



PLANT PROTECTION

The Plant Protection Division was formed in 2021. In 2022 the Division continued to incorporate changes to build programs and better position staff for the future. This Division is comprised of three programs, Entomology, Certification/Compliance and Plant Health. Dana Rhodes is the Plant Protection Division Chief and maintains duties as the State Plant Regulatory Official. A new position to the Division is Certification Specialist, held by Sarah Gettys. Sarah will coordinate mandatory and voluntary state and federal certification programs for the Plant Protection Division. These programs include the Nursery/Greenhouse Plant Merchant Certification, Systems Approach to Nursery Certification (SANC), Fruit Tree Improvement Program (FTIP), Xylella, ACO, Greenhouse Certification Program, and Post Quarantine Entry. We have also added a new Spotted Lanternfly (SLF) Operations Manager, Jacob Henry. He oversees all spotted lanternfly management and control activities throughout the Commonwealth.

The Plant Protection Division oversees the plant inspection programs, plant disease survey, invasive and destructive insect survey and laboratory functions. Division programs protect the health of plants in the neighborhoods, farms, fields, and forests of the Commonwealth. It provides consumer protection for farmers and homeowners purchasing plants by ensuring the plants they buy are healthy, and it helps to provide a level playing field for businesses wanting to sell plants interstate or internationally. The plant merchant licensing and plant inspection program is responsible for phytosanitary inspection and certification. The Plant Disease Diagnostic Laboratory provides disease diagnostic support to survey, plant inspection, and certification programs. The Entomology program is responsible for insect pest and pathogen regulation through monitoring, detection, taxonomy and delimitation. The Compliance program oversees the SLF business permit program in addition to utilizing the detection skills of our canine detector dog, Lucky.

Our State Plant Pathologist and CAPS Coordinator is Dr. Katya Nikolaeva. Our Entomology Program Manager, Mike Hutchinson, is our State Entomologist. Shane Philipps is the Compliance and Enforcement Program Specialist and oversees wood products and SLF Regulatory activities including our K-9 detector dog, Lucky.

PLANT MERCHANT LICENSING AND INSPECTION

BY THE NUMBERS 2022

6930	Licensed Businesses
4002	Compliance and Routine Inspections completed
679	Federal Phytosanitary Certificates Issued
622	State Phytosanitary Certificates Issued
231	Compliance Agreements Issued

Nursery/Nursery Dealer Certification: Regional plant inspectors continued to contact businesses that need to be licensed under requirements of the PA Plant Pest Act, inspect registered business, and provide inspections for federal and state phytosanitary certificates. Over 6900 businesses were licensed as Plant Merchants in Pennsylvania in 2022. This is a decrease of about 1000 from 2021. Some operations closed due to retirement of original owners or consolidation. This number includes nursery operations, greenhouse operations, plant dealers, brokers, and landscapers.

Phytosanitary Certification: In 2022, 679 Federal phytosanitary certificates were issued to ship plants internationally. Canada received most of the material followed by China, France, Germany, and Dominican Republic, as the higher number of countries for phytos issued for export. 662 state phytosanitary certificates were issued to ship plants interstate.

Nursery/Nursery Dealer Inspections: Just over 4000 inspections of nurseries, nursery dealers and greenhouses were performed for calendar year 2022. Plant inspectors were asked to perform trace back inspections for the new Sweet Chili Mosaic Virus which originated from off-shore cutting locations. Unfortunately, positive material had to be destroyed by growers which had received the material. Plant inspectors provided sanitation information and assisted in verifying proper management was provided.

Systems Approach to Nursery Certification (SANC):

Pennsylvania continues to work with companies interested in the SANC process. Conard Pyle and North Creek Nursery have completed steps for SANC Certification and continue to meet the standards as verified during their external audits. Pennsylvania continues to be actively engaged with the SANC program through committee work and has helped to shape the SANC initiative since its inception. Pennsylvania looks forward to working with these two companies on the GCP program in the upcoming year. These two facilities have shown an interest in participating in the USDA Voluntary Greenhouse Certification Program (GCP) to ship plant material to Canada. PDA is excited to assist with this new program.

<http://sanc.nationalplantboard.org/>

PLANT PATHOLOGY PROGRAM



The Plant Pathology Program, within the Division of Plant Protection, Bureau of Plant Industry, is responsible for the diagnosis of plant diseases in the Commonwealth, and the control of plant diseases of regulatory significance. The three primary components of Plant Pathology program work are Survey, Diagnostic Services, and Certification Programs.

Fruit Tree Improvement Program

The Pennsylvania Fruit Tree Improvement Program (FTIP) provides specialized virus inspection and testing services for participating PA fruit tree nurseries. All *Prunus* material was tested for plum pox virus (PPV), Prunus necrotic ringspot (PNRSV), prune dwarf virus (PDV), and tomato ringspot virus (ToRSV). A total of 2,623 *Prunus* samples were processed through the FTIP laboratory this year. To monitor for ToRSV, 300 broadleaf weed samples were collected and tested. Forty-nine soil samples were collected from source, nursery production blocks, and proposed sites for nursery production. The soil samples were shipped to North Carolina Dept. of Ag. and Consumer Sciences Agronomic Services Division to assess the presence of *Xiphinema* nematodes.

Registered, common source, and production blocks were found in thrifty growing conditions, with no obvious signs of virus infection. Overall, virus presence is at an acceptable level for all participating nurseries. Positive trees are removed from registered blocks, and positive common source material is avoided when collected for budwood. No PPV was detected in any *Prunus* samples in 2022. PNRSV and PDV remain the most commonly found viruses in the FTIP, with PNRSV comprising 80% of the total virus positive samples, and PDV 11% of total positives. PNRSV was detected in common and registered source blocks, as well as nursery production blocks. PDV was detected in nursery production blocks. No registered or common source blocks were positive for PDV this year. ToRSV was detected in one *Prunus* budded nursery stock sample this year. Twelve broadleaf weed samples tested positive for ToRSV. The ease at which virus-positive seeds can establish within source and nursery blocks makes broadleaf weed control imperative to prevent introduction of ToRSV into the production scheme. Dagger nematodes: *Xiphinema* sp. nematodes were present at low but detectable levels source, nursery production blocks, and proposed sites for nursery production. Their presence makes broadleaf weed control extremely important, to prevent transmission from virus positive weeds to fruit trees.

Sample Type	# Samples Tested	# Samples Positive	Viruses Found	Frequency Overall
Registered Seed Samples	429	5	PNRSV	0.29%
Registered Scion Samples	212	0	None	0.00%

Common Budwood Samples	893	20	PNRSV	2.24%
Rootstock Nursery Samples	180	7	PNRSV & PDV	0.79%
Budded Stock Nursery Samples	839	52	PNRSV, PDV, & ToRSV	0.80%
Broadleaf Weed Samples	300	12	ToRSV	4.00%

Lab Support for Nursery Inspection

In 2022, the Plant Diagnostic Labs processed 860 samples submitted by Plant Inspectors, as recorded in the PAlants database: Pathology (638), Virology (397) and Nematology (4). Testing identified 61 pathogens in 446 host samples: bacteria (5 in 72), fungi/oomycetes (40 in 225), nematodes (2 in 3), viruses (14 in 146). Some samples were processed in multiple labs and found to be co-morbid for pathogens.

Plant Pathogen Detected	Host	Number of Detections
Bacteria		72
<i>Pectobacterium/Dickeya sp.</i>	<i>Zantedeschia sp.</i>	1
<i>Pseudomonas sp.</i>	<i>Berberis sp., Salvia Sp., Syringa sp.</i>	8
<i>Xanthomonas hortorum pv. pelargonii</i>	<i>Geranium sp., Pelargonium sp.</i>	49
<i>Xanthomonas sp.</i>	<i>Amaranthus sp., Brassica sp., Capsicum sp., Myosotis sp. Zinnia sp.</i>	13
<i>Xylella fastidiosa</i>	<i>Quercus sp.</i>	1
Fungi/Oomycetes		225
<i>Alternaria sp.</i>	<i>Begonia sp., Daucus sp., Lupinus sp., Lycopersicon sp., Petunia sp., Phlox sp., Prunus sp., Rhododendron sp., Syringa sp., Viburnum sp.</i>	10
<i>Aspergillus sp.</i>	<i>Allium sp.</i>	1
<i>Blumeriella sp.</i>	<i>Prunus sp.</i>	1
<i>Botrytis sp.</i>	<i>Buddleia sp., Calibrachoa sp., Dracaena sp., Paeonia sp., Persea sp., Petunia sp., Pseudotsuga sp., Spiraea sp., Zinnia sp.</i>	10
<i>Cercospora sp.</i>	<i>Cercis sp., Pieris sp., Rhododendron sp., Viburnum sp.</i>	4
<i>Chrysomyxa sp.</i>	<i>Picea sp.</i>	3
<i>Cladosporium sp.</i>	<i>Buddleia sp., Calathea sp., Pachysandra sp., Persea sp., Petunia sp., Rhododendron sp.</i>	7
<i>Colletotrichum sp.</i>	<i>Guzmania sp., Hosta sp., Lupinus sp., Rhododendron sp. (Azalea), Sansevieria sp.</i>	5
<i>Cyclaneusma sp.</i>	<i>Pinus sp.</i>	1
<i>Cylindrocladium pseudonaviculatum</i>	<i>Buxus sp.</i>	6
<i>Diplodia sp.</i>	<i>Pinus sp., Pseudotsuga sp.</i>	3
<i>Discula sp.</i>	<i>Cornus sp.</i>	2
<i>Dothistroma sp.</i>	<i>Pinus sp.</i>	2

