Northern NY Agricultural Development Program
2014-15 Project Report

Biological Control of Alfalfa Snout Beetle (ASB): Combined NNY projects to promote and advance awareness of ASB including adoption of biological control with entomopathogenic nematodes

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- Lewis County: Miller Spraying; Mellissa Spence, Cornell Cooperative Extension Agriculture Program Educator
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- Franklin County: Jason Fox, Scott Jennette, John Ray Leinback, Gary Monica, David Moore, Eugene Poirier, Peter Poupore, Noah Reiff, Carl Reome
- Jefferson County: Curt Bisbort, Harold Boomhower, Steve Eisel, Jon Freeman, James Gilligan, Mike Hill, Diesel Hitt, Todd Hyman, Mike Kiechle, Brad Reiner, Ron Robbins

- Lewis County: Shawn Bender, Dan Beyer, Patty Beyer, Gary Berrus, Mike Branagan, Dale Brown, Dale Buckingham, Gary Campany, Rodney Clintsman, Derek Conway, Jerome Demko, Dallen Farney, Ron Hebert, Pete Jones, Mark Karelus, Dean Moser, Lynn Murray, John O'Brien, Steve O'Brien, Terry Pominville, Wilfred Schrag, Tim, Yancey, Nathan Yousey, Myron Zehr
- St. Lawrence County: Peter Braun, Dick Eakins, David Fisher, David Stout

Background:

Alfalfa is an important high-quality forage for milk production and as a cash crop in Northern New York state. In 2012, the USDA-NASS Census of Agriculture counted more than 127,000 acres of alfalfa or alfalfa-grass crops, accounting for almost 21% of more than 611,000 acres of cropland across the state's northern six counties (Jefferson, Lewis, St. Lawrence Franklin, Clinton and Essex).

Alfalfa Snout Beetle (*Otiorhychus ligustici*, ASB) is an insect pest of alfalfa and clover and is unique to Northern New York and Canada within North America. ASB was first discovered in NNY in 1896, and the scale of its detrimental impact has followed the increase in alfalfa production on NNY farms. While it is geographically isolated to NNY, if introduced to other northern alfalfa growing areas in the US, it would also be devastating in those areas.

ASB continues to be the major limiting factor in alfalfa production and stand longevity within the NNY region. As a result of the dedication and long-term vision by the Northern New York Agricultural Development Program (NNYADP) board, an alfalfa snout beetle biological control program has been developed and is currently in the process of implementation.

To date, we estimate ASB-biocontrol nematodes have been released in 300 fields representing approximately 14,000 acres on 77 farms. Some of these farms have only released biocontrol nematodes in a single field while some farms have inoculated the majority of their fields.

Farmers who have released biocontrol nematodes in multiple fields report vastly reduced numbers of ASB adults migrating in the spring and alfalfa stands producing longer than prior to application of the nematodes. In contrast, farms with portions of a single field treated are not seeing much impact on their ASB populations.

Though this biological control has been found to be effective and persistent, the treatment is not currently available commercially and new infestations have outpaced acres treated. New farms were identified with fields infested with ASB in Jefferson, Lewis, St. Lawrence, and Franklin counties during the fall months of 2012, 2013, and 2014. ASB infestations on these newly discovered farms were well established, indicating the insect has been on the farm a number of years but not identified by the farmer.

Research data collected over the past seven years indicates that the application of biocontrol nematodes can be a single event and these nematodes persist multiple years at effective populations even when the field is rotated to corn or soybeans for 4-5 years. In many of these

rotated fields, the populations of biocontrol nematodes actually increase during the corn or soybean years. As a result, the nematode population is actually higher when the field is planted back into alfalfa then when it was rotated out of alfalfa.

A focused analysis of the accumulated reearch data during the winter of 2014-15 was the basis of the development of a formal biocontrol application recommendation for the farmers and agribusiness professionals in NNY. The current recommended application patterns and effective biocontrol nematode rates are based on the farm's alfalfa snout beetle population level. In addition, biocontrol nematode applications should be focused on new seedings and 1st production-year alfalfa stands.

The remaining challenge is to convince the majority of the alfalfa producers to invest in the application of biocontrol nematodes on all of their fields over a 4-5 year rotation cycle regardless of milk prices. Innovative farmers have found ways to reduce the cost of the biocontrol nematodes to $13 per acre if the farmer rears their own nematodes or $26 per acre if the "ready-to-spray" nematodes are purchased from the Shields' Lab at Cornell University.

The Shields' Lab at Cornell University has assisted NNY farmers in inoculating alfalfa fields using biocontrol nematodes to suppress the spread of ASB for nearly a decade. Despite the successes we have seen with stand longevity and development of a low-cost application method, new infestations continue to emerge each year across the NNY region. The focus of this project for 2015 was to:

- continue evaluations on the established demonstration plots,
- conduct a comprehensive survey in five of the six NNY counties (Essex County was not included because all the alfalfa ground is currently infested and comprises only a small amount of the small agricultural acreage in the county.)
- develop a practical guide for scouting and assessing ASB infestations,
- convince alfalfa producers in known ASB-infested areas to apply biocontrol nematodes,
- and further examine application techniques that allow quicker applications at the current cost outlay.

