

Pennsylvania Department of Agriculture

2016 Entomology Program Summary

The Pennsylvania Department of Agriculture (PDA) Entomology Program is responsible for the regulation of insect plant pests, which includes survey, laboratory analysis, and control/mitigation of new invasive insects when warranted. In 2016, the Entomology Program either conducted or actively participated in 17 invasive insect pest surveys across the Commonwealth. The laboratory received and processed 17,724 different insect samples and identified 103,367 specimens from these samples. Regardless of the survey, all samples were screened for Cerambycidae, Buprestidae, Scolytinae, Pentatomoidea, Siricidae, Symphyta, Vespidae, Fulgoroidea and other select species like *Phytomyza gymnostoma* (Allium leafminer), *Sirex noctilio*, *Larinus turbinatus*, *Adelges tsugae* (Hemlock Woolly Adelgid), and *Pyrhalta viburni* (Viburnum Leaf Beetle). *Bombus* species were added late in 2016 in response to the listing of *Bombus affinis* as a Federal endangered species. In addition, several other non-targeted species were identified if they were unfamiliar to staff taxonomists. Entomology surveys are carried out by permanent and temporary PDA staff, as well as cooperating government and non-government collaborators. Insect samples are also submitted through cooperative extension, private industry, and the general public.

SPOTTED LANTERNFLY (SLF):

The cooperative response to eradicate SLF by the community, local governments, individual property owners, businesses, state agencies, researchers, and the federal government has been a refreshing experience and the Entomology Program extends a sincere thank you to everyone who has dedicated time, expertise, and resources this effort.

On September 22, 2014 an educator with the PA Game Commission submitted a report detailing damage to *Ailanthus altissima* (tree of heaven) and the presence of an unknown insect associated with the damage in Eastern Berks County. An inspection by PDA staff resulted in the collection of a pest new to North America, *Lycorma delicatula* (spotted lanternfly). A brief delimiting survey indicated a population that was limited in distribution and a quarantine was established late in



2014 to contain the pest in its known area. Efforts to research the pest, delimit its distribution, and begin an aggressive control strategy were undertaken in 2015. Information gathered in 2015, confirmed that SLF makes use of many plant species for the majority of life cycle, but is highly focused on tree of heaven from Late-July through October. Data indicated that egg mass scraping was an effective means for population reduction, and that use of adhesive tree bands was of limited use, capturing only the 1st through 3rd instar SLF. Starting in December of 2015, a targeted attract and kill control strategy was implemented at 20 properties in the core infested zone, which was continued and expanded in 2016. In March of 2016, PDA was awarded emergency Farm Bill funding to attempt eradication of SLF, and cooperators were awarded funding for research and outreach. To adapt to the changing infestation, and changing needs of the program, PDA hired a full time program coordinator and 16 seasonal employees dedicated to eradication and survey efforts

in 2016. A seasonal field crew coordinator was also hired. PDA also leased a centralized office to stage SLF crews and offer space for cooperating researchers to work on biological control, impact studies, treatment efficacy, and other spotted lanternfly research.

The program targets were slightly altered in 2016 to band fewer trees, but over a wider area, and some crews were switched to assist with the attract and kill control work in the core zone. The combined number of trees banded by volunteers and PDA SLF Crews was 3,062 which resulted in the death of 332,609 SLF. Combined with mortality counts from 2015, tree banding has killed 570,431 SLF. Though not an insignificant number, there is clearly room for improvement in tree band efficacy. The original bands used were selected due their ease of use, quick deployment, relatively low cost and low environmental impact. Other program control methods require additional preparation and cannot be deployed as quickly. Two band types were used in 2016 due to one manufacturer discontinuing production. A new vendor was located and the second type of band was deployed late in the 2016 season. The new band has been found to be more effective in adult SLF capture, but will continue to be evaluated for any non-target impacts. After SLF started to deposit egg masses, the crews and volunteers switched from banding and active capture to egg mass scraping, and this effort resulted in the death of an additional 798,875 SLF. When combined with egg mass scraping mortality from 2015 a total of 1,402,520 SLF have been killed by egg mass scraping. Considering that there is little to no equipment need for this control tactic, an enhanced effort to train volunteers to scrape egg masses will be employed going forward.

Using band count numbers to select properties with high levels of infestation, a control method combining host tree removal with trap tree establishment was implemented. Information from research by Kutztown University indicated that late instar and new adult *Lycorma* were almost exclusively feeding on *Ailanthus* starting in late July prior to dispersing for egg laying. The attract and kill method removes most of the "required" host and leaves a few male trees that are 10 inches or more in diameter on each property as a trap crop. The removed



Dead spotted lanternflies beneath trap tree.

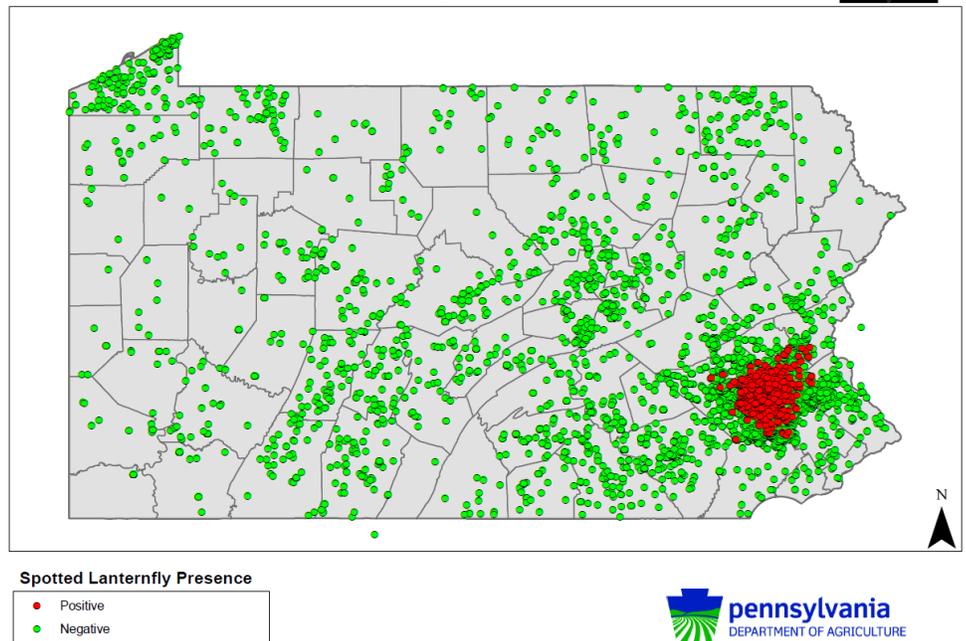
trees have the stumps treated with herbicide (Triclopyr) to prevent sprouting. The trap trees are treated with a systemic insecticide (Dinotefuran). The adults and late instars concentrate and feed on the trap trees and die. Though this method targets the adults, the method also kills some larvae and the impact on adults is dramatic. It is difficult to assess the effectiveness of this method during operations. Though the visual evidence is obvious, actual population counts are difficult to achieve. The effectiveness of tree banding is uncertain but does follow a consistent protocol. Because all treated properties are privately owned, access to the properties after treatment is limited, but PDA was able to access four parcels to band remaining treated *Ailanthus* trap trees in 2016. The sites were treated using host reduction in combination with trap trees in the

spring of 2016. The sites originally had 41 Ailanthus trees. After treatment, PDA left 15 live Ailanthus trees which were treated with Dinotefuran in May of 2016. The 15 trees were banded every two weeks in 2015 and in 2016. In 2015, bands captured 10,956 lanternfly nymphs. In 2016, the same 15 trees had 5,971 nymphs captured on bands. It is important to note, that since this method targets adults, that the majority of the lanternfly mortality took place after band collections became ineffective in late July. A more meaningful comparison can be made at the end of July 2017.