<i>Fusarium sp.</i>	<i>Abies sp., Alnus sp., Alyssum sp., Angelonia sp., Begonia sp., Cannabis sp., Chrysanthemum sp., Crop Situation - Soil, Euphorbia sp., Fragaria sp., Hibiscus sp., Lavandula sp., Paeonia sp., Penstemon sp., Picea sp., Pinus sp., Pseudotsuga sp., Sedum sp., Viburnum sp.</i>	24
<i>Gymnosporangium sp.</i>	<i>Amelanchier sp., Crataegus sp., Malus sp.</i>	5
<i>Lophodermium sp.</i>	<i>Pinus sp.</i>	3
<i>Macrophoma sp.</i>	<i>Buxus sp.</i>	4
<i>Monilinia sp.</i>	<i>Prunus sp.</i>	1
<i>Mycosphaerella sp.</i>	<i>Picea sp.</i>	1
<i>Penicillium sp.</i>	<i>Allium sp.</i>	1
<i>Peronospora sp.</i>	<i>Bacopa sp., Geum sp., Ocimum sp., Salvia Sp., Spinacia sp.</i>	7
<i>Pestalotia sp.</i>	<i>Cedrus sp., Pinus sp.</i>	2
<i>Pestalotiopsis sp.</i>	<i>Cornus sp., Kalmia sp., Prunus sp., Rhododendron sp., Rhododendron sp. (Azalea), Rhus sp., Thuja sp., Viburnum sp.</i>	21
<i>Phaeocryptopus sp.</i>	<i>Pseudotsuga sp.</i>	2
<i>Phomopsis sp.</i>	<i>Abies sp., Kalmia sp., Picea sp., Rhododendron sp., Viburnum sp.</i>	9
<i>Phyllosticta sp.</i>	<i>Aesculus sp., Kalmia sp., Leucothoe sp., Rhododendron sp., Rhododendron sp. (Azalea), Spathiphyllum sp., Syringa sp., Viburnum sp.</i>	14
<i>Phytophthora sp.</i>	<i>Abies sp., Fagus sp., Fragaria sp., Heuchera sp., Kalmia sp., Picea sp., Pieris sp., Pinus sp., Rhododendron sp., Vaccinium sp.</i>	26
<i>Pseudocercospora sp.</i>	<i>Syringa sp.</i>	1
<i>Puccinia horiana</i>	<i>Chrysanthemum sp.</i>	2
<i>Puccinia sp.</i>	<i>Hemerocallis sp., Philodendron sp.</i>	2
<i>Pythium sp.</i>	<i>Abies sp., Lavandula sp., Penstemon Sp., Pinus sp., Syngonium sp.</i>	6
<i>Rhizosphaera sp.</i>	<i>Picea sp.</i>	2
<i>Septoria sp.</i>	<i>Cornus sp., Syringa sp.</i>	2
<i>Stegophora sp.</i>	<i>Ulmus sp.</i>	1
<i>Stigmia sp.</i>	<i>Picea sp.</i>	12
<i>Stomiopeltis sp.</i>	<i>Picea sp.</i>	1
<i>Thielaviopsis sp.</i>	<i>Calibrachoa sp., Catharanthus sp., Paeonia sp., Petunia sp.</i>	7
<i>Tubakia sp.</i>	<i>Quercus sp.</i>	1
<i>Verticillium sp.</i>	<i>Acer sp.</i>	1
<i>Volutella sp.</i>	<i>Buxus sp., Pachysandra sp.</i>	12
Nematodes		3
<i>Bursaphelenchus xylophilus</i>	<i>Pinus sp.</i>	2
<i>Litylenchus crenatae</i>	<i>Fagus sp.</i>	1
Viruses		146
Carlavirus - Potato Virus S	<i>Solanum sp.</i>	6
Ilarvirus - Apple mosaic virus	<i>Rosa sp.</i>	1
Ilarvirus - Prunus necrotic ringspot virus	<i>Rosa sp.</i>	1

Potexvirus - Alternanthera mosaic virus/Papaya mosaic virus	<i>Portulaca sp., Tradescantia sp.</i>	8
Potexvirus - Hosta virus X	<i>Hosta sp.</i>	3
Potyvirus - Potato virus A	<i>Solanum sp.</i>	1
Potyvirus - Potato virus Y	<i>Solanum sp.</i>	19
Potyvirus - Potato virus Y - Necrotic Strain	<i>Solanum sp.</i>	4
Potyvirus Group	<i>Alocasia sp., Curcuma sp.</i>	3
Rose Rosette Disease (Virus Suspected)	<i>Rosa sp.</i>	1
Tobamovirus - Tobacco mosaic virus	<i>Bacopa sp., Calibrachoa sp., Capsicum sp., Nemesis sp., Petunia sp.</i>	74
Tospovirus - Impatiens Necrotic Spot Virus	<i>Amaryllis sp., Antirrhinum sp., Begonia sp., Capsicum sp., Impatiens sp., Lobelia sp., Lycopersicon sp., Peperomia sp., Ranunculus sp.</i>	11
Tospovirus - Tomato spotted wilt virus	<i>Capsicum sp., Lycopersicon sp., Rhipsalidopsis sp.</i>	6
Virus, family not yet determined	<i>Ficus sp., Hydrangea sp., Spiraea sp., Tradescantia sp.</i>	8

Plant Pathology Surveys

2022 Cooperative Agricultural Pest Survey

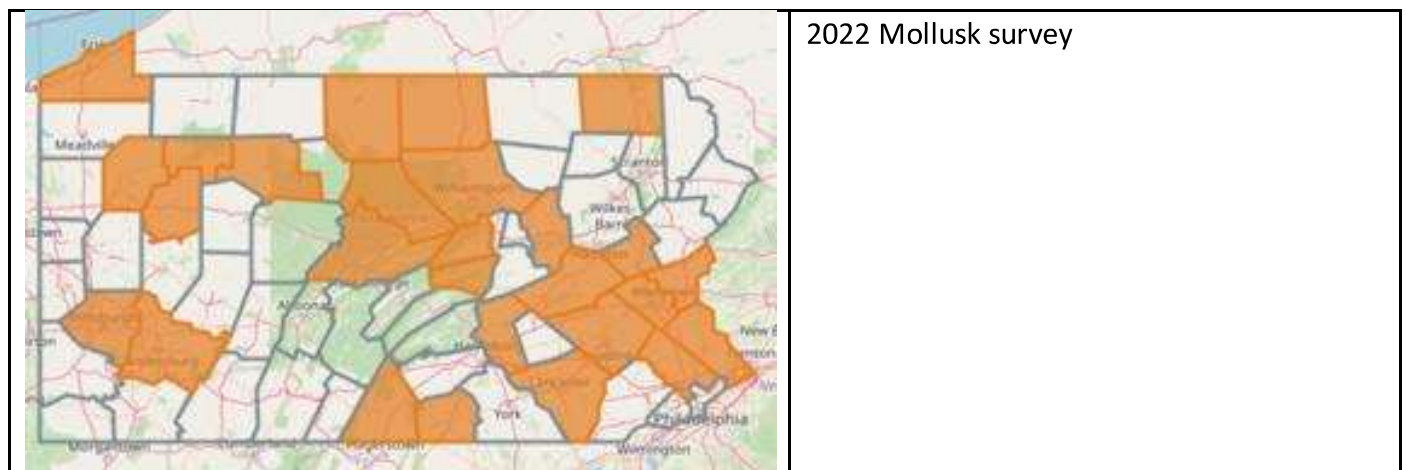


Pennsylvania Department of Agriculture leads the Cooperative Agriculture Pest Survey (CAPS) in PA with support from Pennsylvania Department of Conservation and Natural Resources, The Pennsylvania State University, Penn State Extension, DHS-Customs and Border Protection and USDA-APHIS-Plant Protection and Quarantine. The coordinating committee meets annually to review program needs and accomplishments and to network about pest issues of concern to the Commonwealth. The infrastructure provided through the CAPS program creates a ready resource of expertise and diagnostic ability to address new introductions of damaging insects, pathogens, nematodes and weeds.

1. Mollusk survey.

Visual survey was conducted at 46 sites (nurseries, greenhouses, retails, and warehouses) located in 27 PA counties. A total of 1,144,317 plants have been inspected. Twenty four samples were collected and sent to USDA PPQ Identifier. No target pests have been found. One slug collected from Lycoming County nursery was identified as *Arion sp.* *Arion sp.* is listed as Quarantine pest. Four Quarantine Amber snails (*Succinea sp.*) were identified from two PA nurseries and one from environmental condition. One snail from Lehigh nursery was confirmed as *Planorbella trivolvis* Say (Ram's-Horn Snail), a non-Quarantine freshwater snail.

Survey Component	Common Name	Sites	Counties	Samples	Plants Surveyed	County Names:
<i>Ceruellia spp.</i>	Hygromiid snails	46	27	24	1,144,317	Adams, Allegheny, Berks, Bucks, Carbon, Centre, Clarion, Clinton, Columbia, Dauphin, Elk, Erie, Forest, Franklin, Lancaster, Lehigh, Lycoming, Montgomery, Northampton, Potter, Schuylkill, Snyder, Susquehanna, Tioga, Union, Venango, Westmoreland
<i>Cochlicella spp.</i>	Cochlicellid Snails	46	27	24	1,144,317	
<i>Belocaulus spp.</i>	Leatherleaf slugs	46	27	24	1,144,317	
<i>Colosius spp.</i>	Leatherleaf slugs	46	27	24	1,144,317	
<i>Laevicaulis spp.</i>	Leatherleaf slugs	46	27	24	1,144,317	
<i>Sarasinula spp.</i>	Leatherleaf slugs	46	27	24	1,144,317	
<i>Semperula spp.</i>	Leatherleaf slugs	46	27	24	1,144,317	
<i>Veronicella spp.</i>	Leatherleaf slugs	46	27	24	1,144,317	
<i>Meghimatium pictum</i>	Chinese slug	46	27	24	1,144,317	
<i>Monacha spp.</i>	Hygromiid snails	46	27	24	1,144,317	
<i>Lissachatina fulica</i>	Giant African snail	46	27	24	1,144,317	



2. Nursery/Greenhouse Pathogen Survey.

The targets for 2022 survey were Alder root and collar rot (*Phytophthora alni*), Scots Pine Blister Rust (*Cronartium flaccidum*), Cypress mortality (*Phytophthora austrocedrae*), Beech leaf disease (*Litylenchus crenatae*) and Boxwood Blight (*Calonectria pseudonaviculata*). The first three diseases are on the National Pest Priority list and not known to be present in Pennsylvania. During their plant inspection duties, PDA Plant Inspectors documented sites where susceptible host material was present and noted whether or not symptoms of diseases were found. Samples were taken to the lab when symptoms were present. The samples were examined and/or tested in the PDA labs for survey target pathogens in addition to receiving a general diagnostic examination. PDA Plant Inspectors inspected 41,207 boxwood, 48,312 pine, 20,817 juniper, 1,325 alder and 6,465 beech plants in nurseries and retail stores. No positive results have come from this survey for exotic target organisms. Boxwood blight was detected in four boxwood samples.

