Northern NY Agricultural Development Program
2012-2013 Project Report

On-Farm ASB Bio-Control-ASB Demonstration Plots as Educational Tools and Validating Establishment for Producer-Applied Fields

Project Leaders:

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Collaborators:

- Mike Hunter, Jefferson County Cornell Cooperative Extension
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Cooperating Producers:

- Jefferson County: Lynn Murray, Dan Rossiter
- Lewis County: Dale Buckingham, Gary Campany, Rodney Clintsman, Zach Jones, Wilfred Schrag, George Zehr
- Clinton County: Jon Rulfs, Tom Remillard

Background:

Alfalfa snout beetle (ASB) continues to limit alfalfa producer success year after year and is the most economically important pest of NNY alfalfa production. The ASB-infested region includes 500,000 acres of farmland (13% of NY State) and this insect continues to spread. The economic impact of ASB expansion to the rest of NY State will be devastating to the state's dairy and forage industry.

Within the infested region, ASB frequently destroys entire fields in a single year from larval feeding on the roots. Long-term support from NNYADP has been critical to the identification of three local species of persistent entomopathogenic (insect-attacking) nematodes effective on ASB, field testing of these nematodes as potential biological control, and the development of a producer-friendly, low-labor, nematode mass-rearing technique. From 2007 to 2012, we have worked closely with 57 farms across 6 counties and bio-control nematodes were successfully inoculated and are persisting in 146 fields.

Efforts to increase producer participation in NNY initiated a 2012 survey to determine the reason for limited producer participation. Over 40 NNY alfalfa producers submitted their suggestions and concerns regarding our ongoing program. Among the results, a surprising 84% of producers were interested in viewing demonstration plots of the program's success if they are established locally.

With assistance from Mike Hunter and Eric Bever, four NNY alfalfa producers volunteered sections of their fields with road access for the establishment of demonstration plots where bio-control nematodes were applied for the management of ASB.

The establishment of the demonstration plot in each production area will provide a hands-on teaching tool to assist with the education of producers, industry representatives, dairy profit teams, farm advisory teams, and crop consultants in understanding the potential of increased stand longevity and reduced ASB damage on their operation or clients.

A focused effort must continue to reach non-participating alfalfa producers within the snout beetle infested counties to effectively reduce ASB populations and its large economic impact on alfalfa production and profitable milk production in NNY.

Currently, our only management tool is bio-control nematodes, with resistant alfalfa on the horizon. However, if the ASB populations are not reduced in an area before the resistant alfalfa is planted, we fully expect the resistant alfalfa to breakdown under the heavy ASB invasion pressure.

In 2012, 10 Western NNY producers applied bio-control nematodes to 20 different fields. Soil cores were collected and bioassayed in 2013 for the presence of these bio-control nematodes to verify successful nematode establishment in producer fields. The producers whose fields were assayed in 2013 include the following: Campany Farm (Lewis County), Buckingham Farm (Lewis County), Zehr Farm (Lewis County), Clintsman Farm (Lewis County), Sullivan Farm (Lewis County), Jones Farm (Lewis County), Yousey Farm (Lewis County), Schrag Farm (Lewis County), Murray Farm (Jefferson County), and Shelmidine Farm (Jefferson County). Our efforts to manage ASB in NNY infested counties using bio-control nematodes are aided in the continued support of NNY alfalfa producers.

Methods & Results

Demonstration Plot Locations

Jefferson County

A two-acre demonstration plot was established in a 100-acre field (N 43.7600, W -76.1075) owned and operated by Dan Rossiter, Doubledale Farm, Mannsville, NY. Plot design included eight, .25 acre blocks. Four blocks were treated with nematodes and the other four blocks remained untreated. Each block was assayed prior to nematode establishment on July 18, 2013, to determine if an existing nematode population was present.