Outreach for spotted lanternfly is coordinated through a separate Farm Bill project, but works in concert with the eradication program. PDA in cooperation with PSU cooperative extension presented outreach at 10 events attended by 779 people since the start of this project in July of 2016. Events included talks on biology, regulatory information, and training for volunteers. PDA has held monthly community update conference calls with affected municipalities, and continues to reach out to the effected community. Outreach is a key factor in the detection of spotted lanternfly in new areas. In 2016, PDA received 1,595 reports from the toll free report line, badbug e-mail, and general contacts. Of these, 1,576 were positive when investigated and 19 were false reports. This is a report accuracy rate of 98.80%. For the life of the program, 2,440 reports were received and 2,191 were accurate. The accuracy rate for public reporting for the history of the program is 89.79%. This level of report accuracy has allowed for extremely effective dispatch of survey resources and helped to accurately characterize the distribution of this pest.

Efforts to survey for SLF across the state by the SLF crews, PDA Plant Inspectors, PDA Apiary Inspectors, and volunteers helped to identify many new infested areas over the course of 2016, which led to the expansion of the quarantine and a better understanding of the scope of the infestation. The public is extremely effective and helpful for reporting new locations. Combined survey efforts led to the discovery of infestations in two new counties (Lehigh and Northampton) and a number of new townships in counties already known to be positive for SLF. By the end of 2016, SLF was known from 956 properties in 74 municipalities. The heaviest infestations are centered around the initial point of detection, and most of the remote populations in new townships and counties are comprised of only a few specimens. The quarantine restricting the movement of SLF life stages and conveyances has been extended.

2014 -- 2016 Lycorma Detection Survey
Results through 13 Decemberr 2016



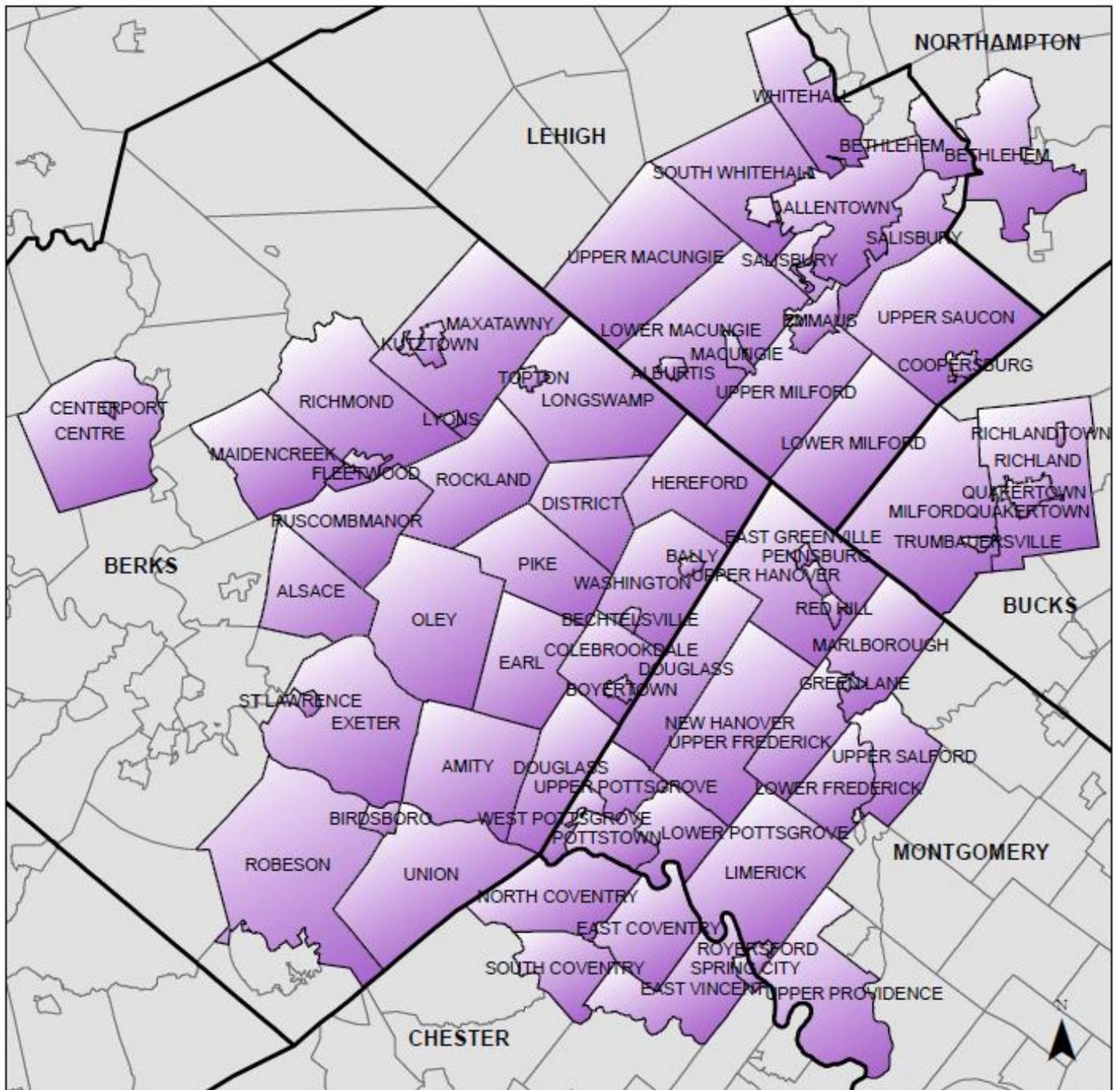
Efforts by PDA cooperators like PSU, Kutztown University, local government, the USDA, and the PA Department of Conservation and Natural Resources (DCNR) helped to keep the community informed, provide for much needed training, and helped answer questions about SLF. PSU provided the community with outreach materials, fielded calls from the community and arranged for training and public meetings. The DCNR initiated a native parasitoid study and was able to identify two parasitic wasps already attacking SLF in PA. The DCNR continues to work with the USDA to develop biological control strategies. The local DCNR

forest district provided tree identification training for SLF crews. The USDA has worked with PDA and PSU to test insecticide efficacy in trap trees and investigate potential plant volatile and insect pheromone attractants. Kutztown University has helped to characterize what plants SLF are feeding on and at what point in their life cycle they use certain plants. PSU continues to research impacts to grapes and develop control strategies. The community has provided feedback on program operations, pest movement, and even reported damage to new hosts like hops. Working together, the community, government agencies, and the research community are making a stand against this new pest.

Spotted Lanternfly Quarantine Map



Municipalities Under Quarantine as of November 28, 2016

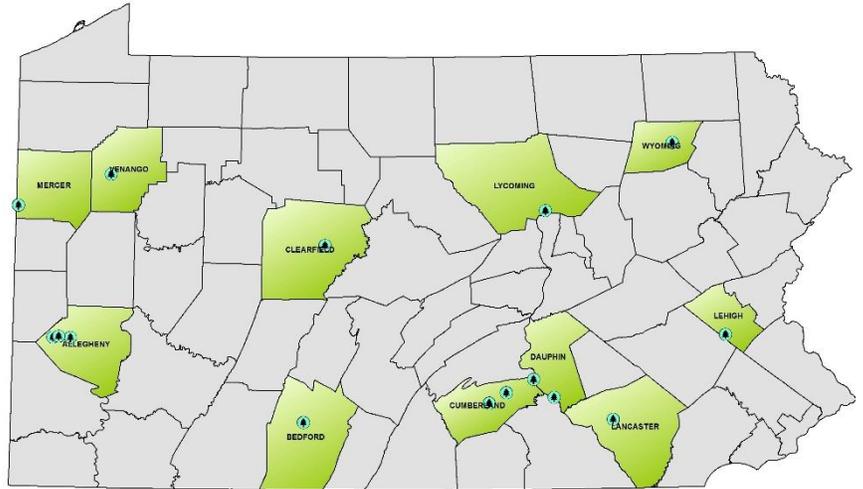


ASIAN LONGHORNED BEETLE (ALB):

This pest continues to be a high priority for Pennsylvania. ALB was declared eradicated from portions of New York, New Jersey, and Ontario in 2013. Unfortunately, new populations of ALB were discovered in New York and Ontario. Pennsylvania continues to screen all wood destroying insect samples for ALB, all of which were negative in 2016. In addition, ALB visual surveillance is performed as part of Pennsylvania's Cooperative Agricultural Pest Survey. PDA also responds to a number of public reports for ALB each year. In 2016 PDA performed visual survey at 164 sites where ALB was not detected. PDA intends to continue sample screening visual surveillance for ALB in 2017.