Survey Component	Common Name	Sites	Counties	Samples Submitted/ Positive	Plants Surveyed
Alder root and collar rot	<i>Phytophthora alni</i>	5	4	1/0	1,325
Scots pine blister rust	<i>Cronartium flaccidum</i>	87	31	0	48,312
Mal del ciprés (Cypress mortality)	<i>Phytophthora austrocedrae</i>	106	40	1/0	20,817
Boxwood blight	<i>Calonectria pseudonaviculata</i>	164	43	7/4	41,207
Beech leaf disease	<i>Litylenchus crenatae</i>	51	21	2/0	6,465



2022 Plant Protection Act 7721 Goal 1 Surveys



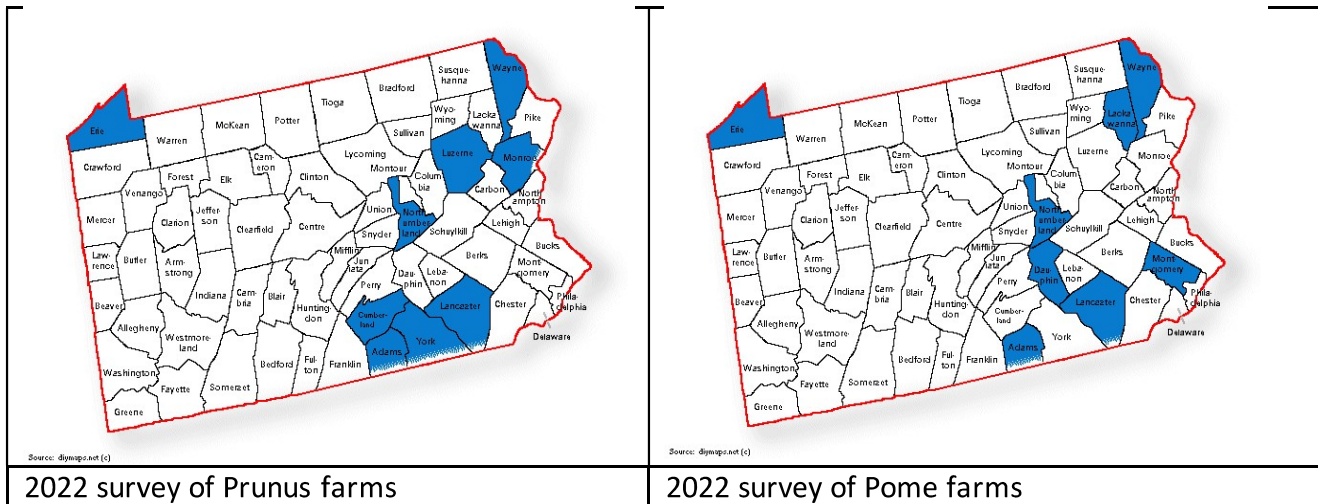
1. Exotic Disease Survey in Orchards.

This survey was done cooperatively by PDA and PSU. 2021 survey targeted a group of important pathogens of fruit orchards: Plum pox virus (PPV), European stone fruit yellows (*Candidatus Phytoplasma prunorum*), Almond witches' broom (*Candidatus Phytoplasma phoenicium*), Apple proliferation (*Candidatus Phytoplasma mali*), and Apple brown rot (*Monilinia fructigena*) and Little cherry disease (Little cherry virus). A multi-county survey included visual inspection and sampling/testing for the pests.

Survey Component	Common Name	Host	Sites	Counties	Samples
Apple proliferation	<i>Candidatus Phytoplasma mali</i>	Apple	20	8	52
European stone fruit yellows	<i>Candidatus Phytoplasma prunorum</i>	Peach, Apricot, Nectarine	30	9	81
Almond witches' broom	<i>Candidatus Phytoplasma phoenicium</i>	Peach, Nectarine	30	9	81
Plum pox virus	Potyvirus Plum pox virus	Peach, Apricot, Nectarine, Plum	20	7	12,070
Brown rot, Apple brown rot	<i>Monilinia fructigena</i>	Apple, Apricot, Cherry, Nectarine, Peach, Plum	21	9	133
Velarivirus Little cherry virus	Little cherry virus	Cherry	8	5	2

Plum pox virus survey. 2022 PPV survey was conducted in seven PA counties (Adams, Cumberland, Erie, Lancaster, Luzerne, Monroe, York). The majority sampling was done in Adams County, the state's top county in both stone fruit and stone fruit nursery tree production. PDA team was able to sample 20 orchard blocks and collect 12,070 samples. All samples were found negative for plum pox virus in ELISA tests.

European stone fruit yellows and Almond witches' broom phytoplasma survey. PDA team visited 30 stone fruit blocks located in nine PA counties (Adams, Cumberland, Erie, Lancaster, Luzerne, Monroe, Northumberland, Wayne, York) and collected 81 samples from peach, apricot, cherry, and plum trees. PDA lab has been approved by USDA PPQ to run molecular diagnostic screening for Phytoplasma since 2015. DNA samples were tested using USDA-PPQ validated Phytoplasma-specific real-time PCR protocol (Hodgetts et al. 2009). No positive samples found.



Apple proliferation phytoplasma survey. Twenty apple blocks located in eight PA counties (Adams, Dauphin, Erie, Lackawanna, Lancaster, Montgomery, Northumberland, Wayne) were visited and inspected for signs and symptoms of phytoplasma. Fifty two samples were collected and tested for phytoplasma. No positive samples found.

Apple brown rot survey. Visual survey conducted at the same apple, pear and stone fruit sites located in nine PA counties. No positive samples found.

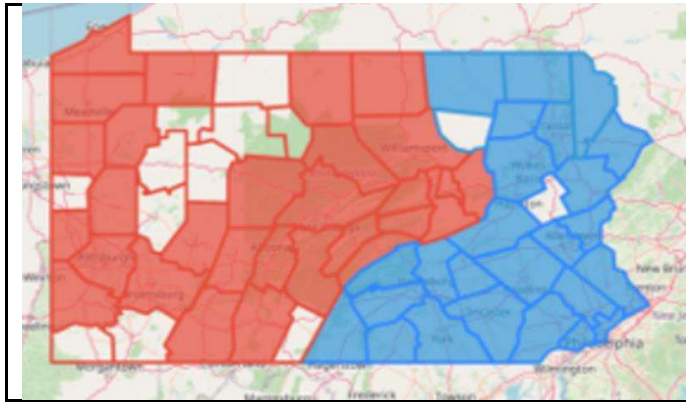
Little cherry disease survey. Eight cherry blocks were surveyed in five PA counties (Adams, Erie, Lancaster, Monroe, York). Two samples were taken to the lab and tested using LAMP protocol. No positive samples found.

3. *Phytophthora ramorum* Program Nursery Survey.

All work was done as described in the *Phytophthora ramorum* Nursery Survey Manual on the APHIS website. PDA lab maintains NPPLAP certification to run national regulatory *P. ramorum* samples since 2006. In 2022, two PDA diagnosticians were accredited by NPPLAP to run molecular detection of *P. ramorum* by both conventional and real-time PCR. Priority was given to nurseries with higher risk for *P. ramorum* distribution because they receive susceptible host material from states where the disease currently is known to exist, or they propagate and sell host material to others, either intra- or interstate. In a process of nursery survey, Plant Inspectors specifically targeted five high-risk host genera: Rhododendron, Kalmia, Camellia, Pieris, and Viburnum.

Number nurseries	Number of other sites ¹	Number of water samples tested	Number of water samples positive	Number of soil samples tested	Number of soil samples positive	Number of plant samples tested	Number of plant samples positive	Plants Surveyed
118	69	36	0	28	0	208	0	48,125

¹Retail stores like Home Depot and Lowes



Map of PA counties surveyed in 2022 in *P. ramorum* nursery survey.

In 2022, PDA Plant Inspectors visited 118 nurseries and 69 retail stores located in 52 PA counties and conducted visual survey for signs and symptoms of *P. ramorum*. A total of 48,125 plants (*Rhododendron* spp. – 33,043, *Kalmia* spp. - 561, *Pieris* spp. - 3,470, *Viburnum* spp. – 10,993, and *Camelia* spp. - 58) were inspected at these locations. PDA Plant Inspectors submitted 208 symptomatic plant, 36 water and 28 soil samples to PDA lab. Water samples were processed according to PPQ Water Sampling Protocol using BOB method. DNA samples were extracted using Qiagen kit from symptomatic plants and from baited water samples. All DNA samples were screened via USDA PPQ approved real-time PCR protocols for the presence of *P. ramorum*. In result, all samples were found negative for the presence of *P. ramorum*.

3. Vegetable Disease Survey.

In 2022, PA vegetable pest survey targeted high-risk pathogens, including *Candidatus* Phytoplasma australiense (Australian grapevine yellows), *Candidatus* Phytoplasma solani (Stolbur disease), *Ralstonia solanacearum* race 3 biovar 2 (Bacterial wilt), *Dickeya solani* (Exotic potato black leg), Cucumber green mottle mosaic virus (CGMMV), Groundnut bud necrosis virus (GBNV), Tobamovirus Tomato brown rugose fruit virus, and *Synchytrium endobioticum* (Potato wart). The survey included visual inspection, sampling and lab testing for pathogens according to 2022 USDA Approved Methods.