Figure 1. Kubinski ASB Biocontrol Demonstration Plot, Lewis County, NY.

Methods & Results:

2014 Demonstration Plot: **Lewis County**

A four-acre demonstration plot was established in a 14-acre field (N 43.6964, W -75.4007) owned and operated by Phil Kubinski, Turin, NY. Plot design included eight, 0.5 acre blocks. Four blocks were treated with nematodes and the other four blocks remained untreated (Figure 1). Each block was assayed prior to nematode establishment on August 14, 2014, to determine if an existing nematode population was present.

Based on Year 1 data, assessments in differences between the treated and untreated plots were inconclusive. ASB has not moved into the field to significantly provide evidence of bio-control from nematodes.

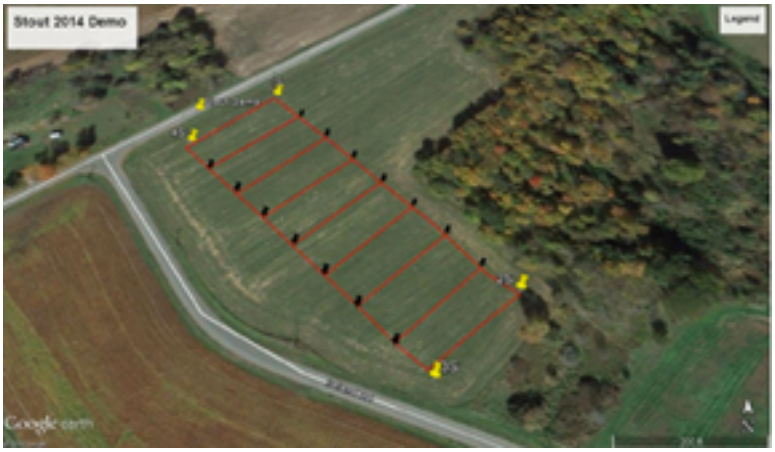

Figure 2. Stout ASB Biocontrol Demonstration Plot, St. Lawrence County, NY.

2014 Demonstration Plot: St. Lawrence County

A four-acre demonstration plot was established in a 10-acre field (N 44.5081, W -75.6959) owned and operated by Dave Stout, Briar Hill, NY. Plot design included eight, 0.5 acre blocks. Four blocks were treated with nematodes and the other four blocks remained untreated (Figure 2). Each block was assayed prior to nematode establishment on July 31, 2014, to determine if an existing nematode population was present.

Based on Year 1 data, assessments in differences between the treated and untreated plots were inconclusive. ASB has not moved into the field to significantly provide evidence of bio-control from nematodes.

2014 Demonstration Plot: Franklin County

A four-acre demonstration plot was established in a 35-acre field (N 44.8381, W -74.4014) owned and operated by Dave Moore, Carsada Dairy, Malone, NY. Plot design included eight, 0.5 acre blocks. Four blocks were treated with nematodes and the other four blocks remained untreated (Figure 3). Each block was assayed prior to nematode establishment on July 31, 2014, to determine if an existing nematode population was present. ASB pressure was very high in this location. One year after nematodes were applied, the nematode treated plots retained significantly more alfalfa plants than the untreated plots. However, since the remainder of the field has substantial alfalfa stand loss, the field was killed in the fall of 2015 and will be rotated to corn in 2016.

Figure 3. Moore ASB Biocontrol Demonstration Plot, St. Lawrence County, NY.

Table 1. Mean number ± standard error of alfalfa crowns found during stand counts in NNY, 2015.

Kubinski Site	**Treated**	**Untreated**	**Stout Site**	**Treated**	**Untreated**
Block 1	4.17±0.39	4.92±0.42	Block 1	4.48±0.28	6.00±0.27
Block 2	5.25±0.50	5.33±0.37	Block 2	6.36±0.31	6.36±.054
Block 3	3.83±0.42	5.54±0.34	Block 3	6.04±0.56	6.52±0.59
Block 4	4.83±0.40	4.63±0.29	Block 4	7.76±0.41	5.48±0.35
Total	4.81±0.29	5.11±0.20	Total	6.10±0.46	6.09±0.23
Moore Site	**Treated**	**Untreated**			
Block 1	3.20±0.54	1.92±0.36			
Block 2	4.72±0.42	2.04±0.31			
Block 3	3.00±0.48	1.40±0.26			
Block 4	1.60±0.29	1.72±0.28			
Total	2.45±0.56	1.77±0.14			

The number of soil samples indicating the presence of biocontrol nematodes at all sites (Table 2.) indicates that the applied biocontrol nematodes are persisting at expected levels based on data collected over the past decade. This biological control activity is actively reducing the insect population in the field and within the area. There were no differences noted in the alfalfa stand counts between the nematode-treated and untreated plots at both the Kubinski and Stout sites. ASB populations at both sites have not been found in the fields in any significant numbers. However, the biocontrol nematode plots at the Moore site showed a significantly higher stand count in the nematode-treated plots compared to the untreated plots. The invasive pressure from ASB at the Moore site was extremely high and the rest of the field was destroyed.