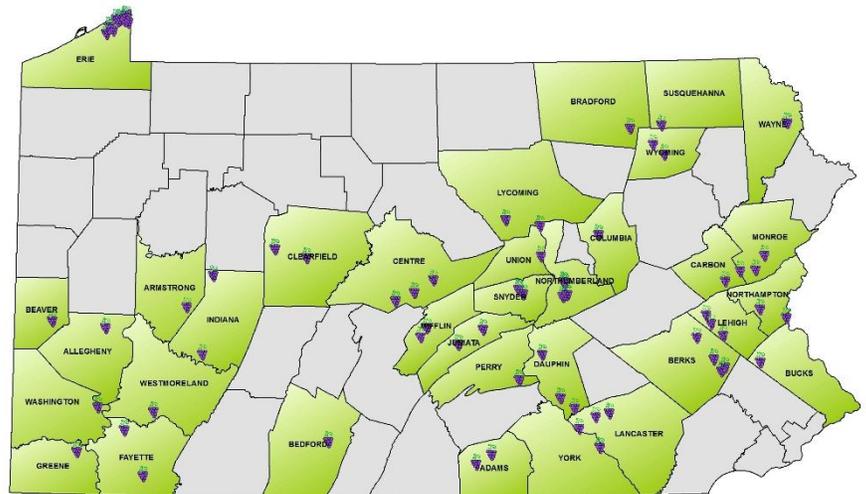
USDA EXOTIC WOOD BORING BEETLE SURVEY:

In May of 2016, the USDA-APHIS PPQ office out of Carlisle PA, established 75 traps at high-risk sites in 11 PA counties that receive shipments of products originating outside of the United States. Facilities targeted were known to have received shipments that contained pests from abroad in the past. The traps were serviced every two weeks until the end of October. A total of 484 samples containing 2,580 specimens were submitted to the PDA Entomology Laboratory for analysis. This survey targeted a combination of different wood destroying beetles not known to occur in the United States. None of the USDA target pests were detected, but 4 specimens of a non-native spider, *Myrmarachne formicaria* (DeGEER), were trapped in Mercer and Venango Counties.



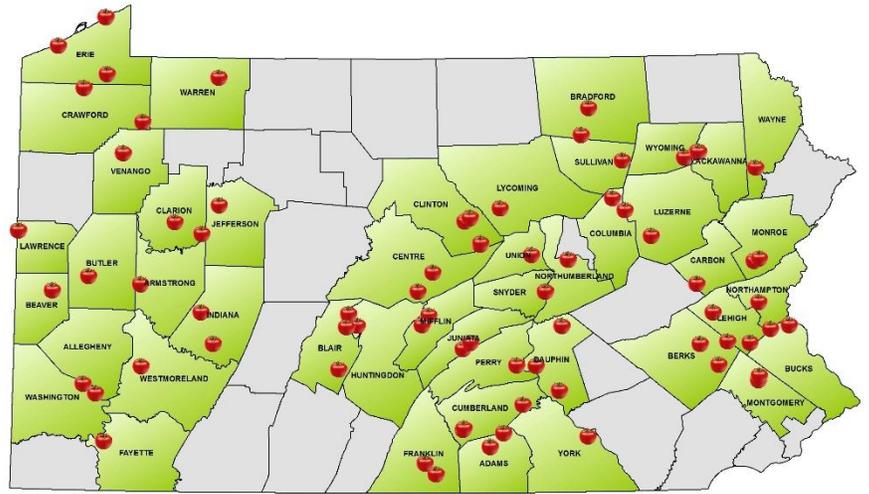
GRAPE COMMODITY PEST SURVEY:

PDA first implemented a grape pest survey in 2010 using Farm Bill money from the USDA and this survey has been continued through 2016. The survey was run from April until the end of June, completing the 2015 project, and the 2016 grape commodity pest survey started on July 1st and ran until the end of October. The 2016 project will resume in April of 2017 and conclude on June 30. Target pests for 2016 included *Lobesia botrana* (European Grapevine Moth), *Autographa gamma* (Silver-"Y" Moth), *Epiphyas postvittana* (light brown apple moth), *Spodoptera littoralis* (Egyptian Cottonworm), and Spotted Lanternfly (*Lycorma delicatula*). In the spring of 2016, survey crews established 618 sites in 34 PA counties at locations supporting wine and juice production. The PDA lab received and processed 2,275 samples which contained 2,865 specimens. No targets were detected in 2016. Surveys did detect 16 specimens of *Autographa* which were not *Autographa gamma*. Six were *Autographa californica* and 10 were *Autographa precationis*. All vineyards surveyed were negative for Spotted Lanternfly. This survey will resume in April of 2017.



TOMATO COMMODITY PEST SURVEY:

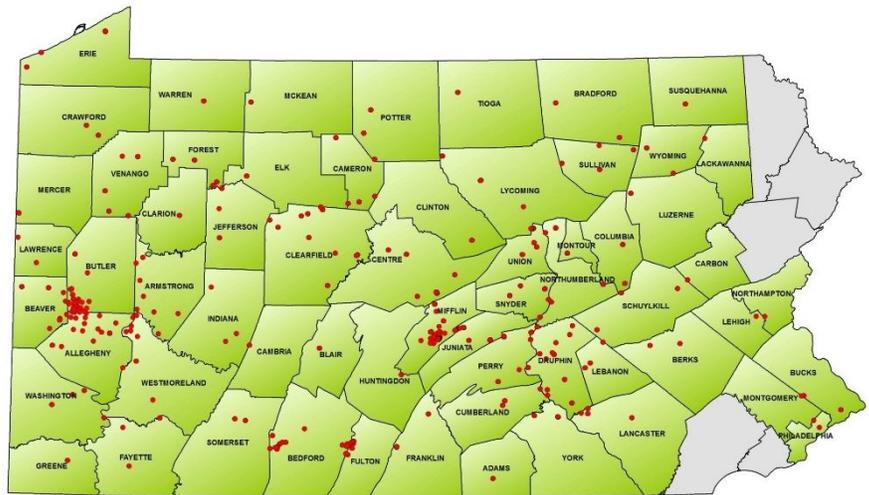
Due to numerous new detections of the tomato pest *Tuta absoluta* (Family Gelechiidae) in Europe, a small survey for this pest was conducted through the PDA IPM program in 2010. In 2011, PDA received Farm Bill money to implement an official tomato commodity pest survey in PA and this was continued through 2016. Similar to the grape commodity survey, the tomato survey runs from July 1, through the end of September, and resumes from April through the end of June the following year. The 2016 project target pests were *Tuta absoluta* (tomato leaf miner), *Chrysodeixis chalcites* (golden twin spot moth), *Spodoptera litura* (Cotton Cutworm), *Helicoverpa armigera* (old world bollworm), and *Bactericera cockerelli* (tomato/potato psyllid). Seasonal surveyors deployed 581 sites in 45 counties at tomato processing facilities, retail food distribution centers, as well as at some tomato production sites. Surveyors submitted 4,262 samples throughout the 2016 season which contained 2,413 specimens, all of which were negative for the target pests. Traps did collect 33 specimens of other moths in the Family Gelechiidae that were not *Tuta absoluta* and 24 moths in the Genus *Chrysodeixis* which were not *Chrysodeixis chalcites*. Traps also collected 168 moths in the genus *Helicoverpa* which were not *Helicoverpa armigera* and 2 *Spodoptera* which were not *Spodoptera litura*. Traps did collect 47 Psyllid species but none were *Bactericera cockerelli*. This survey will resume in April of 2017.