Australian grapevine yellows. Fourteen potato fields in six PA counties were visited and inspected for the symptoms of phytoplasma. A total of 27 samples were taken to PDA lab. Samples were processed and kept at -20°C. DNA extraction from leaf mid-veins was performed using Qiagen kit (Qiagen, Valencia, CA) according to the manufacturer's instructions. DNA samples were tested using USDA-PPQ validated Phytoplasma-specific qPCR protocol (Hodgetts et al. 2009). All samples were found negative for phytoplasma.

Exotic Stolbur phytoplasma. PDA survey team visited and inspected 23 Solanaceous fields (potato, tomato, eggplants, and pepper) in seven PA counties for the symptoms of phytoplasma. A total of 50 samples showing purpling, yellowing and upward rolling of the leaves were taken to PDA PDL. All samples were tested in qPCR protocol and found negative for phytoplasma.

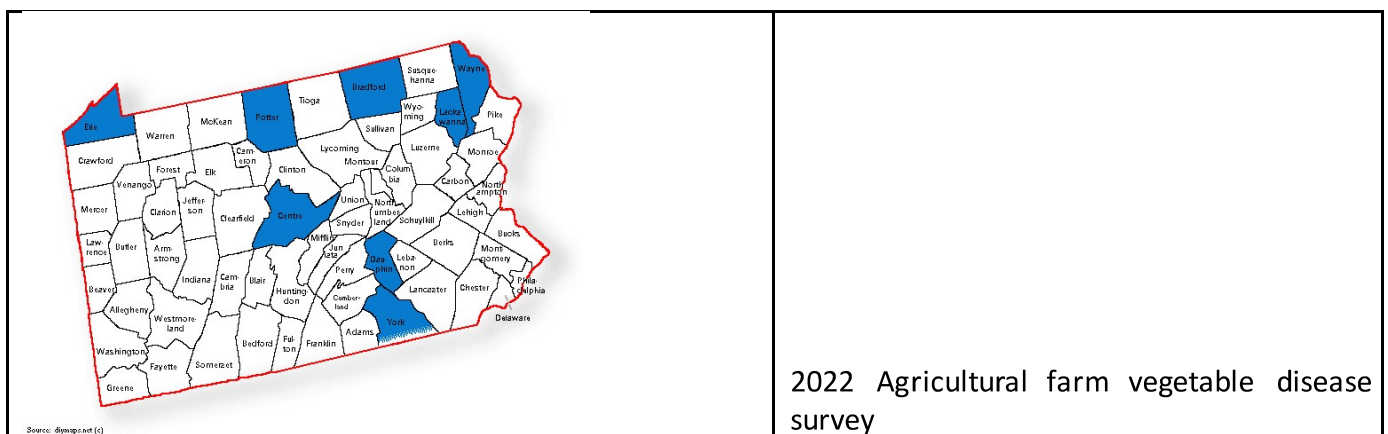
Bacterial wilt survey. Twenty three sites were inspected for the symptoms of bacterial wilt. Three samples with symptoms of wilting, yellowing of the leaves and browning of vascular tissue were tested by ELISA immunostrips specific to *Ralstonia solanacearum* and found negative.

Potato wart survey. In September – November 2022, potato tubers from eight fields located in three PA counties were screened for potato tuber galls and warty growths. No suspect samples found.

Common Name	Scientific name	Host	Sites	Counties	Samples
Australian grapevine yellows	Candidatus Phytoplasma australiense	Potato, tomato	14	6	27
Stolbur Phytoplasma	Candidatus Phytoplasma solani	Potato, Tomato, Eggplant, Pepper	23	7	50
Bacterial wilt	Ralstonia solanacearum race 3 biovar 2	Potato, Tomato, Eggplant, Pepper	16	7	3
Tobamovirus Tomato Brown Rugose Fruit Virus	ToBRFV	Tomato, Pepper	16	7	33
Potato wart	Synchytrium endobioticum	Potato	8	3	10
Tobamovirus Cucumber green mottle mosaic virus	CGMMV	Cucumber, Pumpkin, Squash, Zucchini, Watermelon	12	5	33
Exotic Potato black leg	Dickeya solani	Potato	14	6	33
Groundnut bud necrosis virus	GBNV	Potato, Tomato, Eggplant, Pepper	16	7	33

Groundnut bud necrosis virus (GBNV) and Tomato brown rugose fruit virus (ToBRFV) surveys. Sixteen sites were inspected for the symptoms of GBNV and ToBRFV. Thirty three samples were taken to the lab and tested with ELISA tests specific to GBNV and ToBRFV. Based on our results, all samples were found negative for the tested viruses.

Cucumber green mottle mosaic virus. Eight cucurbit (cucumber, pumpkin, squash, zucchini, and watermelon) sites in three PA counties were visited and inspected for symptoms of CGMMV. Ten samples were taken to the lab and tested with ELISA specific to CGMMV. All samples were found negative.



National Forest Stream survey for *Phytophthora ramorum*.

Since 2010, PDA lab is serving as a regional lab for the Eastern Regional Forest Stream Survey for *P. ramorum*. In 2022, 66 forest stream sites in ten US states: AL (9 stream sites), FL (3 stream sites), GA (10 sites), IL (5 sites), MD (7 sites), MS (5 sites), NC (5 sites), PA (6 sites), SC (9 sites), TX (6 sites), were surveyed in Sudden Oak Death Forest stream survey. Total DNA was extracted in PDA or PSU labs and PCR was done in PDA lab using USDA-APHIS-PPQ protocol. In result, *P. ramorum* was detected in five sites located in two states. All results were reported to USDA Forest Service officials.

Number of samples collected and analyzed in 2021 stream survey:

States	AL	FL	GA	IL	MS	MD	NC	PA	SC	TX	Total
Samples tested	108	12	120	22	56	88	42	48	98	66	660

Diagnostic Support to Other States in 2022 (samples):

State	Number of samples tested
➤ Exotic phytoplasma	
New Jersey	35
Rhode Island	19
➤ <i>Phytophthora ramorum</i> nursery survey	
Connecticut	158
Kentucky	81
West Virginia	329
Vermont	263
➤ <i>Phytophthora ramorum</i> trace-forward samples	
New Jersey	51
West Virginia	4

SPOTTED LANTERNFLY PROGRAM:

2022 was a encouraging year for the Spotted Lanternfly (SLF) team. While the quarantine expanded by 6 counties, this increase was smaller than years previous and only one incident appeared to be caused by non-natural spread. Staffing maintained levels of 29 limited term and seasonal employees throughout the 2022 treatment season. Additionally, a new office was opened in Greensburg, PA, enabling staff in the western SLF treatment zone to have a space to more effectively plan and stage their treatments for the 2023 season.

Compliance and Enforcement

2022 was primarily a rebuilding year for compliance and enforcement. Despite being down to two technicians at one point, the compliance and enforcement team has come back to be at full capacity with more members than ever. There are now six technicians spanning the entire commonwealth. The team reached over 750 businesses during their compliance assistance work throughout 2022.

Much attention has been placed on testing a new database for SLF permitting and inspections. Compliance and enforcement has been working closely with the developers throughout the year to inform them of our needs as well as test what they have built. The team is very excited to have this tool to assist with our efforts.

The K9 team was able to conduct 63 business inspections throughout the year, as well as many trainings. There were egg masses detected during two of those inspections. The inspection that stands out the most included inspection of over 400 pallets of fruit trees being shipped to Canada. This is the second year straight that no SLF has been found during this inspection.

Roadside inspections resumed during 2022 in a limited capacity. The team partnered with Pennsylvania State Police to conduct two separate inspections. During these inspections, 15 trucks were inspected and given notice of the permitting requirements. Planning is currently underway to get the 2023 inspections scheduled.

The whole team has continued to work closely with the entomology staff to trap and treat for spotted lanternfly during 2022. They have also been following up on public reports when needed. These efforts are included in the data submitted by the entomology staff.

SPOTTED LANTERNFLY COMMUNICATIONS AND OUTREACH:

PDA continues to work with the communications offices of both Penn State University and the United States Department of Agriculture to bring a united and consistent message to all people in the Commonwealth. These messages go out through various means, including social media posts, press releases, news interviews, public events, informational handouts, videos, billboards, signs for parks and other public places, and advertising in newspapers, radio, and on public transportation.

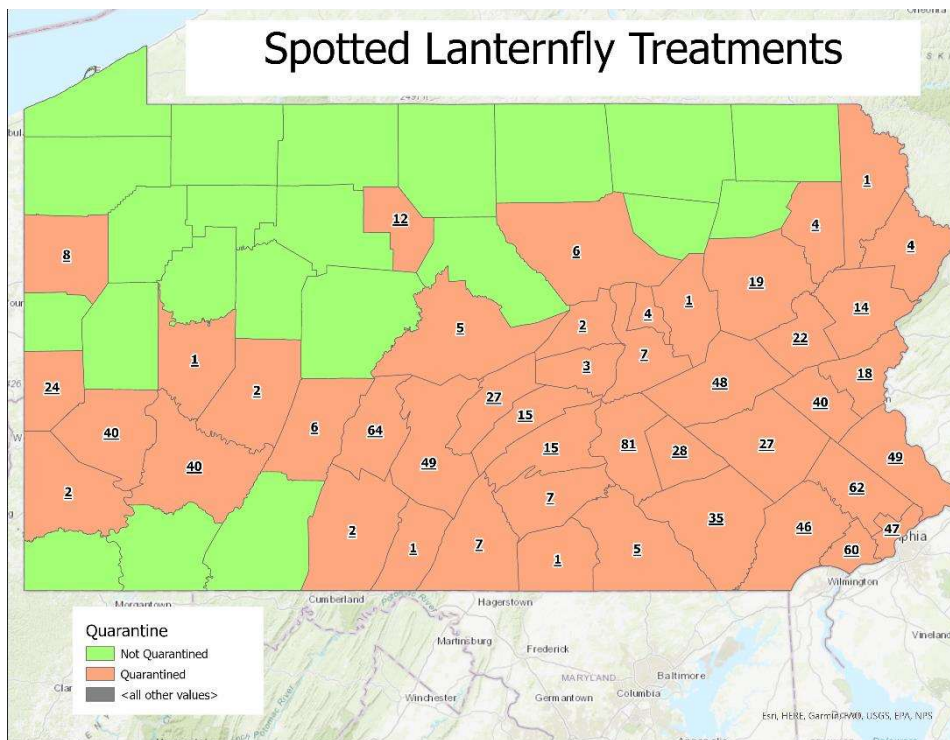
PDA also works with Penn State University to maintain a Public Reporting Tool for recording sightings of SLF by the public. The ability to report is available either online via a PDA-created web application or through contacting a call center staffed by Penn State. Reports from outside the known infested areas are followed up by PDA staff across the state, where reporters are contacted and visited to confirm sightings and to quickly discover and control emerging populations. In 2022, more than 55,000 reports of Spotted Lanternfly were made by Commonwealth residents.

