Northern NY Agricultural Development Program
2017 Project Report

Identification and Grower Education of Key Pests in Apple Orchards in Northern New York

Project Leader(s):

- Michael Basedow, Cornell Cooperative Extension Eastern NY Commercial Horticulture Program, 6064 Rt 22, Plattsburgh, NY 12901, 518-410-6823, mrb254@cornell.edu
- Anna Wallis, Plant Pathology and Plant-Microbe Biology, Cornell University, Ithaca NY, aew232@cornell.edu (Formerly with CCE ENYCHP)
- Arthur Agnello, Cornell University Department of Entomology, NYS Agricultural Experiment Station, Geneva, NY, ama4@cornell.edu
- Dr. Srdjan Acimovic, Plant Pathology and Plant-Microbe Biology Section, SIPSCornell University, Hudson Valley Research Lab, Highland, NY

Cooperating Producers:

- Banker Orchards, Peru, NY
- Chazy Orchards, Chazy, NY
- Everett Orchards, Peru, NY
- Hart Apple Farm. Peru, NY
- Forrence Orchards, Peru, NY
- Northern Orchards, Peru, NY

Background:

Pest management is one of the largest investments fruit growers must make in terms of time, labor, and materials in order to produce marketable fruit and maintain healthy trees. In addition, orchard landscape and the tools and protocols used to manage pests are dynamic systems, depending on factors that include seasonal conditions, weather, orchard system, new government regulations, and new technology. Fortunately, a wealth of knowledge and tools is available to help growers make educated pest management decisions and implement more Integrated Pest Management (IPM) tactics and strategies. These tools include trapping protocols developed by Cornell University, web-based monitoring systems (NEWA: Network for Environment and Weather Applications at Cornell), advising by private consultants, and the results of regionally-based apple

orchard research funded by the farmer-driven Northern New York Agricultural Development Program (NNYADP).

However, orchard management is becoming more specific and precision-based, and therefore more complicated and technical. In addition, effective strategies change from year to year based on seasonal conditions and updated regulations and information. As a result, successful pest management requires a considerable amount of knowledge and skills that many young and new growers do not have. Pest management practices, especially IPM (integrated pest management), are based very closely on knowing trap counts, degree days, and life stage of the insects. Tracking and reporting regional insect activity along with management recommendations help growers better prepare and effectively execute insect control.

In the 2015 and 2016 growing seasons, NNYADP funds were used to successfully collect data on activity of key pests in at least 5 sites in commercial orchards, disseminate information about pest activity and management recommendations weekly throughout the growing season, and provide appropriate outreach through meetings, workshops, and publications. Funds were also used to test an insect IPM protocol against 'grower standard' control blocks at each site. In general, we found the IPM protocol to be very effective and growers very quick to adopt the protocol and recommendations, and many of them already using IPM techniques.

The goals of this project in 2017 were to 1) continue monitoring the key insect pests in northern NY orchards and determine how they are changing over time, 2) communicate to orchardists season-specific pest activity and management considerations over the course of the 2017 season, and 3) assist growers in navigating the tools and information available to make management decisions.

Methods:

Blocks were established at five sites on commercial orchards in northern NY to trap and scout for key insects. These insects included codling moth (CM), Oriental fruit moth (OFM), obliquebanded leafroller (OBLR), apple maggot (AM), mites, aphids, and scales. Traps were monitored and sites were scouted weekly throughout the growing season, beginning in mid-April until harvest in early September.

Data collected from trapping and scouting was compared to existing data (2015 and 2016, and previous growing seasons, if available) in an attempt to identify trends and/or unique patterns for 2017.

Results:

Flight patterns of oriental fruit moth (OFM), codling moth (CM), and obliquebanded leafroller (OBLR) were variable between years and sites, as illustrated in attached Figures.

OFM biofix occurred in mid- to late May in all three seasons (May 18–23), at approximately 400–465 Degree Days Base 43 (DD43). Degree Days (DD) are a way to

express the accumulation of heat over time. Many insect growth stages are closely tied to temperatures that are over a specific temperature threshold. For example, obliquebanded leafroller develop when temperatures are above 43 degrees (Carrol, 2011). This is later than the average biofix observed in the Cornell University orchards at Geneva, NY, over the past 33 years, (223–324 DD43), corresponding to an average calendar date of May 2 (Agnello 2017a). The discrepancy may be due to low insect populations in Northeastern NY and therefore low detection. Trap catches throughout the season indicate approximately three generations. Timing of these generations varied considerably by year and are likely related to seasonal conditions. While moth activity appeared to cease after mid-summer in 2017, we continued to detect insects into September during 2015 and 2016. This indicates the need for continued scouting and possible management closer to the harvest date.