Lewis County
A four-acre demonstration plot was established in a 9-acre field (N 43.9170, W -75.3777) owned and operated by Gary Campany, Campany Homestead Farm, Croghan, NY. Plot design was four, one acre blocks. Two of the blocks were treated with nematodes while the other two blocks remained untreated. Each block was assayed prior to nematode establishment on August 8, 2013, to determine if an existing nematode population was present.

Clinton County
Site 1: A four-acre demonstration plot was established in a 132-acre field (N 44.6017, W -73.5515) owned and operated by Jon Rulfs, Adirondack Farm, Keesville, NY. Plot design included eight, 0.5 acre blocks. Four blocks were treated with nematodes and the other four blocks remained untreated. Each block was assayed prior to nematode establishment on August 6, 2013, to determine if an existing nematode population was present.

Site 2: A four-acre demonstration plot was established in a 28-acre field (N 44.5831, W -73.4954) owned by Karl Schweikert and rented by Tim and Tom Remillard, Peru, NY. Plot design included eight, 0.5 acre blocks. Four blocks were treated with nematodes and the other four blocks remained untreated. Each block was assayed prior to nematode establishment on August 6, 2013, to determine if an existing nematode population was present.

Bio-control Nematodes
Using the multi-species approach, two native NY strains of bio-control entomopathogenic nematodes (EPNs), (*Steinernema carpocapsae* and *Steinernema feltiae*), were reared for each demonstration site. EPN infective juveniles (IJ) were applied at a rate of 63 million per species per treated block. Each treated block received a two-species combination, the total number of IJs per treated block were 125 million. A total of 500 million nematodes were reared for each demonstration site.

Application of Nematodes
For each demonstration site, infective juveniles were washed from rearing containers and strained twice through screens before being added to the 2-50 gallon spray tanks inside the truck (Figure 1 & 2). Nematodes were applied using a spray boom fitted with 0010 fertilizer steam nozzles (screens removed). Nematodes were applied at a water rate of 50 gpa.

Jefferson County/Rossiter Site
A population of nematode infective juveniles, (IJs) *S. carpocapsae* and *S.feltiae*, was applied to the soil surface on July 23, 2013.

Lewis County/Campany Site
A population of nematode infective juveniles, (IJs) *S. carpocapsae* and *S.feltiae*, was applied to the soil surface on August 8, 2013.

Clinton County/Remillard and Rulf Sites
A population of nematode infective juveniles, (IJs) *S. carpocapsae* and *S.feltiae*, was applied to the soil surface on September 5, 2013.

Biocontrol Nematode Establishment Assay
During 2012, farmers chose to either apply nematodes in strips across a field or they chose to apply nematodes to the entire field. Soil cores were collected for laboratory bioassay from fields applied by producers during 2013 growing season to verify presence of bio-control nematodes in Jefferson and Lewis Counties. At each field site, 100 soil samples were randomly removed based on GPS coordinates recorded during the introduction of the EPNs. Samples were returned to Cornell University where each sample was analyzed utilizing a Galleria-based laboratory assay.

Table 1.Percentage of positive samples in EPN establishment

Producer	# Soil Samples	Days Post Inoc	%Sc Positive Samples	% Sf Positive Samples
Buckingham	100	445	15	10
Campany I	100	383	2	19
Campany II	100	383	3	18
Clintsman	100	444	10	10
Jones I	100	384	14	16
Jones II	100	384	8	11
Murray I	100	380	1	25
Murray II	100	380	1	25
Schrag	100	475	6	42
Zehr	100	383	3	27

Conclusions/Outcomes/Impacts:
Bioassay results indicated that biocontrol nematodes became established at all sites where they were applied. Normal establishment populations run between 20%-25% of the soil cores showing the presence of nematodes. Three of the farmer applied sites were in the 10% range, with three additional sites close to 20% but below the 20% level. Questions arise about these three sites regarding timely applications by the farmers after receiving the nematodes and the actual storage conditions for the nematodes during the time between receipt and application.

In those sites with low establishment rates, nematode populations will respond to invading insects and the population levels of nematodes should rise to effective levels. Although, more crop damage will be expected while the biocontrol nematodes respond to the invading insects.