The 2016 project target pests were *Tuta absoluta* (tomato leaf miner), *Chrysodeixis chalcites* (golden twin spot moth), *Spodoptera litura* (Cotton Cutworm), *Helicoverpa armigera* (old world bollworm), and *Bactericera cockerelli* (tomato/potato psyllid). Seasonal surveyors deployed 581 sites in 45 counties at tomato processing facilities, retail food distribution centers, as well as at some tomato production sites. Surveyors submitted 4,262 samples throughout the 2016 season which contained 2,413 specimens, all of which were negative for the target pests. Traps did collect 33 specimens of other moths in the Family Gelechiidae that were not *Tuta absoluta* and 24 moths in the Genus *Chrysodeixis* which were not *Chrysodeixis chalcites*. Traps also collected 168 moths in the genus *Helicoverpa* which were not *Helicoverpa armigera* and 2 *Spodoptera* which were not *Spodoptera litura*. Traps did collect 47 Psyllid species but none were *Bactericera cockerelli*. This survey will resume in April of 2017.

EMERALD ASH BORER (EAB):

2016 marked the ninth year since the Buprestidae beetle *Agrilus planipennis* was discovered in Butler County and the sixth year since the removal of the in-state quarantine which had restricted the movement of materials from known infested areas to non-infested areas. It was also the sixth year of bio-control efforts by our cooperating agency (DCNR), and the fifth season of the tropical ash rearing project to support the production of bio-control agents.



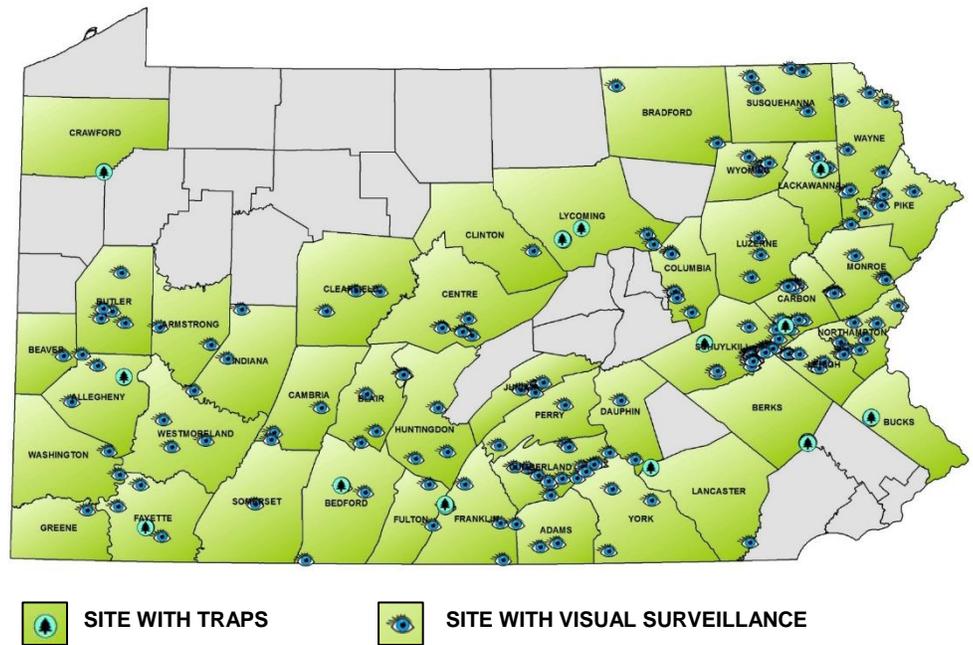
At the beginning of 2016 there were 57 counties with confirmed populations of EAB known in PA, and no official survey work was performed by PDA in 2016. In 2016 official confirmed samples were obtained from Carbon, Lackawanna, Lehigh, and Northampton Counties. These new detections bring the total number of infested PA counties to 62 as of December 31, 2016.

Over 350 *Fraxinus uhdei* (tropical ash) were started from seed in July of 2011 to support the rearing of EAB biological control agents at the National Rearing Lab in Brighton, MI. Germination and initial growth of the seedlings continued through December of 2011. In 2012 the ash trees were cut back and an initial shipment of 400 leaves and a number of cut back trees were sent to Michigan in May. Starting in November of 2012, regular shipments of leaves were made (as need dictated by the rearing lab in Brighton) and this program continued through the end of 2016. In 2016, regular shipments were made each week from February through

June, and September through December, totaling 6,880 leaves and 23 boles. The USDA requested that 62 trees from the PDA program be transferred to Florida in December 2016, leaving a total of 158 trees being maintained in the greenhouse at PDA.

COOPERATIVE AGRICULTURAL PEST SURVEY (CAPS) Exotic Wood Boring Beetle Survey (EWBB):

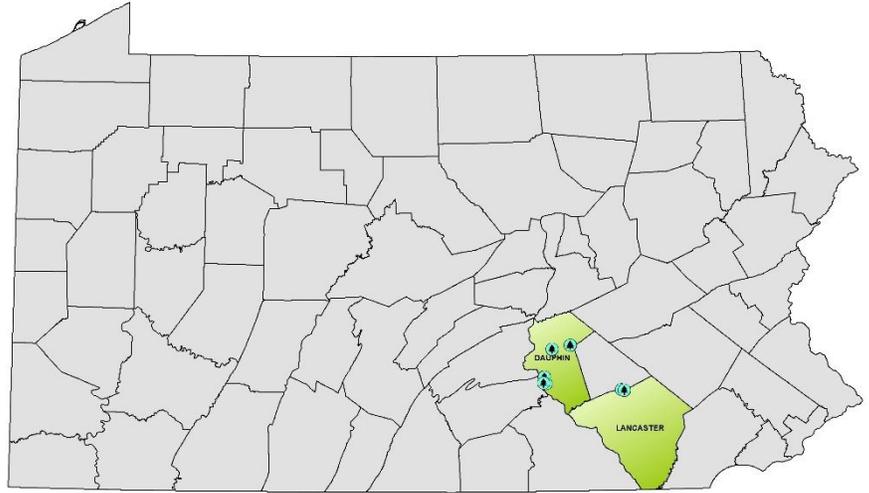
The Cooperative Agricultural Pest Survey is a federally funded survey that targets pests of specific national concern to agriculture. Though the EWBB survey targets species of national concern it also adds species of state concern. Due to the extreme economic impact caused when non-native wood destroying insects are introduced to PA, PDA runs some form of this survey each year. Surveys are carried out in accordance with national survey guidelines. Pests of state concern can be surveyed in a more flexible manner. In 2016, insects affecting oak, sassafras, conifers, and other Northeastern hardwoods were selected as target species. This included pests like oak splendor beetle, Asian longhorned beetle, oak ambrosia beetle, spruce engraver, bamboo borer, citrus longhorned beetle, and many other pests not known to occur in PA or have a limited distribution. Information from the interception of pests at ports provided by the US Customs and Border Patrol, European pest alerts, and NAPIS are used to help refine the list of target pests for PA. Protocols for the surveillance of many of these pests require visual surveillance, while others call for pheromone or plant volatile baited traps. For pests that are trapped, 12 sites were established at sites deemed high-risk for exotic pest introduction with 108 variously baited traps. In addition, traps using general Cerambycidae lures, Trichoferus lure, and Callidiellum lure were hung at some sites. Risk was determined by pathway analysis and cooperation with USDA-APHIS and input from the PA state CAPS committee. Traps were run from April through the end of October. Each trap is serviced every two weeks, which generated a total of 1,469 samples and 23,889 specimens. No CAPS targets were trapped in 2016 surveys. However, non-CAPS traps hung at the sites did capture target species. The traps for Callidiellum species did capture 107 specimens of Callidiellum rufipenne (Japanese Cedar Longhorned Beetle). Though not new to the state, the traps did detect this pest for the first time in Berks and Schuylkill Counties. Most significant was the detection of single specimen of Trichoferus campestris (Velvet Longhorn Beetle) in a Trichoferus trap in Carbon County which was a new state record. Trichoferus campestris is an invasive longhorn beetle that is well established in Utah, and has been picked up in other states. The beetle has a broad host range including apple and mulberry, and will attack both live and recently dead wood. No additional specimens were collected and visual surveillance of the site did not identify any infested trees. Additional trapping for Trichoferus is planned for 2017. CAPS traps did pick up 12 specimens of Cnestus mutilatus (Camphor Shot Hole Borer) and five specimens of Sirex noctilio. Visual survey points were taken at all sites and several additional locations, totaling 182 visual survey sites in 43 counties for pests that are visual survey only. All visual surveys were negative for target pests. This survey will be implemented again 2017 targeting different pests and new high-risk locations.