CM biofix occurred in late May (May 25–30), at approximately 560–590 DD43. This is slightly later than average Geneva observations over the past 35 years: first catch 396–566 DD43 and average calendar date of May 18 (Agnello 2017b). The patterns of CM catch generally followed the same pattern observed in other regions of NY (Breth 2010). Trap captures indicated an "A" and "B" peak for the first generation flight and a second-generation flight. The considerable variability in moth number and flight pattern (relative size of A and B peaks, for example) between sites is not unusual, and justifies site-specific monitoring and management.

OBLR biofix ranged from June 1–20, at approximately 730–1003 DD43, consistent with the Geneva average first catch: 795–980 DD43 (Agnello 2017c). A clear 1st peak flight was observed in late June to early July each year at most sites. A slight increase in trap captures was observed from September 1-11. This may be related to reduced insecticide applications approaching harvest. Alternatively, it may indicate the presence of later generations, as the result of longer, warmer growing seasons relative to other years Therefore, monitoring insects through the beginning of September is advised in order to detect insect pressure close to harvest.

In 2017, we included an abandoned, unmanaged orchard site. CM trap captures at the abandoned site were much higher than at commercial sites. This could indicate that managed orchard sites are "clean" (i.e., growers have excluded or effectively managed these insects). We did not observe this discrepancy for the other moths we monitored. OFM bore into young stem axils, while OBLR summer larvae feed on green leaf tissues. The abandoned orchard had less green shoot growth, which may have made the orchard a less suitable habitat for OFM and OBLR.

For all three insects (OFM, CM, and OBLR), we expected that we might observe lower trap captures, fewer generations, and lower pressure as compared with other regions of NY, due to geographic isolation, colder winters, and shorter growing season. However, we observed very similar patterns and generation numbers, with slight (expected) delays in emergence in the spring. We observed great variability among sites for all insects. This and the foreseeable change in orchard landscape factors (climate, introduction of pests, management tools) substantiate the need for continued monitoring of multiple sites in

Northeastern NY to detect changes in regional patterns and to provide site-specific management recommendations.

As we continue to collect this information each season, we are compiling a database housed within the CCE ENYCHP of insect pressure in Northern NY, and able to track how it varies from year to year, and make inferences about how it may change in the future. The information within the database is shared through outreach programs, primarily through weekly e-alerts.

Education and Outreach

E-alerts

The Eastern NY Commercial Horticulture Program (ENYCHP) Apple Program sends brief email alerts called 'e-alerts' to enrolled members on a weekly to twice-weekly basis throughout the growing season, containing orchard management recommendations and information about upcoming events. In 2017, more than 50 e-alerts were sent to more than 700 ENYCHP Tree Fruit enrollees. Each week, usually on Tuesday after checking traps, information was provided in e-alerts about trap captures, insect pest activity, and management recommendations.

Petal Fall Meeting

The annual Champlain Valley Apple Petal Fall meeting was held on May 23 at Rulfs Orchard in Peru, attended by 43 participants. Information was presented on insect and disease management considerations for 2017 including IPM recommendations, by Hudson Valley Research Lab Entomologist Peter Jentsch, and Hudson Valley Research Lab Pathologist Dr. Srdjan Acimovic.

Northeastern NY Commercial Tree Fruit School

Several presentations were given at the annual Northeastern NY Commercial Tree Fruit School, attended by 72 participants, pest management issues. Topics were grower-identified as a direct result of interacting with growers on this project. Presentations included "Pesticide Resistance Management" by Laura McDermott, and "Fire Blight in a Changing Climate" by Dr. Srdjan Acimovic.

Effective Orchard Spraying and NEWA Training

A 1-day training (7 hours) was offered in Chazy, NY, on March 28, attended by 21 participants. In the morning session, Dr. Andrew Landers presented information on orchard spraying physics, technology, and methods. The afternoon session included presentations by Dr. Juliet Carroll, Dr. Art Agnello, Dr. Kerik Cox, Dr. Jaume Lordan, and Anna Wallis on the NEWA website and apple forecasting tools (insects, diseases, irrigation, thinning), with hands-on demonstrations.