Table 2. Percentage of positive samples in 2014 established demonstration plots in NNY.

Producer	# Soil Samples	60-75 Days Post-Inoc		363-Days Post-Inoc	
		% Positive Soil Samples		% Positive Soil Samples	
		Sc	Sf	Sc	Sf
Kubinski	100	0	25	5	27
Moore	100	13	24	11	19
Stout	100	9	35	1	16

Biocontrol Nematode Rate and Application Method Study

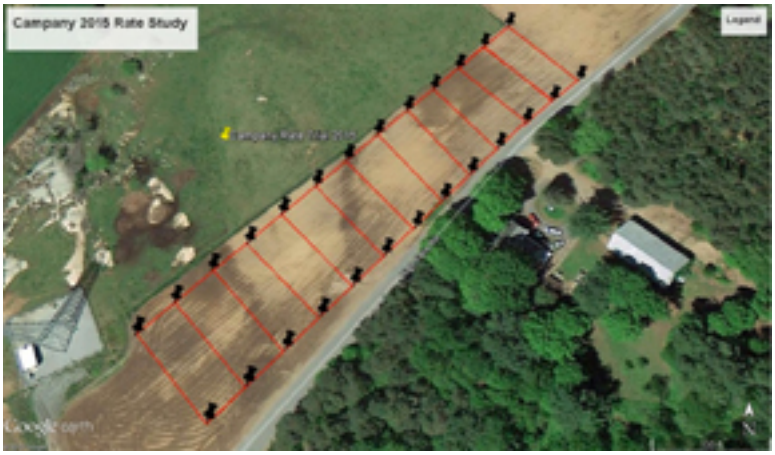

Figure 4. Campany ASB Nematode Application Rate Study Site, Lewis County, NY, 2015.

<u>Lewis County:</u> Homestead Farm, Croghan, NY

A three-acre demonstration plot was established in a 10-acre field (N 43.9160, W -75.3754) owned and operated by Gary Campany in 2015 (Figure 4). The purpose of this trial was to examine if a better application strategy using diluted concentrations of biocontrol nematodes will allow full coverage of alfalfa fields quicker while maintaining the cost of $13-$26 per acre.

On July 22, 2015, the plot area was pre-sampled for the presence of biocontrol nematodes and none were found. The site was then partitioned into four replicated blocks, within each block contained three different nematode application methods while holding the number of nematodes applied per acre consistent:

- **Rate 1** 100 million IJs/50 gal water-33% rate (6' nozzle separation) applied at 5 mph
- **Rate 2** 100 million IJs/50 gal water-nozzles on 24" centers, 16gpa rate, applied at 10 mph
- **Rate 3** 50 million IJs/50 gal water-nozzles on 24" centers, 16gpa rate, applied at 5 mph.

A population of nematode infective juveniles (IJs): *S. carpocapsae* and *S. feltiae* was applied to the soil surface on August 7, 2015. S. carpocapsae are most prevalent at a soil depth of 1-2 inches; S. feltiae are most prevalent at a soil depth of 3-6 inches.

Soil cores were collected in each treated area to verify a successful inoculation within the 69-days post nematode application. Within the areas treated using **Rate** 1, 50 samples were removed

on a grid; in the other two areas treated (**Rate** 2 & 3), 25 random samples were removed. Each sample was removed from the soil and split into upper 2" and 3-6" portions that would be used to bioassay for nematode presence.

Soil cores were returned to the laboratory and bio-assayed using a standard technique with wax moth larvae as an indicator for the presence of biocontrol nematodes in the sample. The level of nematodes in each sample will also be used as an indicator to the presence of host insects within the area of the field.

Table 3. Percentage of positive samples across the three treatment rates, 2015.

69-Days Post-Inoc	**Treatment Rate 1 100m/50 gal @ 33% rate**		**Treatment Rate 2 100m/50 gal 24" centers**		**Treatment Rate 3 50m/50 gal 24" centers**	
	% Positive Soil Samples		% Positive Soil Samples		% Positive Soil Samples	
	Sc	Sf	Sc	Sf	Sc	Sf
Rep 1	0	14	8	20	4	24
Rep 2	6	20	8	16	4	16
Rep 3	8	22	4	28	8	28
Rep 4	4	24	4	28	4	20
Total	5	24	6	23	5	23

Key: Sc: S. carpocapsae; Sf: S. feltiae

The levels of biocontrol nematodes (Table 3.) indicate a positive inoculation and establishment of these native nematodes in all reps across the field site. On the first initial nematode distribution sampling, no differences were noted between the three different application patterns. The information from this trial was shared with the commercial applicators as to provide some ease to restrictions of the amount of water needed (50/gpa) to apply biocontrol nematodes but the recommendation of 33% continues to be the standard. (15/gpa/nozzle).