Traps were run from April through the end of October. Each trap is serviced every two weeks, which generated a total of 1,469 samples and 23,889 specimens. No CAPS targets were trapped in 2016 surveys. However, non-CAPS traps hung at the sites did capture target species. The traps for Callidiellum species did capture 107 specimens of Callidiellum rufipenne (Japanese Cedar Longhorned Beetle). Though not new to the state, the traps did detect this pest for the first time in Berks and Schuylkill Counties. Most significant was the detection of single specimen of Trichoferus campestris (Velvet Longhorn Beetle) in a Trichoferus trap in Carbon County which was a new state record. Trichoferus campestris is an invasive longhorn beetle that is well established in Utah, and has been picked up in other states. The beetle has a broad host range including apple and mulberry, and will attack both live and recently dead wood. No additional specimens were collected and visual surveillance of the site did not identify any infested trees. Additional trapping for Trichoferus is planned for 2017. CAPS traps did pick up 12 specimens of Cnestus mutilatus (Camphor Shot Hole Borer) and five specimens of Sirex noctilio. Visual survey points were taken at all sites and several additional locations, totaling 182 visual survey sites in 43 counties for pests that are visual survey only. All visual surveys were negative for target pests. This survey will be implemented again 2017 targeting different pests and new high-risk locations.

OTIS TRAP EFFICACY SURVEY:

PDA has assisted the USDA-APHIS OTIS lab with the development of traps for several years. In 2016, PDA received funding to run traps sites to test trap longevity and efficacy for trapping EAB and other wood destroying insects, particularly Buprestidae. As part of the agreement PDA was also asked to process trap efficacy samples from sites in Massachusetts, Louisiana, Utah, Ohio, and, New York for this study. In PA, 18 traps were established at sites in two counties on ash trees. Sites were run



from May through the end of September, and serviced every two weeks. A total of 149 samples containing 4,488 specimens were received and processed by PDA from traps in Pennsylvania. An additional 1,381 samples containing 30,683 specimens were processed from surveys in the other states.



Agrilus smaragdifrons adult
(photo staged)

Agrilus smaragdifrons exit
holes in tree of heaven

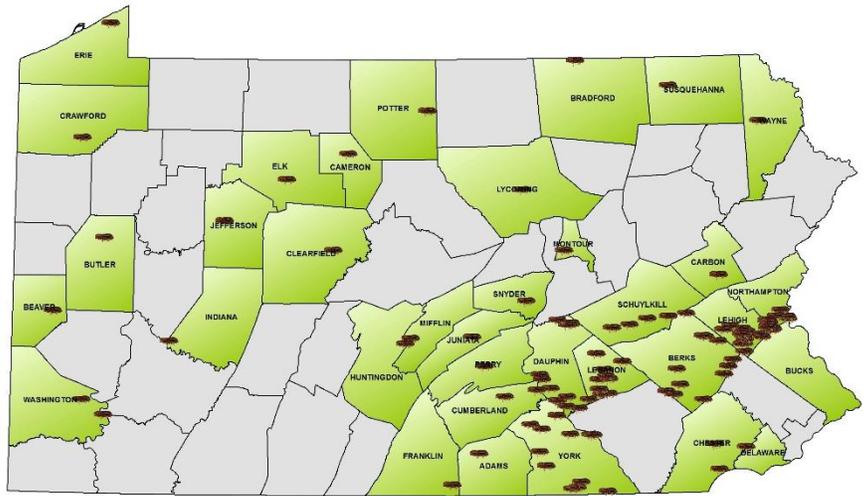
Though designed to improve efficacy for other surveys, one detection of note resulted. A Buprestidae new to the state, *Agrilus smaragdifrons*, was detected in Dauphin County. *Agrilus smaragdifrons* was declared new to the US from New Jersey in early August 2016. PDA submitted a specimen similar to *Agrilus smaragdifrons* from Lehigh County for identification in 2015. The final result from that submission was "an undetermined species of *Agrilus*". After seeing the report from New Jersey a, new specimen trapped in Dauphin which matched the description was submitted and confirmed to be the first detection in the state. Though trapped on ash, the limited literature available on the new species suggested a strong association with tree of heaven. In response, PDA performed visual and sweep net survey on tree of heaven, placed additional traps in Dauphin County

on tree of heaven, directed Spotted Lanternfly crews to collect *Agrilus* bi-catch of tree bands placed on tree of heaven, and laboratory staff were directed to screen all samples for *Agrilus smaragdifrons*. These efforts resulted in the detection of 117 specimens of the pest in Bucks, Dauphin, Lehigh, and Northampton Counties. Visual survey in Dauphin County was able to detect exit holes and galleries in tree of heaven. A majority of the specimens were trapped in Lindgren funnels or on tree bands placed on tree of heaven. Five specimens were captured in Lindgren traps hung on ash and one was collected in a Lindgren funnel hung on Black Walnut. Potential damage to other tree species in unknown at this time.

Data from OTIS studies are used to help the USDA in determine approved trapping methods for national surveys. Evaluation of the traps and their efficacy will be performed by the lead researchers from the USDA OTIS laboratory.

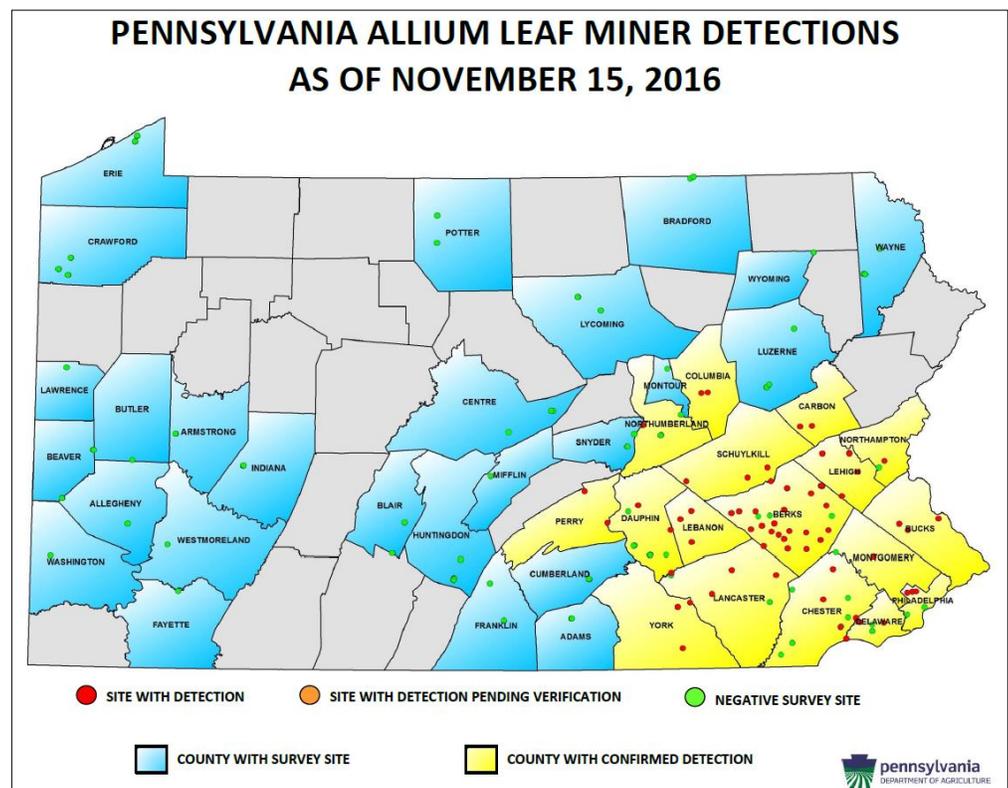
WALNUT TWIG BEETLE (TCD):