Fire Blight

During the 2016 growing season, producers in the Champlain Valley experienced an unprecedented fire blight epidemic. In 2017, we continued to use the infrastructure put in place by this project (on farm monitoring, e-alerts and articles, grower contacts, meetings) to continue scouting efforts, identify new infections, monitor blocks infected in

2016, predict and identify infection events, alert growers, and make management recommendations. Due in part to the vigilance of both farmers and Cornell Cooperative Extension educators, very few new infections were reported in 2017, and of those reported several were false alarms. In addition, blocks that were infected in 2016 were effectively managed during the 2017 growing season. However, many tree losses continue to be reported, and we are still working with growers to identify best management strategies.

Next Steps:

Continued monitoring will be necessary to detect regional and site-specific changes in pest pressure in Northern NY apple orchards. Three years of data is only enough to start seeing trends, and data collection should continue in an effort to build a long-term databank for calculating average emergence and activity of pests (such as that collected by Cornell Entomologist Art Agnello for Geneva, NY). Grower outreach was well received and should continue, as it will assist growers in knowing seasonal variation and address regional changes, and help providing up-to-date IPM recommendations.

Acknowledgments:

This work was partially funded by the Northern New York Agricultural Development Program. Thank you to the technicians, regional Extension personnel, and private consultants who assisted with and informed this work: Emelie Morton, David Wilfore, Annie Mills, Lindsey Pashow, Amy Ivy, Laura McDermott, Jim Eve, and Eric Boire. Thanks also to the collaborating orchards involved in this project: Banker Orchards, Chazy Orchards, Everett Orchards, Forrence Orchards, Hart Apple Farm, and Northern Orchards.

Reports and/or articles in which results of project have been published.

Wallis, A., Agnello A., & Reissig, H. "On-Farm Evaluation of Apple IPM Protocols in the Champlain Valley." New York Fruit Quarterly. 25(4):5-11. Winter 2017.

For More Information:

Project Leader Michael Basedow, Cornell Cooperative Extension Eastern NY Commercial Horticulture Program, 518-410-6823, mrb254@cornell.edu

Photos:

Insect traps used for monitoring, NNY apple orchard pests projects, 2017. Photos by A. Wallis.



Left: Delta traps with pheromone lures deployed for codling moth, Oriental fruit moth, and obliquebanded leafroller, Center: Sticky card with pheromone lure, obliquebanded leafroller

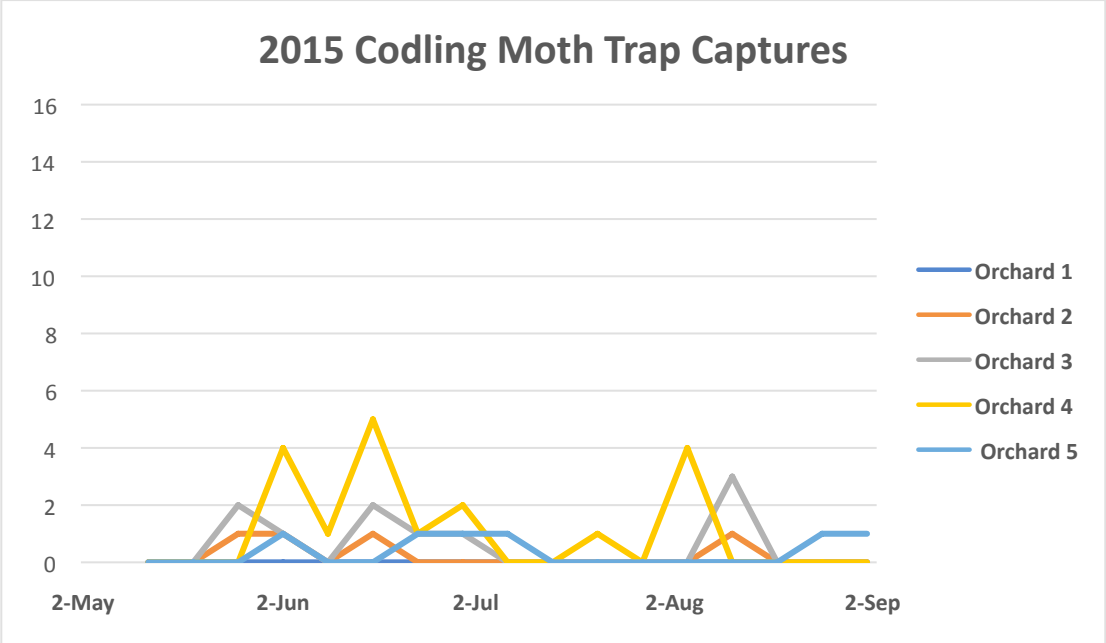
trap. Right: Apple maggot sticky red sphere trap with volatile apple essence lure, in an orchard in Clinton County. Lures are deployed at the beginning of July near the orchard edge, near other host trees (i.e., Hawthorne), if present.