Additional sampling will be conducted in 2016 to further examine the effect of nematode application on nematode distribution in the field.

2015 Cost-Sharing Program for Biocontrol Nematode Applications

Many neighboring farmers have watched biocontrol nematode applications over the past five years with interest and participating farmers have reported a significant reduction of ASB damage in their fields. The goal of the cost-sharing program (Table 4.) was to encourage those farms not participating in the biocontrol nematode program against ASB the opportunity to either have a commercial applicator apply the nematodes for them, or purchase nematodes from the Shields' Lab at Cornell University and apply them using their own equipment. Both options provided financial support through discounts or refunds given by NNYADP. In addition, to those farmers who had previously applied nematodes more than three years ago or longer, a discount on the purchase of nematodes was offered.

Table 4. Number of producers by county x acres applied x cost sharing $ in 2015.

	Jefferson Co.	Lewis Co.	St. Lawrence Co.	Franklin Co.	Clinton Co.	Totals
# Participating Producers	11 farms	24 farms	4 farms	9 farms	2 farms	50
# Acres Treated	1,137	1,641	1,004	318	200	4,300
Applicator Cost Sharing Distribution	$4,175	$1,770	$0	$1,055	$0	$7,000
Nematode Discounts	$10,260	$12,715	$3,060	$3,250	$1,800	$31,085

As a result, 22 farms applied bio-control nematodes for the first time, with a total of 50 farms participating in the program during the 2015 growing season. This was an increase from 10 growers applying nematodes in 2013, and 18 farms applying nematodes in 2014.

Farms Using Custom Applicators

In 2015, the Cornell Cooperative Extensions (CCE) of Jefferson and Lewis counties reimbursed 14 growers a total of $7000 in cost-share payments for alfalfa growers who had not applied nematodes in the past. Farmers hired custom applicators to apply nematodes to their fields. Alfalfa growers with large amounts of alfalfa acres needing treatment represented most of the farms that had custom applicators apply nematodes. This custom application reimbursement program increased the adoption of nematode applications with larger alfalfa growers.

The number of acres treated by the five NNY-based commercial applicators was 2,260 (1,100/acres through cost-sharing initiative). Custom applicators that made applications through this program were Miller Spraying (Lewis County), Rudd's Spray Service (Jefferson County), D&D Spraying (Jefferson County) and DeBeer Seed and Spraying (Franklin County). Woodcrest Dairy in St. Lawrence County used Bourdeau Brothers to apply nematodes in 2015 at a discount (non-reimbursement).

Farmer-Applied Nematodes

The remaining 36 growers who participated in the cost-sharing program applied **their own nematodes** purchased from Shields Lab at Cornell University using their own equipment and borrowing nematode screening/wash cans provided by the Shields' Lab to the CCE offices in each county. All but one farm received a discount on the purchase of bio-control nematodes.

Slightly more than 2,000 acres were treated by individual farmers to their own land during 2015. We now estimate that number of acres treated with biocontrol nematodes over the last decade to be 14,000. While that is an excellent start on the area-wide program implemented in 2010, the number of acres treated still only accounts for 11% of 127,000 acres of alfalfa or alfalfa-grass crops in northern NY; the program has a significant task ahead to protect these crops regionwide.

ASB Comprehensive Survey in NNY

The alfalfa snout beetle survey efforts consisted of scouting alfalfa fields in the five NNY counties with the highest infested areas based on the following criteria: farms (fields) that were located in known-infested areas, and fields located outside of previously-scouted ASB infestation boundaries. A total of 209 fields were surveyed over a 6-week period beginning in October 2015. Those assisting the ASB survey included CCE Field Technician Lindsay Pashow: Clinton County, NNY Regional Field Crops & Soils Specialist Kitty O'Neil: Franklin County, D&D Spray Service: Jefferson County; CCE Lewis County ag program educator Mellissa Spence: Lewis County, and CCE St. Lawrence County ag educator Billy Bullock: St. Lawrence County.

ASB Survey: Jefferson & Lewis Counties

A total of 31 fields (17 different growers) with unconfirmed ASB populations were checked in Jefferson and Lewis counties. In Jefferson County, much of the survey work was done in the area on the outskirts of a recently discovered large population in the Towns of Hounsfield and Henderson.

Of the fields checked, only 3 "new" ASB populations were found, all in Jefferson County (Figure 5). Lewis County survey efforts focused on areas in the southern part of the county in the Town of Turin (Figure 6).