FEDERAL ASSISTANCE:

USDA has supported PDA efforts by supplying funding to support surveillance and control activities. USDA and PDA staff work jointly to effectively survey and control SLF both in quarantined and non-quarantined counties.

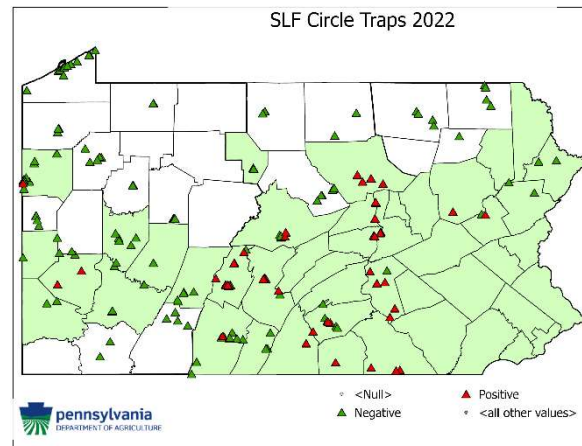
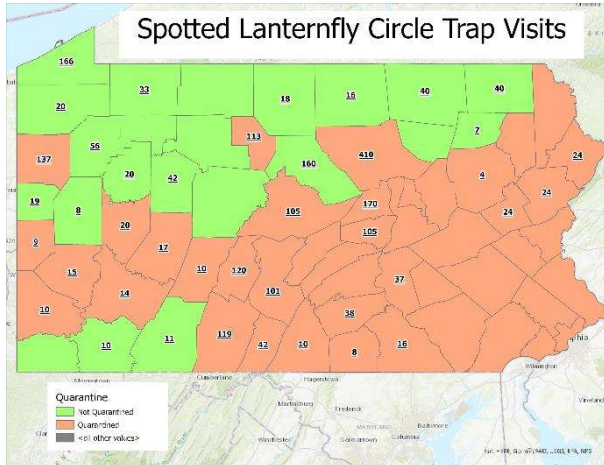
SPOTTED LANTERNFLY SURVEY AND TREATMENT OVERVIEW:

SLF related treatment or survey activity took place in all 67 counties of Pennsylvania in 2022. Treatments were completed in every county of the quarantine, and visual surveys or circle trap visits were completed in every non-quarantined county. The 2022 treatment season saw nearly 60,000 trees treated (59367 total- 50877 systemic insecticide and 8490 systemic herbicide), and almost 1700 acres of broadcast treatments completed (1696 acres). Systemic treatments increased by 10.7% and contact insecticide treatments increased by 14.4%. Treatment expenditures equaled \$5,441,627 spread across 597 treatments at 438 properties, effectively treating 24,818 property acres.



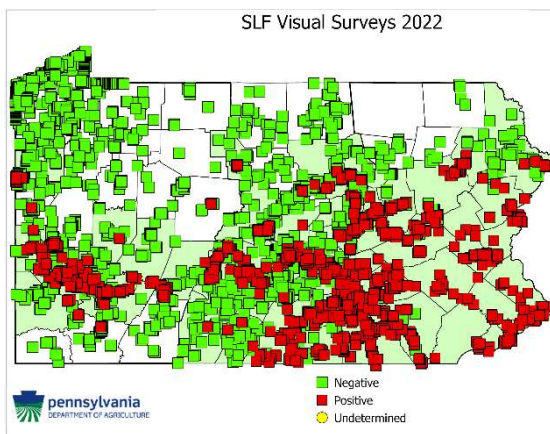
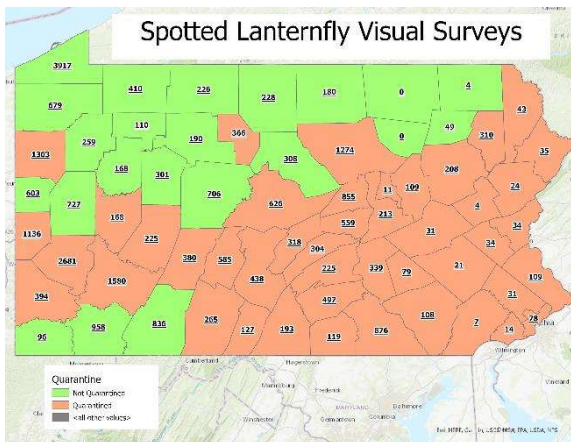
SPOTTED LANTERNFLY CIRCLE TRAP SURVEY:

- 296 Circle traps were established across 42 counties by 17 staff members



SPOTTED LANTERNFLY VISUAL SURVEY:

- 26,611 completed in 66 counties
- 5,317 surveys (20%) positive
- Average surveys per county were 396
- Maximum of 4114 surveys completed (Erie Co.)



ENTOMOLOGY PROGRAM

The Pennsylvania Department of Agriculture (PDA) Entomology Program is responsible for the regulation of insect pests of plants, which includes survey, laboratory analysis, and control/mitigation of new invasive insects when warranted.

For surveys conducted by PDA, all samples were screened for Long-horned beetles (Cerambycidae), Jewel beetles (Buprestidae), Bark beetles (Scolytinae), Horntail wasps (Siricidae), wasps in the family Vespidae,

Bumble bees (*Bombus*), Spotted Lanternfly (*Lycorma delicatula*) and other select species depending on the survey. 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 public.

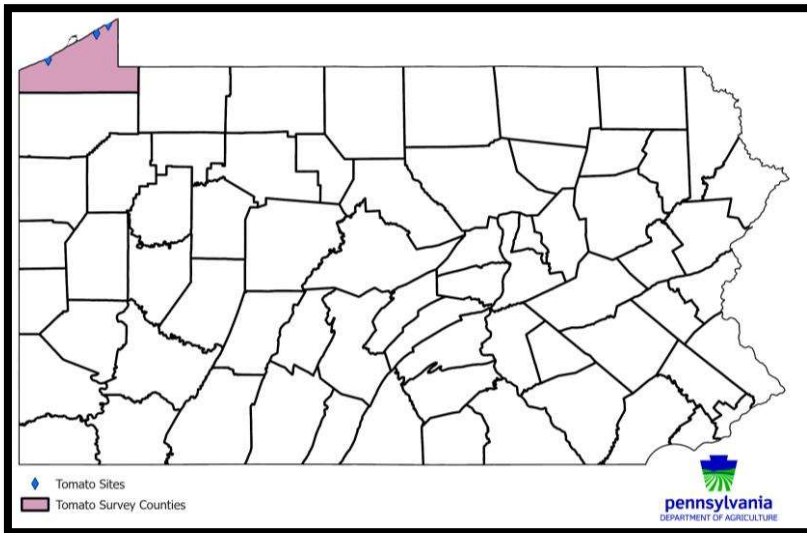
FEDERAL ASSISTANCE

USDA has supported PDA efforts by supplying funding to support surveillance and control activities. USDA and PDA staff work jointly to effectively survey and control SLF both in quarantined and non-quarantined counties.

TOMATO COMMODITY SURVEY:

The Golden twin-spot moth (*Chrysodeixis chalcites*) is a species native to Europe and Africa that has demonstrated invasive ability by becoming established in New Zealand and periodically being discovered in Canada. No known established populations occur in the U.S., but sightings occasionally occur around the Great Lakes. PDA conducted survey at 3 tomato grower locations in Erie County along the coast of Lake Erie. A total of 44 samples were taken and no Golden twin-spot moths were identified.

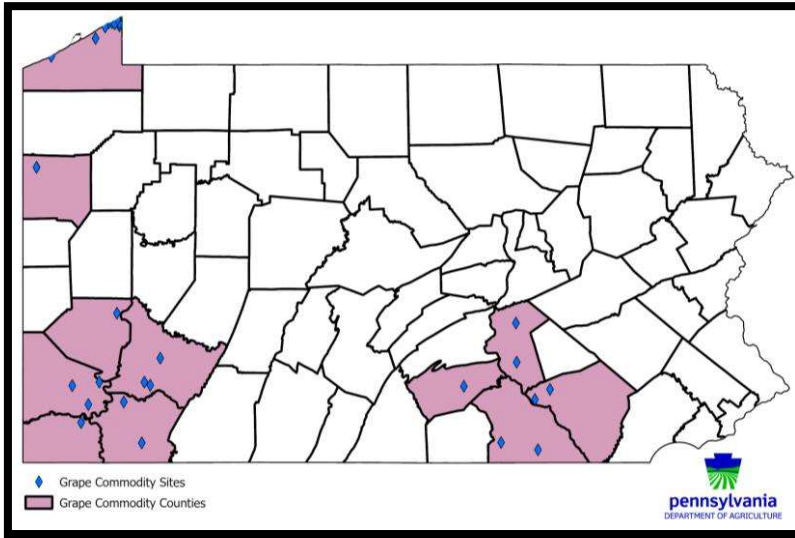
- 3 trap sites in 1 county
- 6 trap locations
- 44 Samples
- 10 specimens identified
- 0 target pests identified



GRAPE COMMODITY SURVEY:

PDA first implemented a grape pest survey in 2010, using Farm Bill (now called PPA section 7721) funds from the USDA. This survey has been continued annually through 2022. The survey was run from May until the end of October 2022. Surveillance was conducted for the European grapevine moth (*Lobesia botrana*) and the Christmas berry webworm moth (*Cryptoblabes gnidiella*). The Spotted lanternfly was also targeted and is covered under the Spotted lanternfly section of this report. Survey was conducted by PDA in the following 11 counties: Allegheny, Cumberland, Dauphin, Erie, Fayette, Greene, Lancaster, Mercer, Washington, Westmoreland and York. Survey crews established 27 trap sites and deployed 54 traps at locations supporting wine and juice production. The PDA lab received and processed 619 samples, from which 152 specimens were identified. No target species were detected.