In August of 2011, Penn State Cooperative Extension in Bucks County obtained a sample of dying black walnut. The cause of the dying walnut was confirmed as Thousand Cankers Disease, a disease complex caused by a twig beetle, *Pityophthorus juglandis*, (WTB) and the fungus it vectors. Trees at the initial detection site were voluntarily removed and destroyed by the property owner in February of 2012 and PA started a state-wide trap survey for the beetle. PA received Farm Bill support to run a 100 trap survey for the beetles starting in July of 2012 and this survey continued through 2016. PDA and the DCNR Bureau of Forestry deployed 106 traps in 35 counties in 2016. PDA focused on un-infested Counties and higher concentrations of traps in counties adjacent to known positive counties. The DCNR placed and monitored a few traps in Bucks, Chester, and Delaware Counties which are counties currently under state quarantine. The state of MD requested assistance with the processing of samples from MD which PA agreed to identify. In all, PDA received and processed 1,588 samples containing 25,836 specimens. No *Pityophthorus juglandis* were collected and no new locations were identified in 2016. The quarantine was not expanded and remains in effect for Bucks, Chester, Delaware, Lancaster, Montgomery, and Philadelphia Counties. PA will resume this project in April of 2017.



ALLIUM LEAF MINER:

In late December 2015, PDA was contacted by PSU Extension from Lancaster County for confirmation of an identification of a pest causing 100% mortality of Allium crops on an organic Community Supported Agriculture (CSA) farm. The original sample contained pupae and one larvae of a fly that was identified as *Phytomyza* sp. To speciate *Phytomyza*, a mature adult male specimen is required. PDA Entomology, a representative from the USDA, and PSU Extension visited the grower and obtained samples of infested Leek and Onion which were reared out in containment at PDA. These specimens emerged the first week of January 2016 and were identified as *Phytomyza gymnostoma* (Allium Leaf Miner) which is a "First in Nation" detection. The Agromyzid fly is native to Asia and is a serious pest of Allium crops in Europe. An investigation indicated that the grower had been experiencing moderate loss to this pest in previous years, but it had grown worse this past season, eventually





Larva in onion, Lebanon County
Photo by Mr. Baase

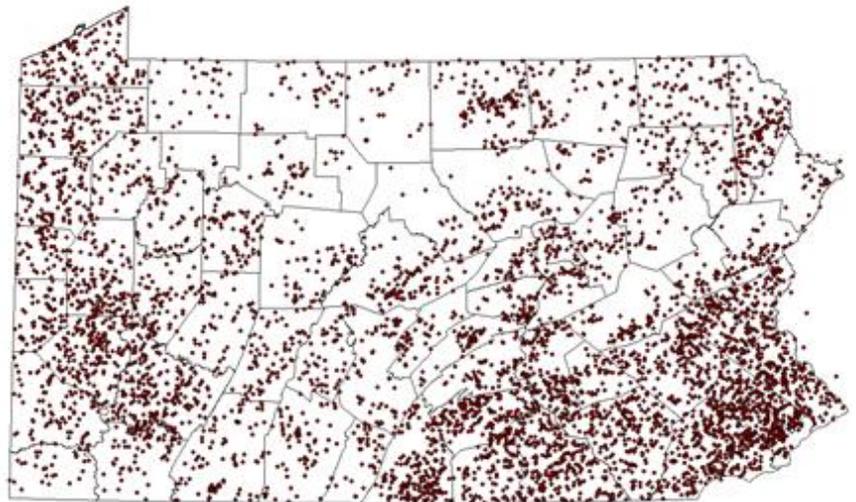


Adults on wild onion, Dauphin County

causing complete crop loss of his Leek and fall Onion. A pathway for introduction to this farm was not determined. In 2016, a delimiting survey and state-wide survey was conducted by PDA and PSU extension. PDA Plant Inspectors established traps at 371 sites in 43 counties, from April through early June 2016 and again from late August through the end of October 2016. PSU extension submitted suspect samples to PDA throughout the year. These efforts yielded 1,470 samples containing 573 specimens. Of these, 551 were identified as *Phytomyza gymnostoma*, and 12 were identified as *Phytomyza plantaginis*, a native Agromyzidae fly that looks similar to *Phytomyza gymnostoma*. The majority of specimens were hand collected. Positive records were obtained from yellow onion, white onion, purple onion, garlic, chive, spring onion, wild onion, leek, and ornamental onion. PDA and PSU also began educating growers throughout the state and region, and asking for reports of damage matching this new pest. Growers who suspect that they have Allium leaf miner should contact PSU extension or the PDA Entomology Program. PSU has developed a pest alert and grower recommendations. A new pest advisory group was formed by the USDA which will provide a report with information about the pest and recommendations.

APIARY INSPECTION PROGRAM:

The value of the apiary industry in Pennsylvania in 2016 was estimated at over \$76 million. Much of this value is attributed to increased yield in crops partially or completely dependent on honey bees for pollination. In 2007, it was estimated that each honey bee colony provided \$1,659.21 to Pennsylvania's economy. Since the onset of Colony Collapse Disorder (CCD) in 2006, more people worldwide have become interested in becoming beekeepers and helping native pollinators.

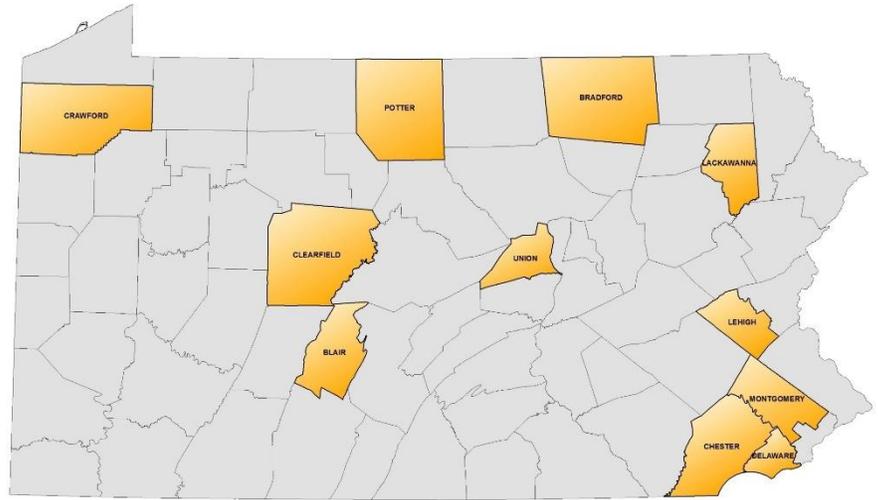


In Pennsylvania, over 3,000 new beekeepers have registered since 2007, including about 800 new beekeepers registering in 2016. Currently, in PA there are about 4,500 registered beekeepers managing over 60,000 colonies in 6,500 bee yards. The majority (about 80%) of these beekeepers care for 1-10 hives. As seen

on the map, managed honey bee colonies can be found almost everywhere in the Commonwealth from roof tops in urban areas to towns, suburbs, farms, and undeveloped land. From the end of April until the end of October, there were seven full time seasonal Apiary Inspectors working across Pennsylvania as well as the State Apiarist located in Harrisburg. Approximately 20% of beekeepers registered in PA had their honey bee colonies inspected.

HONEY BEE DISEASES AND PESTS:

Twenty-four cases of American Foulbrood (AFB), a highly contagious disease affecting honey bees, were detected in sixteen bee yards, in 11 counties in PA in 2016. The PA Department of Agriculture continues to focus on detection and treatment of AFB. All suspect cases of AFB were submitted to Harrisburg and then sent on to the USDA, Beltsville, Maryland for laboratory testing to confirm the diagnosis and to screen for Oxytetracycline hydrochloride, (trade name Terramycin) resistance.



