• On-farm rearing requires the farm to purchase their own wax moth larvae used to rear biocontrol nematodes and the Shields Lab will provide a list of reputable worm suppliers to choose from. Farms will receive biocontrol nematodes from the Shields' Lab for inoculation of the worm cups based on continuous dialogue on anticipated arrival date of worm delivery and proposed application date. The Shields' Lab will provide specific instructions for dosing the insect larvae and temperature requirements for incubating the nematodes. Assistance for rearing your own nematodes will be provided by the Shields' Lab, Cornell Cooperative Extension specialists, or agribusiness individuals with knowledge of the techniques involved upon request.

Sign Up Information:

If you are interested in participating in the bio-control nematode program in 2019, the Shields' Lab will need to know of your intent at least **45 days** before a planned application. The earlier we are notified of your desire to participate the better so we can plan accordingly. Please contact Tony Testa by phone (607) 591-1493 or by email at: at28@cornell.edu, or your local CCE specialist:

Mike Hunter (NNY CCE): Office phone: Cell: (315) 788-8602; Email: meh27@cornell.edu

Kitty O'Neil (NNY CCE): Cell phone: (315) 854-1218, Email: kao32@cornell.edu

Doug Zehr (Lowville Farmers Coop) Cell: (315) 777-3078), Office: (315)-376-4452

Email: dougzehr64@yahoo.com