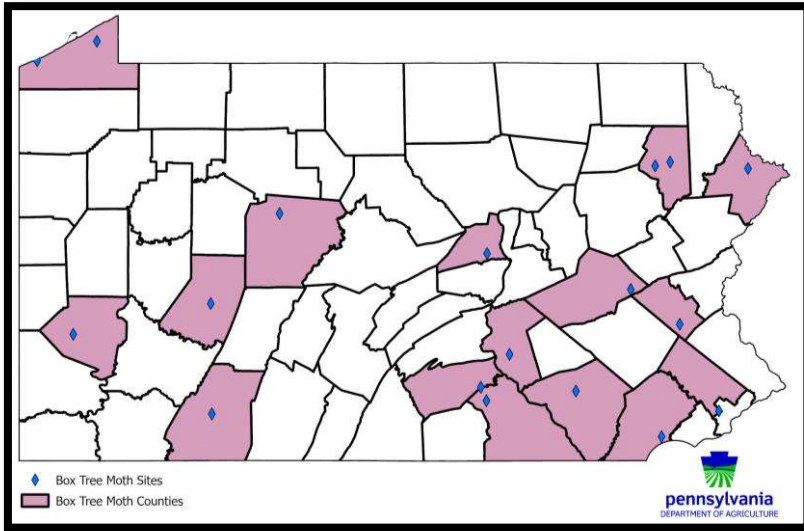
- 27 trap sites in 11 counties
- 54 trap locations
- 619 Samples
- 152 specimens identified
- 0 target pests identified



BOX TREE MOTH:

In response to the detection of box tree moth (*Cydalima perspectalis*) in Toronto, Ontario, Canada in November 2018, PDA conducted a box tree moth survey in Pennsylvania in 2020. This survey has continued through 2022, with survey being conducted in the following 16 counties in 2022: Allegheny, Chester, Clearfield, Cumberland, Dauphin, Erie, Indiana, Lackawanna, Lancaster, Lehigh, Montgomery, Pike, Schuylkill, Somerset, Union and York. Survey crews established 18 trap sites with one trap per location at establishments supporting boxwood nursery stock or boxwood ornamental plantings. Crews collected trap samples through the end of October. A total of 182 samples were submitted to the PDA lab, from which 187 specimens were identified. No box tree moths were detected.

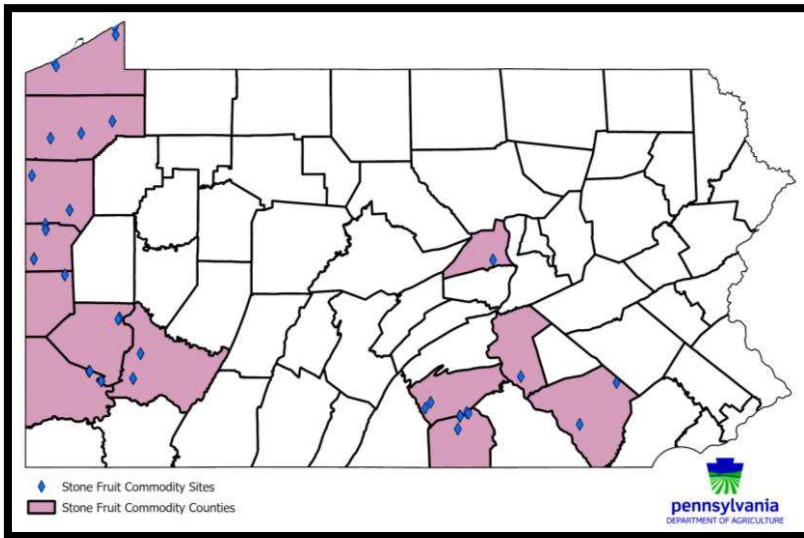
- 18 trap sites in 16 counties
- 18 trap locations
- 182 Samples
- 187 specimens identified
- 0 target pests identified



STONE FRUIT SURVEY:

The objective of this project was to survey for three exotic pests of cherry and other stone fruits, the European Cherry Fruit Fly (*Rhagoletis cerasi*), European grapevine moth (*Lobesia botrana*), and summer fruit tortrix moth (*Adoxophyes orana*). Survey was conducted by PDA in the following 13 counties: Adams, Allegheny, Beaver, Crawford, Cumberland, Dauphin, Erie, Lancaster, Lawrence, Mercer, Union, Washington and Westmoreland. PDA staff placed traps in cherry orchards or on bush honeysuckle situated along wooded edges or fencerows near produce markets. Traps were serviced every two weeks and then sent to the PDA laboratory to be screened for the target pests. A total of 27 sites with 201 traps were established and a total of 1,759 samples were processed. No target exotic stone fruit pests were identified.

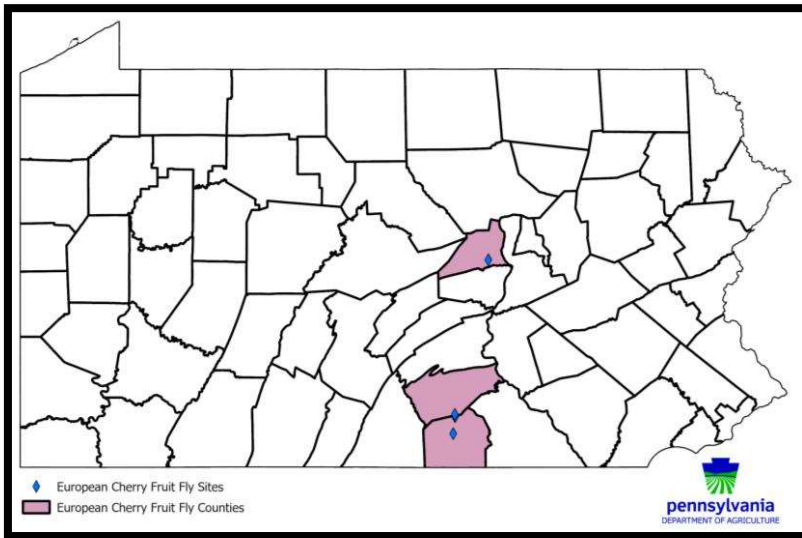
- 27 trap sites in 13 counties
- 201 trap locations
- 1759 Samples
- 52 specimens identified
- 0 target pests identified



EUROPEAN CHERRY FRUIT FLY SURVEY

The objectives of this project emphasize early detection of the European cherry fruit fly (ECFF), *Rhagoletis cerasi* at a large cherry processing facility in PA. The ECFF reduces yields, negatively impacts marketability of fruit, and causes economic losses to cherry producers. A total of 4 trap sites, each with multiple traps, were established on the properties of the facility. In addition to trapping, incoming cherries were examined for the presence of ECFF larvae. No ECFF were detected in the traps or the cherries.

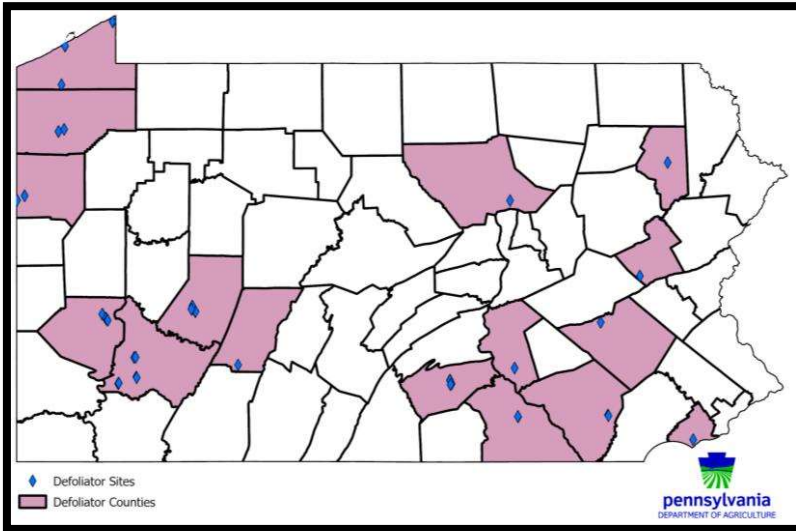
- 4 trap sites in 3 counties
- 30 trap locations
- 210 Samples
- 11 specimens identified
- 0 target pests identified



DEFOLIATOR SURVEY:

The objectives of this project emphasize the early detection of defoliator pests of hardwoods that are native to Asia (*Lymantria dispar asiatica*, *L. dispar japonica*, *L. albescens*, *L. postalba*, and *L. umbrosa*). Survey was conducted in the following 16 counties: Allegheny, Berks, Cambria, Carbon, Crawford, Cumberland, Dauphin, Delaware, Erie, Indiana, Lackawanna, Lancaster, Lycoming, Mercer, Westmoreland and York. PDA deployed seasonal survey crews and inspection staff to establish and monitor traps at 29 sites, at which 54 traps, baited with *Lymantria* lures, were run June through September. Samples contained 12,273 specimens tentatively identified morphologically as *Lymantria dispar*. The target species cannot be reliably separated from the Spongy moth, *Lymantria dispar dispar*, therefore these specimens were shipped to the USDA APHIS FPM lab in Buzzards Bay, Massachusetts where genetic analyses on a subset of the specimens were conducted. Of the 1,258 specimens for which molecular results were obtained, none were target species or subspecies. All were determined to be *Lymantria dispar dispar* (the European subspecies which is well established in Pennsylvania).