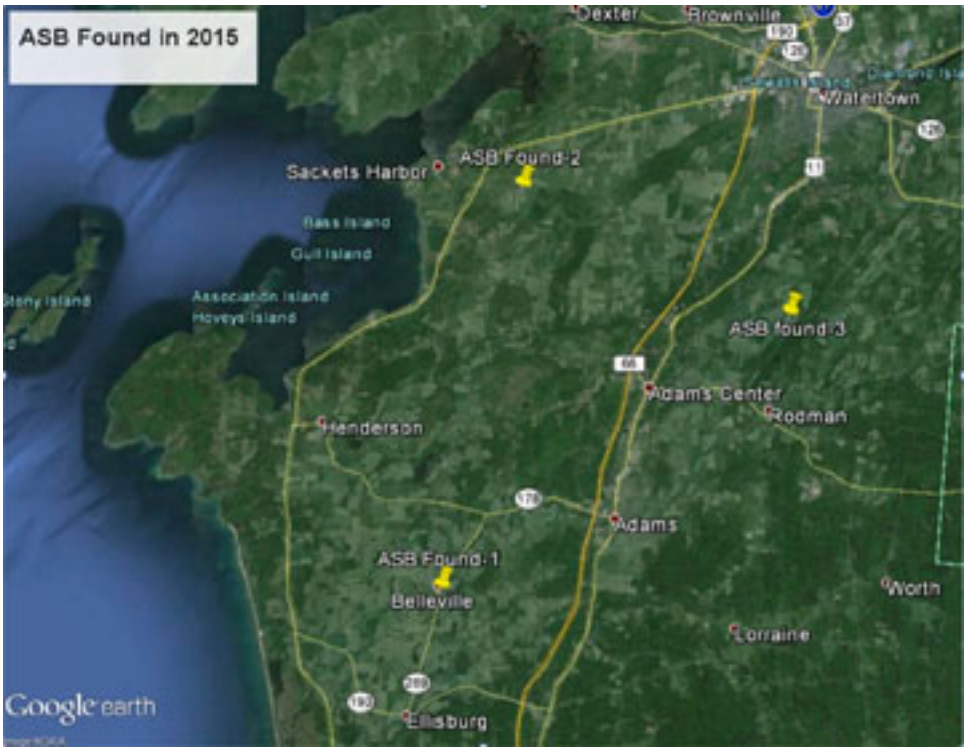

Figure 5. Locations in Jefferson County, NY, with ASB, 2015 survey.

ASB Survey: St. Lawrence County

Surveys for ASB were conducted from Brier Hill past Ogdensburg and Flackville and east to Canton and Depeyster in St. Lawrence County (Figure 7). A total of 13 fields were surveyed with no confirmed locations of ASB infestations other than at Dave Stout's farm in Brier Hill.