Demonstration Plots:
Nematode application three of the four sites were made later than preferred due to the wet summer and the often delayed harvest schedule. Nematode establishment will be verified at all four demonstration sites during June 2014. Based on our experience in multiple

fields, we expect establishment will fall between 20-30% unless there was a population of snout beetle larvae actively feeding in the field during nematode application. Then the nematode levels will be much higher.

Aerial pictures were taken of the Jefferson and Lewis County demonstration sites in October 2013. At the Lewis County site, snout beetle damage was obvious in the untreated plots from the air. A followup site visit seven days later confirmed heavy snout beetle damage in the untreated checks and a significantly lower level of damage in the nematode treated plots. Snout beetle populations on the Campany farm are very high, so these rapid results are not unexpected. In contrast, the Jefferson Co. site did not indicate differences between the treated and untreated plots in the fall 2013. Snout beetle populations at this site are reported low because the farmer has not been raising alfalfa for a number of years. Due to the late application (September) of nematodes on the Clinton Co. sites, efforts to estimate differences between the treated and untreated plots were not made.

Each of the demonstration sites will be visited this spring/early summer to access differences in the treatments. Measurements will include stand counts, crop coverage assessments and to quantify the level of biocontrol nematodes present in each plot. Demonstration sites will be available to the agribusiness community.

Outreach:

NNY Agricultural Development Program Website
http://www.nnyagdev.org/index.php
http://www.alfalfasnoutbeetle.org/

Alfalfa Snout Beetle Project on Facebook
https://www.facebook.com/#!/pages/Alfalfa-Snout-Beetle-Project/154247237964180

2013 NNY workshops:
CCE – Belleville, Jefferson County – March 13, 2013

2013 ASB Walk
October 2013

NNYADP Alfalfa Snout Beetle Media Hits
February 1, 2013 – February 18, 2014

02-07-13 Morning Ag Clips
02-12-13 Cornell Grad School website
02-16-13 Lancaster Farming
02-19-13 Dairy Business Online
02-27-13 Watertown Times feature
02-27-13 New York Ag Connection
02-12-13 Dairy Business Magazine
02-12-13 Cornell Chronicle
02-18-13 New York Ag Connection
02-19-13 North Country Now
02-27-13 Ogdensburg Journal feature

03-2013 Farming Magazine: Ev Thomas column
03-01-13 Ithaca Journal
03-20-13 North Country Now
03-21-13 New York Ag Connection

05-09-13 newzjunky.com
05-09-13 New York Ag Connection
05-09-13 e-Organic
05-11-13 Madison County Courier
05-18-13 Lancaster Farming
05-25-13 North Country Now
06-05-13 Empire State Farmer

10-2013 A Growing Culture
10-18-13 Peru NY Gazette
10-18-13 ATTRA News
10-21-13 Morning Ag Clips
10-21-13 New York Ag Connection
10-23-13 North Countryman
10-23-13 The Burgh
10-23-13 Produce Industry News
10-23-13 andnowuknow.com
10-24-13 Horti-Daily International
10-27-13 Plattsburgh Press Republican
10-28-13 National Strawberry Sustainability Initiative
10-28-13 Growing Magazine

11-2013 U. Mass Extension Berry Notes
11-04-13 Country Folks
11-05-13 Growing Produce
11-06-13 American Fruit Grower
11-06-13 Empire State Farmer
11-10-13 Plattsburgh Press Republican
11-14-13 NY Berry News: cover story
11-30-13 Lowville Journal

01-29-14 Watertown Times
01-29-14 Lowville Journal
01-29-14 Massena-Potsdam Courier

Next steps:

Funding has been awarded for a project titled "Biological Control Nematodes: Demonstrating their culture, application and economic benefit when utilized to control Alfalfa Snout Beetle." by NNYADP for the 2014 growing season.

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Photos:

Figure 1Washing rearing cups

Figure 2 Rinsing through screen