- 29 trap sites in 16 counties
- 54 trap locations
- 231 Samples
- 12,273 specimens identified
- 0 target pests identified



COOPERATIVE AGRICULTURAL PEST SURVEY (CAPS) EXOTIC WOOD BORING BEETLE SURVEY (EWBB):

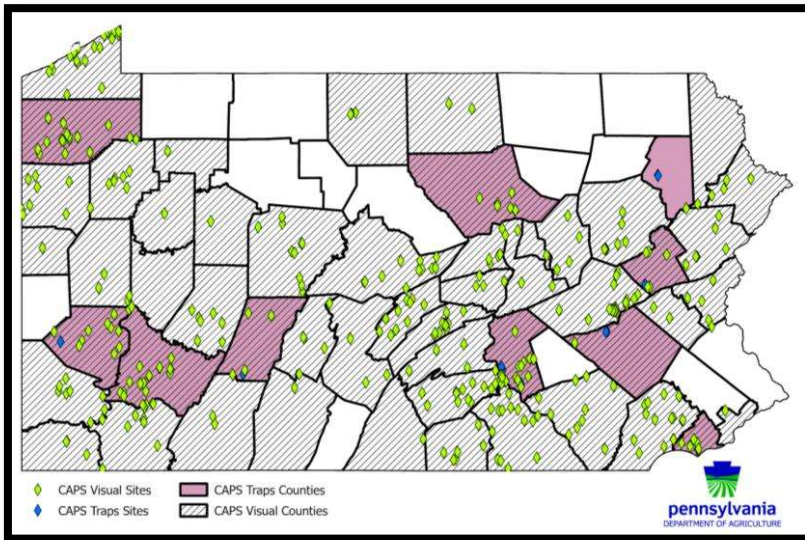
The Cooperative Agricultural Pest Survey is a federally funded survey that targets pests of specific national concern to agriculture. Though the Exotic Wood Boring Beetle Survey targets species of national concern, species of state concern are also targeted. Due to the extreme economic impact caused when non-native wood destroying insects are introduced to PA, PDA participates in this survey annually. Surveys are carried out in accordance with national survey guidelines. Pests of state concern can be surveyed in a more flexible manner. In 2022, thirteen beetle species (see table below) affecting oak, maple, walnut, other hardwoods, and conifers were selected as target species. Information from the interception of pests at ports provided by the U.S. 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 some pests require visual surveillance, while others call for pheromone or plant volatile-baited traps.

For pests that are trapped, 12 sites were established at locations deemed high-risk for exotic pest introduction. Each site contained 8 variously baited traps for a total of 96 trap locations, which were monitored every two weeks from April through October. The traps generated a total of 1,319 samples and 13,180 specimens were identified by the PDA lab staff. Two specimens of a target pest, *Trichoferus campestris* (Cerambycidae), were collected in traps in Berks County. This species is native to Asia and was first detected in the U.S. in New Jersey in 1997. The species is now well established in parts of the U.S., but is not yet common in PA.

Species	Common Name	Host
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<i>Agrilus biguttatus</i>	Oak splendour beetle	Oak
<i>Anoplophora glabripennis</i>	Asian longhorned beetle	Maple, elm, birch, willow, poplar
<i>Hylurgops palliatus</i>	Lesser spruce shoot beetle	Spruce
<i>Hylurgus ligniperda</i>	Red-haired pine bark beetle	Pine
<i>Ips sexdentatus</i>	Six-toothed bark beetle	Pine
<i>Ips typographus</i>	European spruce bark beetle	Spruce
<i>Megaplatypus mutatus</i>	Ambrosia beetle	Poplar, Walnut
<i>Monochamus urussovii</i>	Black fir sawyer beetle	Pine, Spruce
<i>Platypus quercivorus</i>	Oak Ambrosia beetle	Oak
<i>Sirex noctilio</i>	Sirex woodwasp	Pine
<i>Tetropium castaneum</i>	Black spruce beetle	Spruce, Pine
<i>Tetropium fuscum</i>	Brown spruce longhorned beetle	Pine
<i>Trichoferus campestris</i>	Velvet longhorned beetle	Cherry, Mulberry

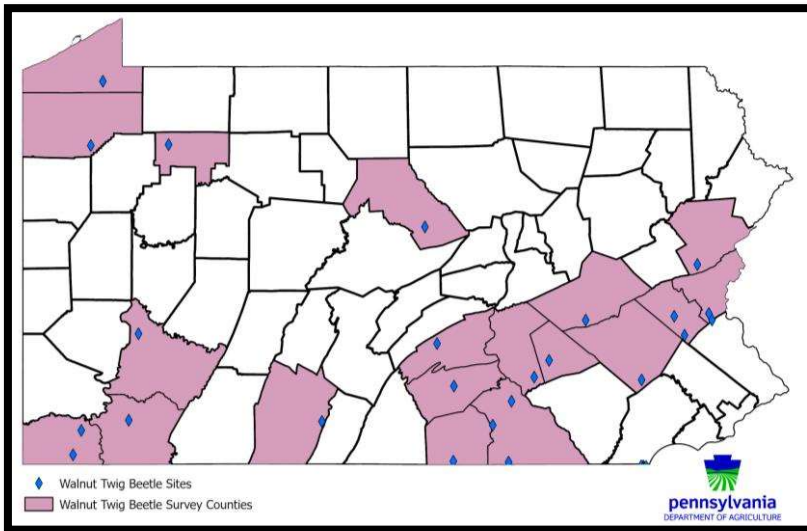
- 12 trap sites in 10 counties
- 96 trap locations
- 1,319 Samples
- 13,180 specimens identified
- 2 target pests identified
- 352 trap visual sites in 52 counties
- 3 specimens identified
- 0 target pests identified



WALNUT TWIG BEETLE:

In 2011, Penn State Cooperative Extension received a sample of dying black walnut from Bucks County. The cause was determined to be Thousand Cankers Disease, a disease complex caused by the interactions of a bark beetle, walnut twig beetle (*Pityophthorus juglandis*) 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 initiated a statewide trapping survey for the beetle. In 2021, PDA performed its final survey for this beetle to support the quarantine order. The quarantine was repealed on January 15, 2022, ending the quarantine order for the state. While the quarantine has ended, PA did continue to survey for this pest in 2022. PDA staff established 24 trap sites in 19 counties, from which 241 samples were taken. A total of 1,368 specimens were identified, but none were the target species of *Pityophthorus juglandis*.

- 24 trap sites in 19 counties
- 24 trap locations
- 241 Samples
- 1,368 specimens identified
- 0 target pests identified



APIARY PERMITS ISSUED:

The Pennsylvania Department of Agriculture (PDA) issued 56 Certificates of Inspection to process export permits for beekeepers requesting permission to allow honey bees and/or used equipment to leave PA. All hives and equipment leaving PA were also inspected for Spotted Lanternfly (SLF) whether the bee yard was in a quarantined county or not. Beekeepers were instructed on what to look for and how to kill any SLF they saw on equipment and/or vehicles. Many also have taken the online permit training and testing to increase their awareness and knowledge of SLF.

There were 205 permits issued to beekeepers wishing to raise, produce, and/or sell queen honey bees and/or nucleus colonies within Pennsylvania.

APIARY INSPECTION PROGRAM:

The value of the apiary industry in Pennsylvania in 2022 was estimated at more than \$76 million. Much of this value is attributed to increased yield and quality 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. Currently in PA approximately 6,500 registered beekeepers manage over 66,000 colonies in over 8,950 bee yards. The majority of these beekeepers care for 1-10 hives.

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 early April until the middle of July, there were six full-time seasonal Apiary Inspectors working across Pennsylvania, as well as the State Apiarist, located in Harrisburg. In mid-July, the new Apiary Inspector in Region 6 began working. The

Apiary Inspectors conducted over 1240 inspections in 2022, inspecting over 9,000 colonies, in over 1,250 apiaries for over 870 beekeepers. This is approximately 11% of the beekeepers registered in PA.

This year, concerns and restrictions due to the COVID19 pandemic did not really affect the apiary program in 2022. However, Highly Pathogenic Avian Influenza (HPAI) was a serious problem for poultry producers in PA. The Apiary Inspectors did not inspect any apiaries with free range chickens and either did not inspect or followed strict protocols for apiary inspections if there were caged poultry on site. Fortunately, the outbreak became less severe as the season progressed and most inspections were able to be completed as planned.

HONEY BEE DISEASES AND PESTS:

American Foulbrood (AFB), a highly contagious disease affecting honey bees, was detected in 5 colonies located in one bee yard in Wayne County in 2022. 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, Honey Bee Research Lab, Beltsville, Maryland to confirm the diagnosis and to screen for resistance to antibiotics. The antibiotic Oxytetracycline hydrochloride (trade name Terramycin) has been used for many years and some AFB strains have developed a resistance. In some cases, these resistant strains of AFB may be treated with the veterinary antibiotic tylosin (trade name Tylan). Most beekeepers choose to burn the infected hive(s) since the antibiotics do not kill the spores which cause AFB. Beekeepers wishing to treat honey bees with an antibiotic (Oxytetracycline and/or tylosin) must work with a veterinarian to obtain a prescription or veterinary feed directive (VFD).

The Varroa mite, *Varroa destructor*, continues to be found throughout Pennsylvania and most areas of the world. These insect pests of the honey bee are a serious concern to beekeepers because they vector viruses causing diseases and feed on the honey bee's fat bodies. This can weaken a colony enough to cause the bees to abscond or die.

Small hive beetles, *Athina tumida*, are found in most areas of Pennsylvania. They are more prevalent in the southern and central areas of the state. This pest was first found in North America, in Florida, in 1998 and has been spreading since then. The small hive beetles can cause vulnerable, weaker colonies to collapse. They ruin the stored honey.

NATIONAL HONEY BEE SURVEY:

This was the twelfth year that Pennsylvania was able to participate in the USDA/APHIS National Honey Bee Disease Survey (NHBS). The 2022 National Honey Bee Survey had three goals: 1) early detection of potentially invasive pests such as the exotic mite *Tropilaelaps*, problematic *Apis* species such as *A. cerana*, and viruses; 2) continuation of an epidemiological survey that will meet the goal of developing a long-term overall baseline picture of colony health, and 3) identification of risk and protective factors that predict colony health and operational success by connecting honey bee health measures over time and annual colony losses.