Fifteen of the AFB strains were susceptible and therefore the symptoms are treatable with the antibiotic Oxytetracycline HCL and seven were resistant to Oxytetracycline HCL. Resistant strains of AFB may be treated with the veterinary antibiotic tylosin (trade name Tylan) or irradiated. Two strains showed inconclusive results. Many beekeepers chose to burn the infected hive(s) since the antibiotics do not kill the bacterium causing AFB. The Varroa mite, *Varroa destructor*, continues to be found throughout Pennsylvania and many parts of the world. These insect pests of the honey bee are a serious concern to beekeepers because they vector viruses causing diseases and can weaken a colony enough to cause the bees to abscond or die. Small hive beetles continue to spread throughout Pennsylvania. They are more prevalent in the southern and mid-sections of the state.

APIARY PERMITS ISSUED:

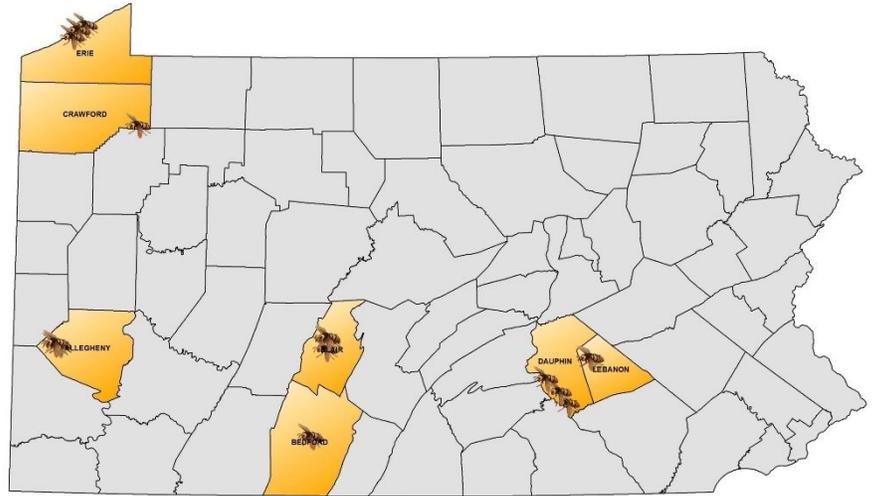
The Pennsylvania Department of Agriculture (PDA) issued 43 Certificates of Inspection to process export permits for beekeepers requesting permission to allow honey bees and/or used equipment to leave PA (32 were issued in 2015). There were 3 Import Permits issued to allow honey bees and/or used equipment to enter PA from other states (8 were issued in 2015). Seventy queen producer/nuc-selling beekeepers were issued permits to sell queens and nucleus colonies in Pennsylvania in 2016 (86 were issued in 2015).

NATIONAL HONEY BEE SURVEY:

This was the sixth year that Pennsylvania was able to participate in the USDA/APHIS National Honey Bee Disease Survey (NHBS). The objective of this survey is to determine the diseases, pests, and parasites present, or absent, in various operations throughout the United States, including a cross-section of operation types. The diseases, pests, and parasites include: American Foulbrood, European Foulbrood, Sacbrood, Chalkbrood, Parasitic Mite Syndrome, *Nosema sp.*, Lake Sinai Virus-2 (LSV-2), Acute Bee Paralysis Virus (ABPV), Chronic Bee Paralysis Virus (CBPV), Kashmir Bee Virus (KBV), Israeli Acute Paralysis Virus (IAPV), Slow Bee Paralysis Virus (SBPV), Deformed Wing Virus, Black Shiny Bees, Small Hive Beetles, Wax Moths, *Varroa* mites, *Apis cerana* and *Tropilaelaps* mites. The survey also records the status of the queen. Live bee samples are sent for virus testing. As of December 2016, 18 of the 24 apiaries have been sampled. The remaining six will be completed in the spring of 2017.

EXOTIC HONEY BEE PEST SURVEY:

Asian Giant Hornet, *Vespa mandarinia*, (AGH) gained national notoriety when it was featured in a Discovery channel program where it was portrayed as a significant threat to apiaries and as a human health threat. AGH made international news in 2013 when conditions in China led the insect to cause 42 deaths. A review of PA regulatory authority identified that there was a gap which might not allow for rapid response should the pest be introduced in North America. In 2015, PA was awarded a Farm Bill grant to survey for AGH in PA and to develop a response strategy should the pest be detected and the effort was expanded to include other pests in 2016.



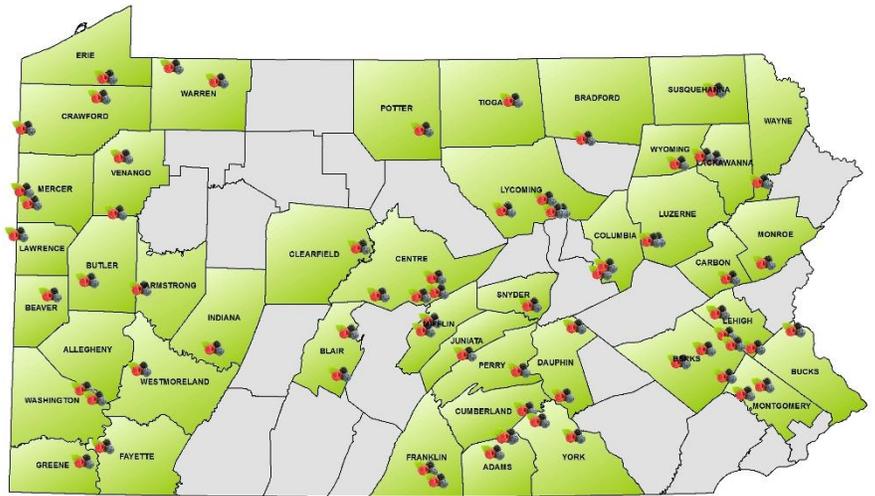
In 2016, 40 high risk sites, including international airports, ports, shipping, rail, and truck transportation hubs were established in 7 counties. Traps were established and monitored April through November by seven apiary inspectors and the State Apiarist. White translucent one gallon jugs were hung from trees and held either one cup of light or dark brown sugar and ½ gallon of water. There were 1,043 site visits, with traps yielding 9,626 identified samples. No Asian Giant Hornets or other exotic pests were identified in 2016, but traps did collect 260 *Vespa crabro* (European hornet) which is often mistaken for AGH. Due to the proposed listing of *Bombus affinis*, PDA also screened these samples for all *Bombus* species. Traps captured 93 *Bombus* species, none were *Bombus affinis*. Plans are underway to continue the survey while also testing additional traps and lures combinations in the spring of 2017. Additional sites are being secured in high risk areas.

In addition, educational handouts are also being prepared. Presentations have been made about the AGH survey at the annual PA State Beekeepers Association meeting and at the meetings local beekeeping groups. In January 2016, at the Apiary Inspectors of America meeting, a cooperator meeting was held with other participating states and information was presented to State Apiarists and Apiary Inspectors. There was a great deal of interest in the program. A draft of PDA's response should AGH be detected has been completed.

SMALL FRUIT COMMODITY PEST SURVEY:

The port of Philadelphia has long been a chief port for the importation of fruit into the Eastern part of the country. In recent years there have been interceptions of Mediterranean fruit fly in New Jersey and in Philadelphia. New fruit feeding flies like spotted wing drosophila and Drosophilid fig fly have established and spread in PA. For these reasons, PDA sought Farm Bill Money to survey for exotic fruit fly pests of small fruit. This survey targeted Spotted Wing Drosophila (*Drosophila suzukii*), Drosophilid Fig Fly (*Zaprionus indianus*), Mediterranean Fruit Fly (*Ceratitis capitata*), Malaysian Fruit Fly (*Bactrocera latifrons*), other *Bactrocera* spp., and South American Fruit Fly (*Anastrepha fraterculus*) at growers or processors of blue berries, strawberries, cane fruits, or other small fruits. PDA crews established 210 sites in 43 counties which were run from April through June 30, 2016. Traps yielded a total of 941 samples with 16 specimens, which were identified at the PDA laboratory with the use of permanent and seasonal taxonomic staff. No targets were identified in 2016.