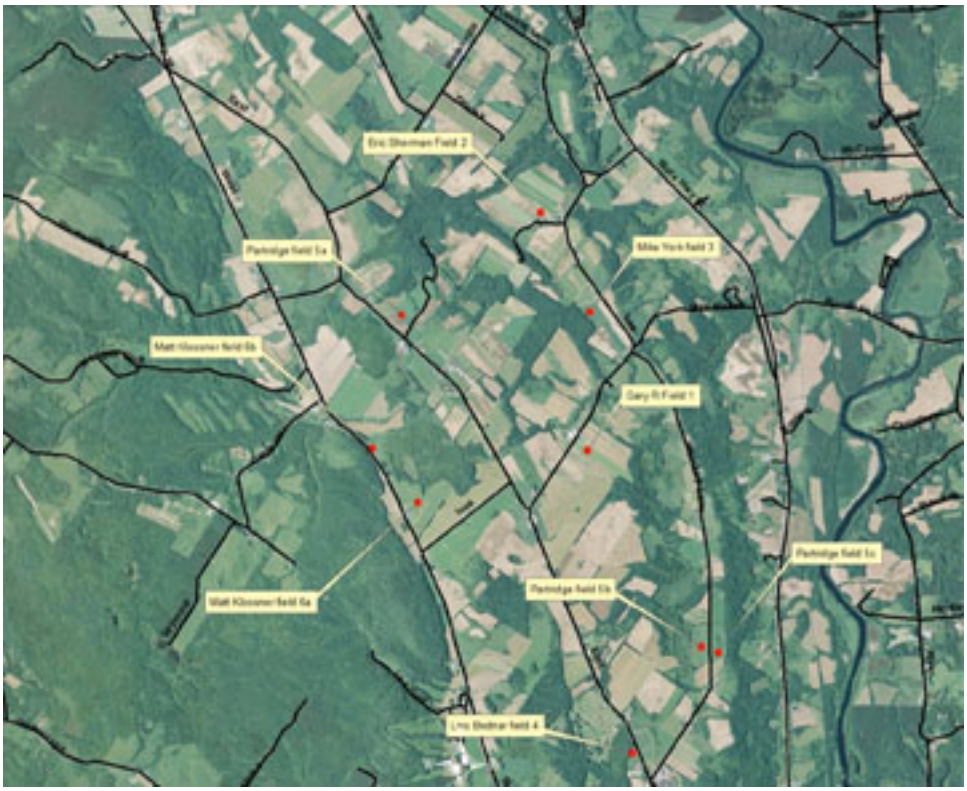

Figure 6. ASB Survey Locations, Lewis County, NY, 2015

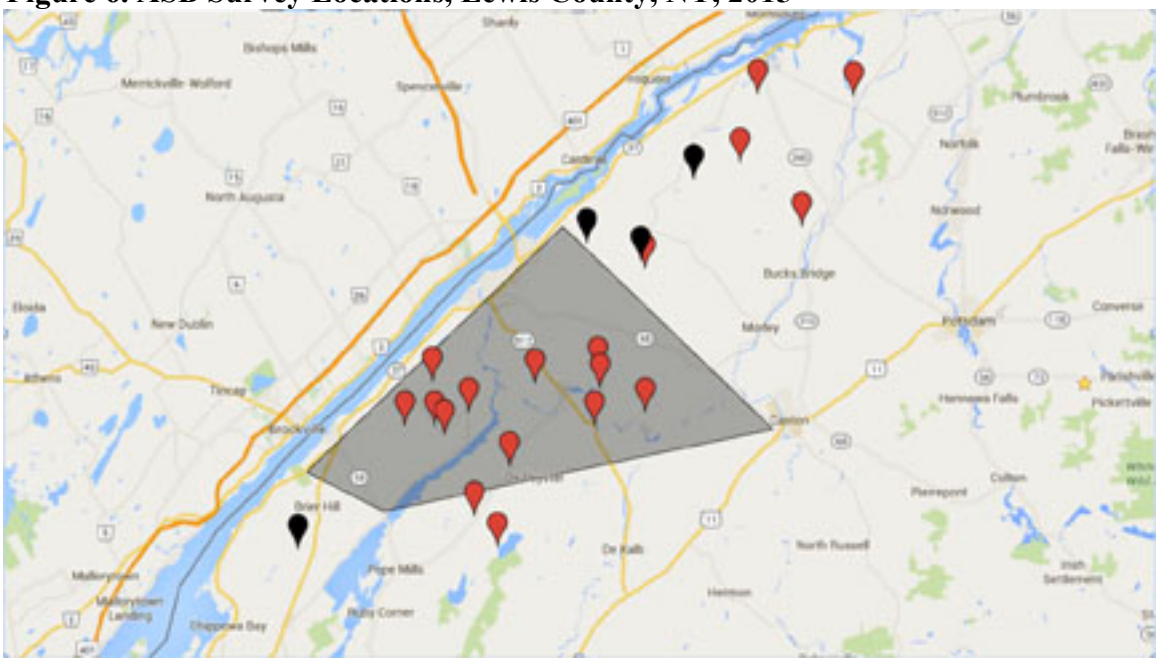

Figure 7. ASB Survey Locations, St. Lawrence County, NY, 2015.

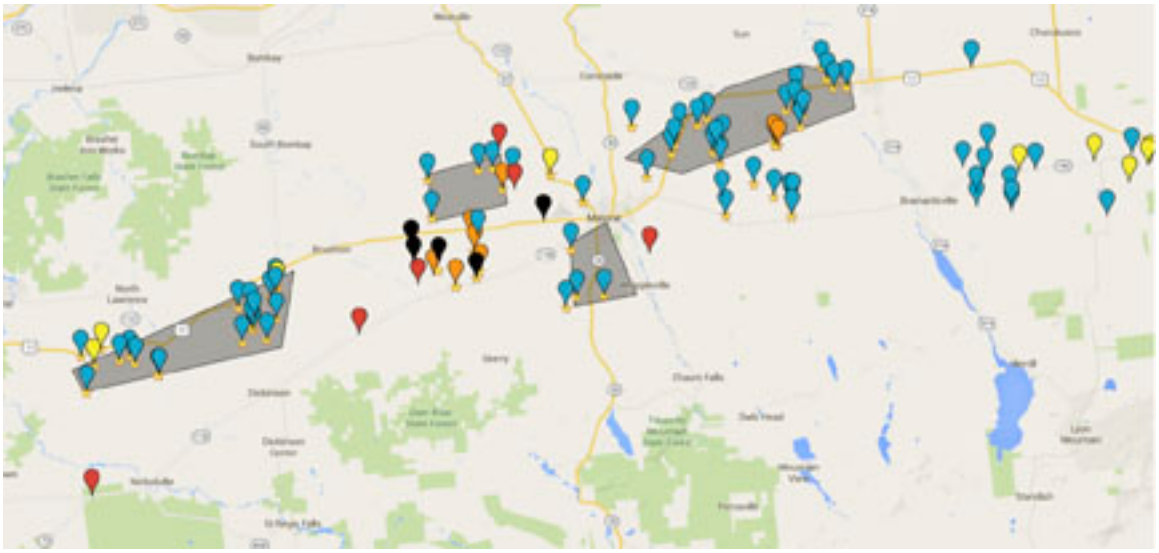

Figure 8. ASB Survey Locations, Franklin County, NY, 2015.