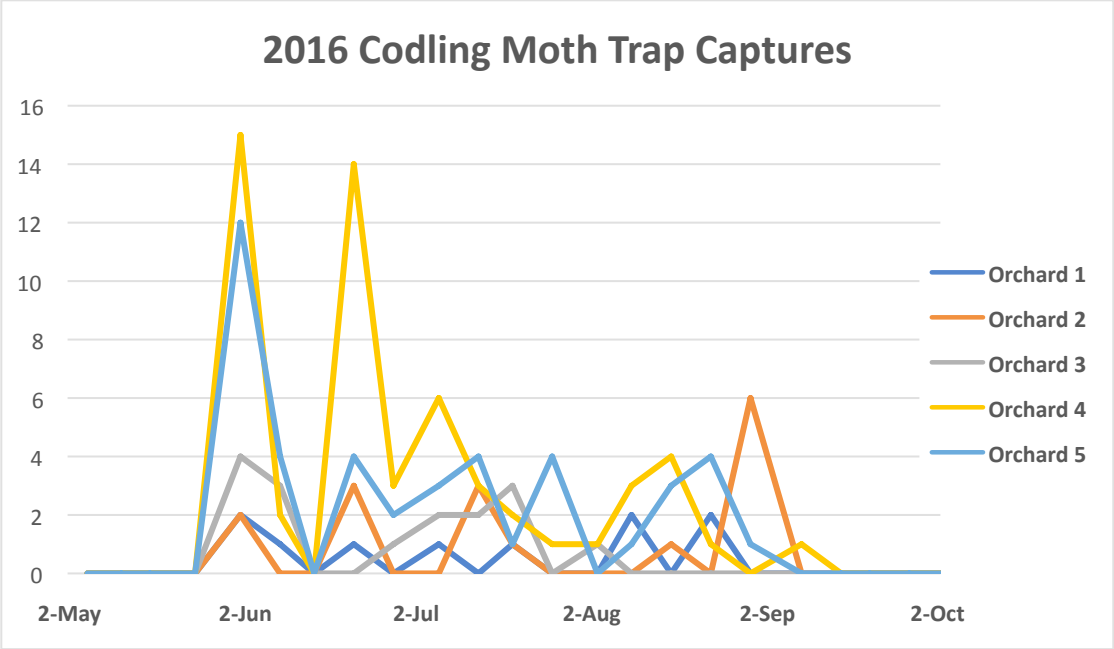
References

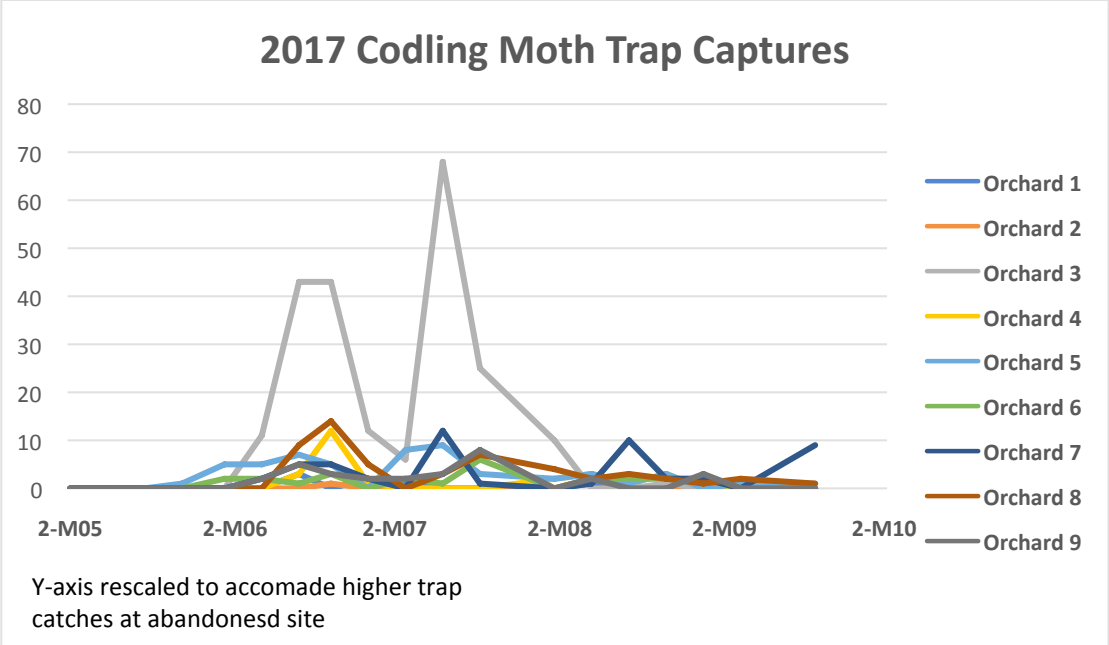
- Agnello, 2017a. (April 17). Upcoming Pest Events. Scaffolds Fruit J. 26(4): 8.
- Agnello, 2017b. (April 24). Upcoming Pest Events. Scaffolds Fruit J. 26(5): 5.
- Agnello, 2017b. (June 5). Upcoming Pest Events. Scaffolds Fruit J. 26(11): 4.
- Breth, D., DeMarree, A., Agnello, A., and Tee, E. 2010. NY Fruit Q. 18(4): 19–23.