In mid-May of 2016 *Rhagoletis cerasi* (European cherry fruit fly) was confirmed for the first time from Ontario Canada. The fruit fly is native to Europe and can cause 100% crop loss in cherry. PDA was asked by the USDA to establish a limited number sites for *Rhagoletis cerasi* and provide screening services for this new potential pest. PDA used existing part-time seasonal survey crews to establish four sites in Erie and Adams Counties. Supplies for this survey arrived in late June 2016 and were immediately deployed. Traps were serviced every two weeks until the end of August. Traps generated 78 samples containing 87 fruit fly specimens. Though some native *Rhagoletis* were trapped, no *Rhagoletis cerasi* were collected. A limited number of samples were identified for New York State, which were negative for *Rhagoletis cerasi* as well. Pennsylvania did not receive funding to survey for fruit flies in 2017.



PLANT DIAGNOSTIC SAMPLE REPORTS (PDSR):

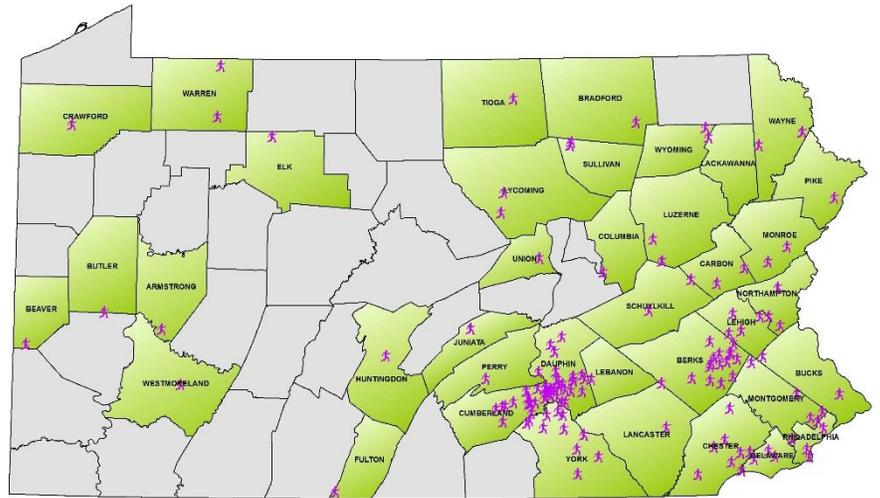
In support of the PDA Plant Merchant Program, the Entomology Lab identifies Plant Inspector collected samples from routine plant merchant inspections where a pest of regulatory concern is suspected. In addition, plant inspectors are asked to target certain pests of concern during their inspections. In 2016, Plant Inspectors were asked to look for spotted lanternfly, Allium Leaf Miner, and Lily Leaf Beetle. A total of 98 samples were submitted in 2016. The most notable PDSR samples submitted in 2016 and were records of Thrips damaging Fraser fir in Dauphin County and Nordman Fir in Chester County. The Thrips were not a known Pennsylvania species and were sent for further verification. The final identification was determined to be *Scirtothrips* sp., with an explanation that there are 15 described species in North America and several that have not yet been described. The *Scirtothrips* submitted were one of the undescribed North American species. As the species is not yet described, there is no information about its biology or pest potential. PDA inspectors and growers noted damage to new growth and needle loss. As a precaution, source nurseries for the Dauphin County trees, which are located in Crawford County, were inspected and found to be negative.



PDA inspectors will be asked to focus on this pest during Christmas tree inspections in 2017.

GENERAL SURVEY SAMPLES AND OTHER DETECTIONS OF NOTE:

In addition to regulatory and funded surveys, the PDA Entomology program also receives samples from cooperative extension, private industry, and the general public. Entomology records these samples as GENERAL SURVEY samples. The majority of these types of samples are submitted by commercial pest control companies and Cooperative Extension. In 2016, PDA recorded 152 samples totaling 2,663 specimens from 38 counties in Pennsylvania. The general survey yielded several notable detections in 2016.



PDA was contacted three times by a quality control worker from a Berks County company that imports product for production. They collected several specimens of an unknown snail inside truck bodies with newly delivered product. They took quick action to segregate the shipment, line the trucks with a border of salt and, inspected the rest of the shipment, finding snails in four total truck bodies. The snail was identified as *Cathaica fasciola* (A Bradybaenid Land Snail) that is widely distributed in China and causes significant losses to economic crops. A second snail species, *Metodonita yantaiensis*, was also identified. The USDA worked with the company who voluntarily had the containers fumigated, and based on repeated interceptions will work with the supplier to mitigate future shipments.



An off duty Pennsylvania Department of Environmental Protection worker noticed sawdust beneath wooden hangers at a nationwide chain store in Dauphin County. The store surrendered the hangers to him, and he submitted them to PDA. An examination yielded specimens of the Bostrichidae beetle *Heterobostrichus aequalis*, a pest considered to be actionable in Puerto Rico and Hawaii. The store chain voluntarily removed these items in Puerto Rico and Hawaii.



A second Bostrichidae species new to Pennsylvania, *Sinoxylon sudanicum*, was submitted to PDA by a pest control operator who extracted it from pallets in Cumberland County.

Cooperators at the DCNR, Bureau of forestry submitted two samples of *Adelges tsugae* from Armstrong and Lawrence Counties. These samples represented new county record for this regulated pest of hemlock.

As part of a national recall on infested pine furniture from China, PDA in cooperation with the USDA received samples of this furniture from multiple locations across the state. The material which was sold on-line was found to contain live Cerambycidae in other states. Of the recalled material examined, furniture from Berks, Monroe, and Luzerne County were found to be infested with 48 specimens the pest *Callidiellum villosulum* (Brown Fir Longhorned Beetle). This longhorn beetle was previously intercepted in artificial Christmas trees featuring real trunks several between 1999 and 2001. Material gathered by the USDA and PDA was incinerated with the assistance of Pennsylvania Veterinary Laboratory. Only in the case of the material sold in Luzerne County, was the furniture exposed to outdoor conditions for an extended period, as it was stored for a few months in an open garage prior to recovery. PDA was fortunate to be using *Callidiellum* lures in traps across the state in 2016 as part of the CAPS survey. Samples from these traps were all negative for *Callidiellum villosulum*. PDA will screen all samples for this pest in 2017.



PDA INSECT REFERENCE COLLECTION

The PDA Entomology program maintains an active and growing collection of insects of agricultural importance. This collection serves as a reference tool for identification and a resource for historical information on insects in Pennsylvania. The collection seeks to improve its holding in areas of agricultural significance as well as areas that have not seen recent improvement. This year the collection added 2,352 new specimens, with particular emphasis on planthoppers (Fulgoroidea) and wood destroying beetles. This was the second largest increase in the past seven years. A large portion of the material added includes specimens from Utah, Louisiana, New York and Ohio broadening the representation of material outside of Pennsylvania.

The collection also acquired several notable pests of agricultural concern through donations and trades. Velvet longhorn beetle (*Trichoferus campestris*), Khapra Beetle (*Trogoderma granarium*), and the pine sawyer *Monochamus galloprovincialis* are three potentially damaging beetles that were unrepresented in the

collection prior to this year. Loans of planthoppers, treehoppers, bees and other hymenopteran pollinators, weevils, and buprestids were also issued this year, totaling over 3,000 specimens.

INVASIVE SPECIES HOTLINE AND E-MAIL REPORT SYSTEM:

In 2016, the invasive species hotline and badbug e-mail account generated 1750 contacts to report possible invasive insects and the Entomology Program received an additional 141 reports from direct mail, telephone calls, and other modes of contact. Of the 1750 contacts, 922 were to the toll-free automated invasive species line and 828 were to the badbug e-mail. The majority of public contacts were to report or ask about Spotted Lanternfly.

**Prepared by the Pennsylvania Department of Agriculture,
Bureau of Plant Industry, Division of Entomology, January 27, 2016**