ASB Survey: Franklin County

A total of 70 fields with unconfirmed ASB populations were checked in Franklin County (Figure 8). The county was partitioned into four areas and within each area; fields with alfalfa were surveyed for evidence of alfalfa snout beetle. The first area surveyed was between Lawrenceville and Moira with 21 fields checked and 3 locations designated as probable for an ASB population. The second area surveyed were the fields located between Bangor and western Malone. A total of 12 fields were checked with 6 locations having confirmed fields ASB populations (Figure 9).

Figure 9. ASB Survey Locations Near Bangor, NY, Franklin County, NY 2015

Figure 10. Confirmed ASB Infestation, Franklin County, NY, 2015.

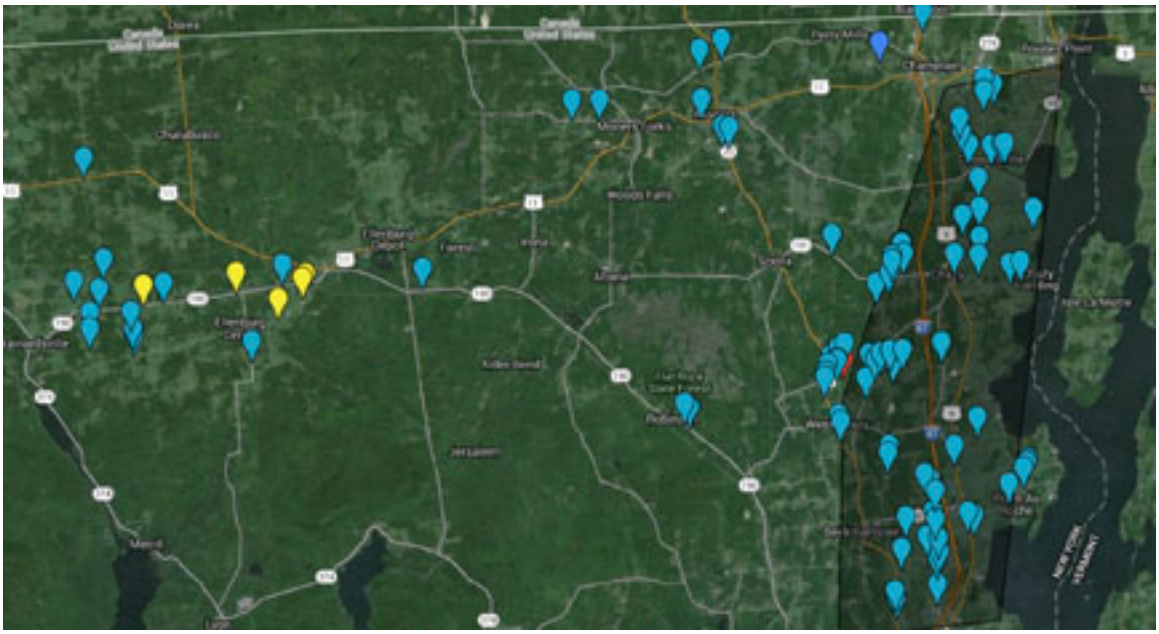

Figure 11. ASB Survey Locations, Clinton County, NY, 2015.

ASB Survey: Clinton County
A total of 95 fields with unconfirmed ASB populations were checked in Clinton County (Figure 11). The county was partitioned into three areas and within each area; fields with alfalfa were surveyed for evidence of alfalfa snout beetle.

The first area surveyed between Brainardsville and Ellenburg Depot (18 fields), found 5 fields with probable evidence of an ASB populations. The second area surveyed was between Mooers Forks and Champlain (12 fields) with no evidence of ASB was present. The last area surveyed was the eastern part of the county between Coopersville and Plattsburgh, where 65 fields were surveyed with no ASB populations found.

Conclusions/Outcomes/Impacts:

The survey conducted in the fall of 2015 has added to the reported areas in NNY that have ASB infestations.

As news of the past successes of farmers who have adopted the biocontrol nematode program to control ASB on their farms spreads throughout the NNY community, that positive reinforcement continues to grow the program. In 2015, 22 new farms joined the nematode application program along with 28 farms renewing their interest in applying nematodes either using a commercial applicator or modifying their own equipment.

The application of nematodes to multiple fields on a farm has encouraged the "neighborhood" concept of inoculating several areas in an infested zone to reduce population spread throughout a community. In Franklin County, one farm enterprise is developing plans to open a nematode-rearing lab to provide nematodes within the Malone, Franklin County, NY, area.

With the assistance from NNYADP, CCE agents, and agribusiness individuals, farmers were able to apply nematodes using new recommendations for 2015 which reduced the cost of treating a field to $10 per acre if the farmers rear their own nematodes or $20 per acre if the "ready-to-spray" nematodes are purchased from the Shields' Lab at Cornell University.

Before the current nematode application method can be modified, more data needs to be collected for the nematode application rate study in progress in 2016. The recommendation of using the 33% nematode application strategy, which requires blocking two of every three nozzles so that nematodes are applied out every 3rd nozzle, then driving the entire field will allow nematodes to fill in within one growing season.