- Carrol, J. 2011. About Degree Days. Network for Environment and Weather Applications. 3 May 2018. http://newa.cornell.edu/index.php?page=about-degree-days.

Appendix: Figures

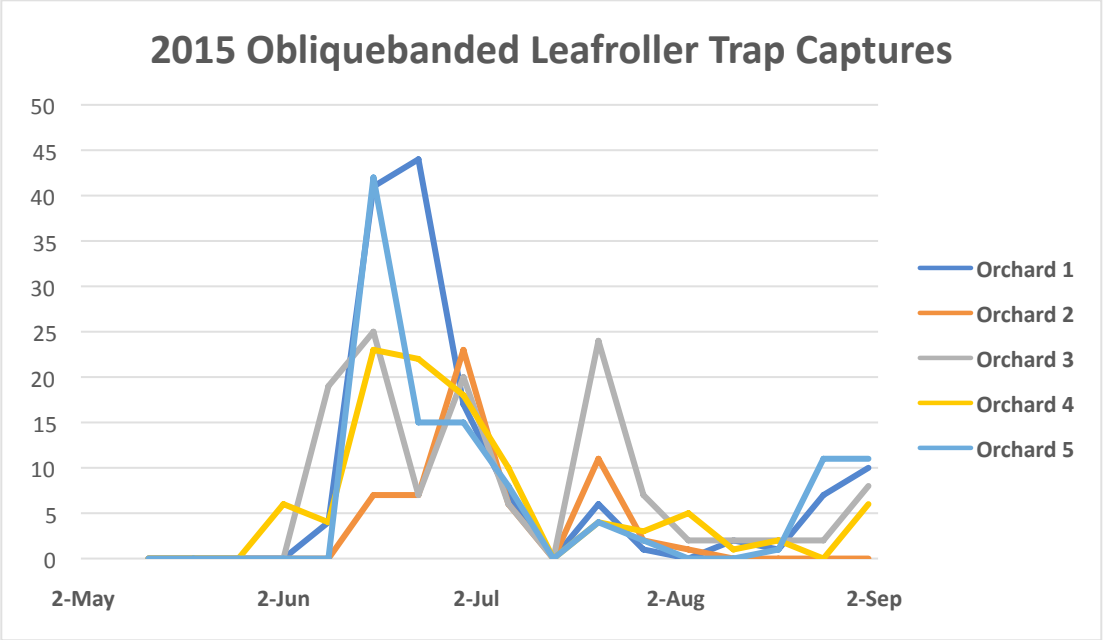
Trap captures of codling moth (CM), Oriental fruit moth (OFM), and obliquebanded leafroller (OBLR) at monitoring sites in the Champlain Valley of NNY in 2015, 2016, and 2017; NNY apple orchard pests project, 2015-2017.

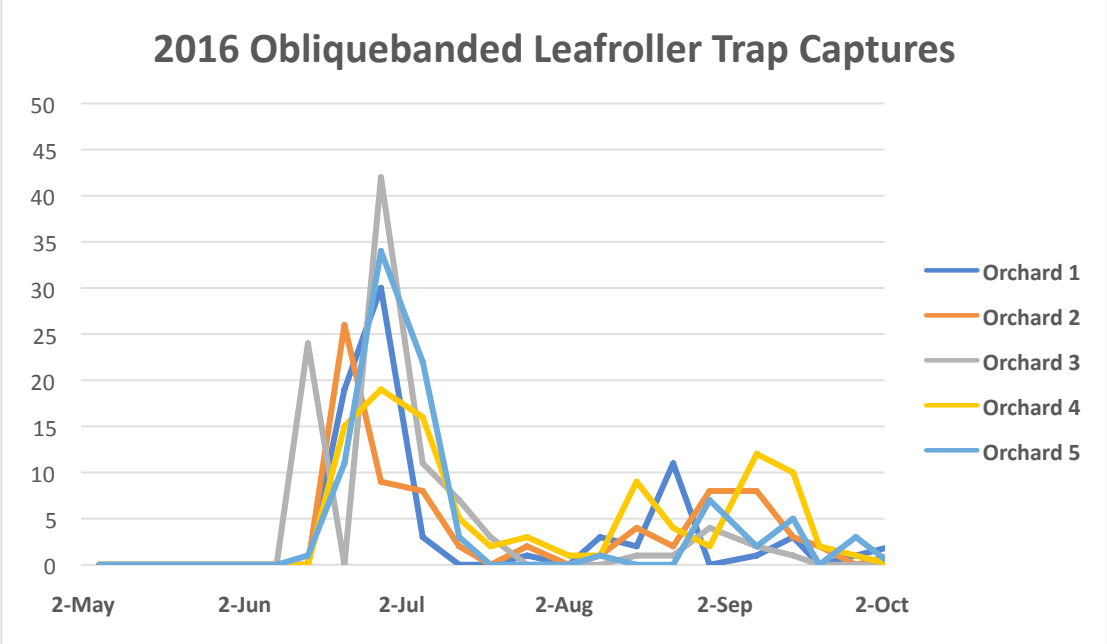


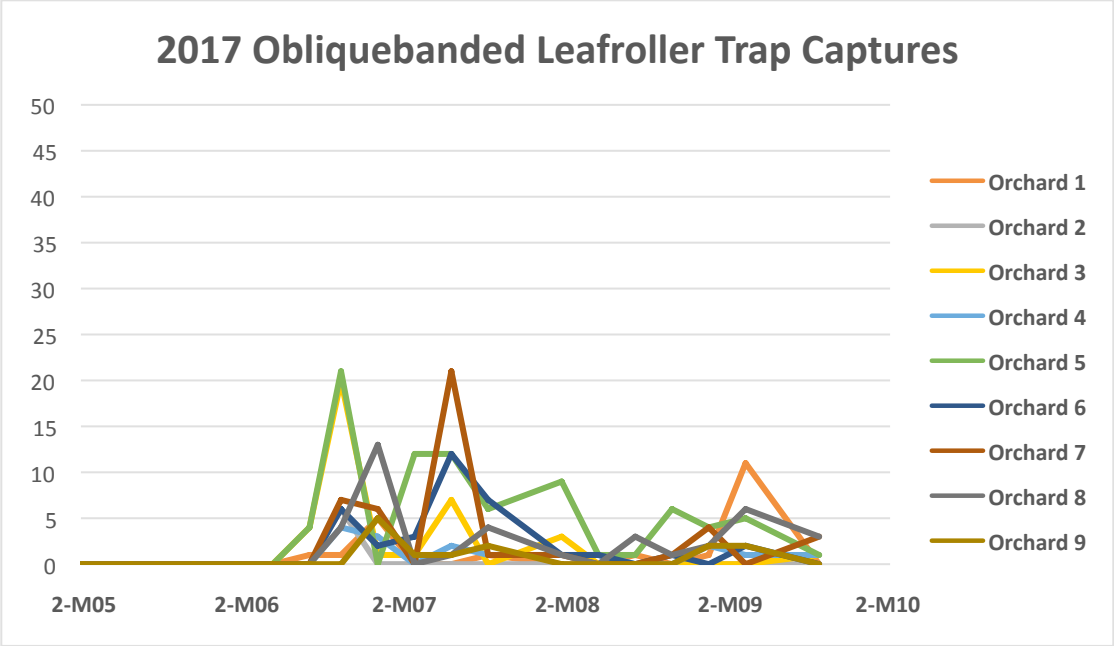


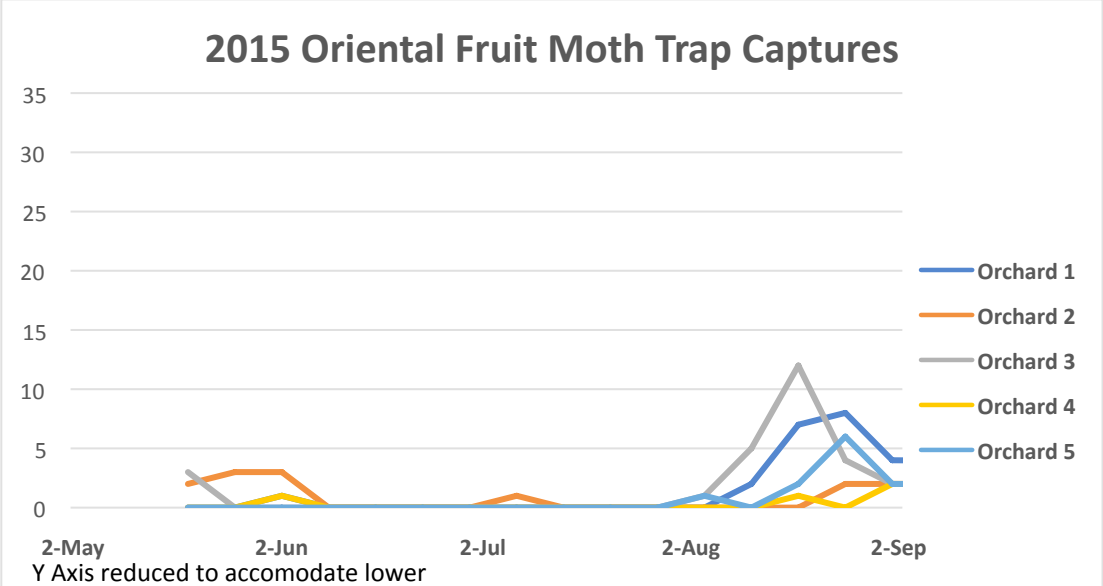


Y-axis rescaled to accomade higher trap catches at abandonesd site

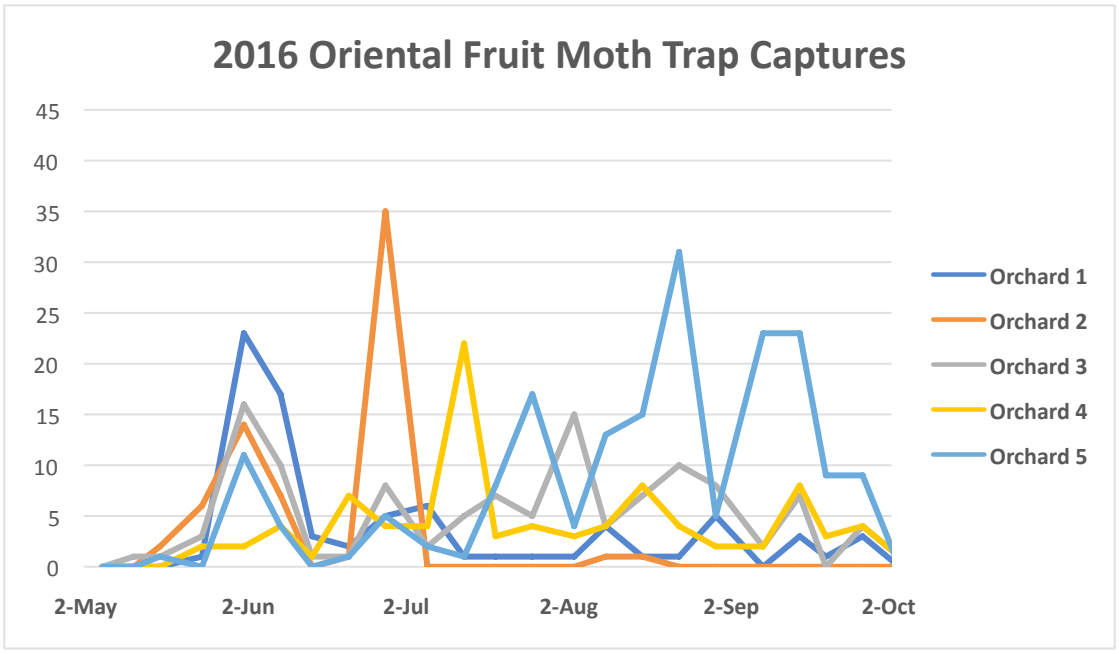

2015 Obliquebanded Leafroller Trap Captures
50
45
40
35
30
25
20
15
10
5
0
2-May
2-Jun
2-Jul