Outreach:

2015 NNY Meetings: NNYADP West Meeting: January 30, Watertown; Franklin County On-Farm Producer Meeting: February 16, Rieff Shop, Bangor; NNY East Crop Congress: February 17, Plattsburgh; St Lawrence Agribusiness Dinner/Conference: February 17, Canton; NNY West Crop Congress: February 18, Lowville; NNYADP East Meeting: February 27, Plattsburgh; Commercial Applicator Meeting: March 23, Watertown.

2016 NNY Meetings: Grower Meetings on March 31: DeBeer Seeds & Spraying, Malone; Charlie's Seed & Spray, Brushton, and Moira American Legion, Moira
Commercial Applicator Meeting: April 6, Watertown.

NNYADP Alfalfa Snout Beetle Media Hits: January 1, 2015 – March 31, 2016

01-15-15	New York Ag Connection	01-15-15	Cornell Field Crops News
01-17-15	Plattsburgh Press Republican	01-18-15	Watertown Times
01-18-15	Ogdensburg Journal	01-18-15	Massena-Potsdam Courier
01-18-15	Malone Telegram	01-18-15	Carthage Republican Tribune
01-18-15	Plattsburgh Press Republican	01-18-15	Cornell Events
01-18-15	Agriculture Industry Today EIN	01-18-15	Lowville Journal
01-24-15	Dairy Agenda Today	01-24-15	Dairy Herd Management
01-26-15	Country Folks		
02-24-15	Clinton County Farm Bureau FB	02-24-15	Morning Ag Clips
02-24-15	New York Ag Connection	02-24-15	US Ag Network
02-27-15	Empire State Farming		
03-01-15	Morning Ag Clips	03-02-15	Hoards Dairyman
03-02-15	CALS Notes	03-02-15	North Country Now
03-02-15	Greenhorns Blog	03-03-15	US Ag Network
03-03-15	Peru Gazette	03-03-15	New York Ag Connection
03-05-15	Cornell Field Crop News	03-09-15	Cornell Chronicle
03-08-15	Plattsburgh Press Republican	03-09-15	myscience.com
03-09-15	Focus on Farming	03-10-15	farms.com
03-11-15	PRO-DAIRY Newsletter	03-11-15	Morning Ag Clips
03-11-15	Minnesota Farm Guide	03-11-15	4-traders.com
03-11-15	seedquest.com	03-12-15	Empire State Farming
03-12-15	Farm and Livestock Directory	03-12-15	International Horti-Daily
03-16-15	American Agriculturist		

May 7, 2015: Cornell Cooperative Extension Field Crops Specialist Mike Hunter's CropCam video of alfalfa snout beetles being collected in Jefferson County, NY: https://vimeo.com/127277031

May 10, 2015: War waged on destructive beetles, Watertown Daily Times
http://www.watertowndailytimes.com/news03/war-waged-on-destructive-beetles-20150510

June 2015: Russians to fight alfalfa snout beetle with expert help, Cornell Chronicle
http://news.cornell.edu/stories/2015/06/russians-fight-alfalfa-snout-beetle-expert-help

June 30, 2015: Russian Farmers Looking to NNY for Help with Pesky Beetle, WWNY TV 7/FOX 28: http://www.wwnytv.com/news/local/Russian-Farmers-Looking-To-NNY-For-Help-With-Pesky-Beetle-310874671.html

June 30, 2015: NNYADP Snout Beetle Project Boosts Agribusinesses, Field Survey Underway, Dairy Herd Management: http://www.dairyherd.com/news/nnyadp-alfalfa-snout-beetle-project-boosts-growers-and-agribusinesses

November 6, 2015: NNYADP Snout Beetle Project Boosts Agribusinesses, Field Survey Underway, NNYADP Press Release: http://www.nnyagdev.org/wp-content/uploads/2015/11/NNYADPASBagbusinessPR.pdf

January 2016: Nematodes are countering alfalfa-killing beetles, Hoard's Dairyman http://www.nnyagdev.org/wp-content/uploads/2016/01/Nematodes.pdf

January 2016: NNYADP Economic Impact Report: See Snout Beetle/New Business Development, pg 2; http://www.nnyagdev.org/wp-content/uploads/2012/02/2016NNYADPreportfinal.pdf

April 2016: Northern New York fighting alfalfa snout beetle, naturally, Progressive Forage Grower: http://www.progressiveforage.com/forage-types/alfalfa/northern-new-york-fighting-alfalfa-snout-beetle-naturally

Next Steps:

Farmers interested in applying biocontrol nematodes for alfalfa snout beetle control need to realize that this project is time-limited with about a 5-year window remaining. It requires 3-5 years to totally inoculate a farm with nematodes and reduce snout beetle populations to a manageable level. 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.

For 2016, there will be no cost-sharing program supported by NNYADP, however, to continue the positive momentum, the Shields' Lab at Cornell University 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. In 2016, 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.

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