2-Aug
2-Sep
Orchard 1
Orchard 2
Orchard 3
Orchard 4
Orchard 5

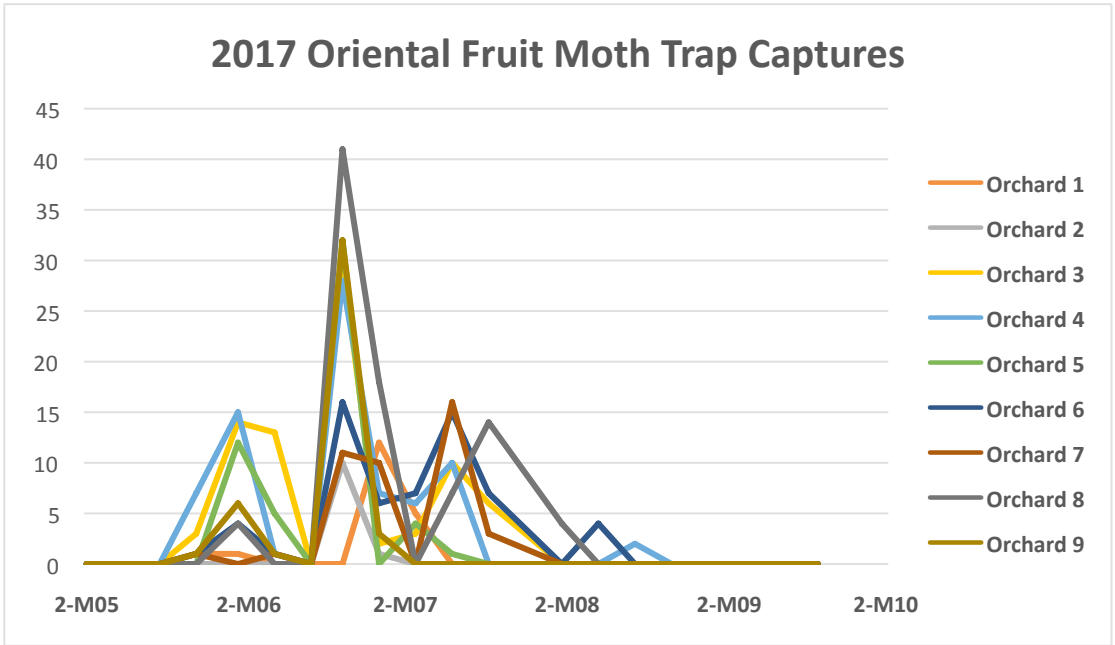

2016 Obliquebanded Leafroller Trap Captures
50
45
40
35
30
25
20
15
10
5
0
2-May
2-Jun
2-Jul
2-Aug
2-Sep
2-Oct
Orchard 1
Orchard 2
Orchard 3
Orchard 4
Orchard 5





Y Axis reduced to accomodate lower trap catches


2016 Oriental Fruit Moth Trap Captures
45
40
35
30
25
20
15
10
5
0
2-May
2-Jun
2-Jul
2-Aug
2-Sep
2-Oct
Orchard 1
Orchard 2
Orchard 3
Orchard 4
Orchard 5


2017 Oriental Fruit Moth Trap Captures
45
40
35
30
25
20
15
10
5
0
2-M05
2-M06
2-M07
2-M08
2-M09
2-M10
Orchard 1
Orchard 2
Orchard 3
Orchard 4
Orchard 5
Orchard 6
Orchard 7
Orchard 8
Orchard 9