The 2022 National Honey Bee Survey (NHBS) began in May 2022 and ends in June 2023. The survey divides the sampling into two sections, longitudinal sampling of 5 beekeepers, and 14 general survey surveillance samples. The longitudinal sampling was conducted twice a season, with bee bread samples taken to be analyzed for 199 known pesticides.

In Pennsylvania, 14 samples and 4 bee bread samples were collected from 12 apiaries from throughout the Commonwealth from May through October 2022. The apiaries represented a cross-section of operation types and sizes. Each of the 12 apiaries had a minimum of 8 colonies in the apiary. We were able to complete 2 longitudinal surveys of a stationary, queen, nuc, and honey producers (4 surveys, 4 bee bread samples) in Montgomery County. The work plan stated that we may select up to 10 random beekeepers to sample for pesticide analysis if unable to do longitudinal surveys. Six of the remaining 10 samples we will complete prior to June 14, 2023 will include bee bread samples for pesticide testing.

The remaining completed surveys included:

2 Stationary apiaries used for honey production

1 Migratory apiary used for honey production, queen and nuc production

5 Stationary apiaries used for honey production, queen and nuc production

1 Stationary apiary used for honey production and nuc production

These apiaries were located in 9 counties spread out across Pennsylvania and covered a good cross-section of rural, suburban and urban environments. The counties included: Bedford (1), Bucks (1), Chester (1), Clarion (2), Crawford (1), Elk (1), Huntingdon (1), Juniata (1), and Montgomery (4).

Targeted pests, parasites and pathogens noted in this survey through visual field inspection are American Foulbrood, European Foulbrood, Sac Brood, Chalkbrood, Small Hive Beetle, and Wax Moth. The status of the queen was also noted on the data sheet.

Honey bee and “frame tapping” samples from each apiary are taken and preserved in alcohol. They were sent to University of Maryland where they were examined for *Varroa* mites load, *Nosema* spore count, and the presence of *Tropilaelaps* mites and *Apis cerana*.

Live honey bee samples were taken from each apiary for submission to the USDA-ARS BRL for molecular and visual analyses. The molecular and visual analyses include the following: Lake Sinai Virus-2 (LSV-2), Acute Bee Paralysis Virus (ABPV), Chronic Bee Paralysis Virus (CBPV), Deformed Wing Virus-A (DWV-A), Deformed Wing Virus-B (DWV-B), Kashmir Bee Virus (KBV), Israeli Acute Paralysis Virus (IAPV), Slow Bee Paralysis Virus (SBPV), and Moku Virus (MKV). Shipping was a challenge since lab staff was mostly working from home and the university was not always delivering shipments. Some live bees were transported to staff on dry ice. Bee bread was sent over night with ice packs.

Each longitudinal sampled apiary will have 2 bee bread samples taken. These samples were frozen until shipped to University of Maryland.

Sample collection and apiary inspection was begun on May 24, 2022, and completed for the calendar year on October 17, 2022 with 14 total apiaries sampled. The 10 remaining samples, including 6 bee bread samples, will be completed and shipped by June 14, 2023.

NATIVE AND NONNATIVE BEE AND WASP SURVEY:

Northern Giant Hornet, *Vespa mandarinia*, (AGH) gained national notoriety when it was discovered in Canada and Washington state late in 2019. This discovery emphasizes the importance of being prepared for the arrival of invasive insects.

The objectives of this project are to develop an inexpensive, user-friendly surveillance survey for early detection of exotic wasps and bees, by creating a trapping system that can be deployed in various locations and to gather information on wild native bees.

Over 10 states participated in this survey by following a standardized exotic wasp and bee survey system which involved a trapping trial which tested the efficacy of the commercially available and commonly used blue vane traps and white plastic 1-gallon jug traps. Each volunteer selected three locations of their choice. There were two blue vane traps and one jug trap at each location. (Each received a total of 9 trap - 3 jug traps and 6 blue vane). The traps were baited using the appropriate amounts of a dark brown sugar and water solution (1 cup packed dark brown sugar added to 1 gallon of water). One of the blue vane traps also had 1 teaspoon of yeast added to the brown sugar solution to see if the increased fermentation affected the catch. If, as we suspect, these traps are successful for surveying for bees and wasps, the combined trap can be deployed as part of an inexpensive surveillance trapping system in subsequent years.

We are still identifying samples, but there were hundreds of trap visits from January 2022 through December 2022. In Pennsylvania, we established traps sites at high-risk sites including international airports, ports, shipping, rail, and truck transportation hubs. We continue to receive samples collected in 2022 from other states.

NATIVE BEE SURVEY:

Native bee surveys were conducted in Pennsylvania from 2008 through 2013. Partly due to concerns about the Rusty Patched Bumble Bee, *Bombus affinis*, a scaled-back version of the PA Native Bee Survey (PANBS) was revived in 2017 and has continued through 2022. Apiary Inspectors established a site for the season and placed 5 yellow and 5 blue small cups, for 8 or more hours, every two weeks at that site. These traps contained water and a drop of Dawn dish soap. We are still identifying samples due to difficulties hiring taxonomists. Details will be included in 2023's year-end report.

PENNSYLVANIA'S POLLINATOR PROTECTION PLAN (P4):

In 2014, the Environmental Protection Agency (EPA) directed state agencies to develop pollinator

protection plans to mitigate risk to honey bees and other pollinators. This was one part of the federal government's plan to help pollinators. While the guidelines for the state pollinator plans are voluntary and not regulatory, the P4 has several goals, including increasing knowledge and communication between farmers, pesticide applicators, beekeepers, and the public about pollinators. While pollinator protection plans were originally geared to managed pollinators, PA and many other states realized the value of native pollinators and expanded the plans to include all pollinators.

Dr. Christina Grozinger, Director of the Center of Pollinator Research at Penn State University worked with PDA to organize a task force and advisory groups to contribute to the plan, editing the input from more than 36 individuals representing 28 state organizations, national organizations, and stakeholder groups. The P4 is housed on the Penn State Center for Pollinator Research's website, with links from PDA and numerous other websites. Various members of this task force continue to meet in-person and/or virtually to work on and update P4 goals.

There have been a few meetings discussing P4 updates and goals and more will be occurring in 2023.

BEE CHECK:

Pennsylvania beekeepers and specialty crop growers can now register online on the Bee Check (beecheck.org) and Drift Watch sites (driftwatch.org) (Field Watch). These websites serve as a voluntary communication tool for crop producers, beekeepers, and pesticide applicators to work together to protect specialty crops and apiaries using mapping programs.

ASH TREE PROGRAM-BIOLOGICAL CONTROL ASSISTANCE:

Emerald Ash Borer, EAB, is an exotic insect that was first detected in North America in Michigan in 2002. It was first documented from Pennsylvania in 2007. In 2011 Pennsylvania began assisting the national EAB parasitoid rearing laboratory in Michigan by growing tropical ash trees, *Fraxinus udii*, in existing PA Department of Agriculture greenhouse space. Leaves from these trees are used to maintain the production of EAB biocontrol insects which are reared at the USDA facility.

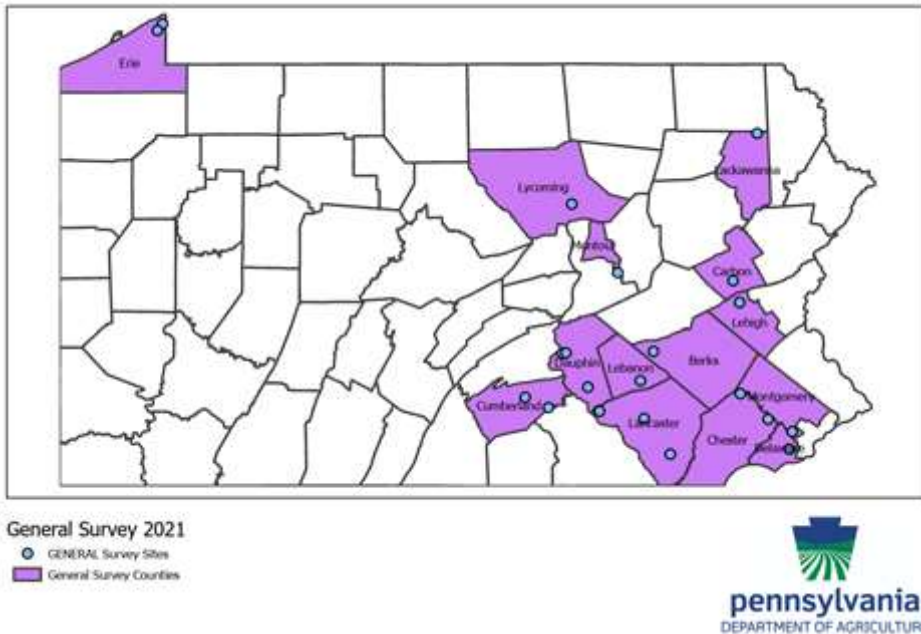
The tropical ash trees were started from seed in July 2011. New trees have been started periodically. Usually, 100-200 leaves harvested and shipped overnight to Michigan, on a weekly basis.

PLANT DIAGNOSTIC SAMPLE REPORT (PDSR):

In support of the PDA Plant Merchant Program, the Entomology Lab identifies Plant Inspectors-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. A total of 91 samples were submitted to PDA, with armored scales (Diaspididae) comprising the most common submissions.

GENERAL SURVEY SAMPLES AND OTHER DETECTIONS OF NOTE:

In addition to the Entomology Program's regulatory and funded surveys, samples from cooperative extension, private industry, and the public are also submitted for identification. The program records these samples as GENERAL SURVEY samples. The majority of these are submitted by commercial pest control companies and private citizens. Samples from this survey can lead to early detections of new pests to PA. In 2022, PDA received 13 samples totaling 46 specimens from 10 counties.



PDA INSECT REFERENCE COLLECTION:

The PDA Entomology program maintains an active and expanding collection of insects of agricultural importance. This collection, dating back to when the Department of Agriculture was enacted, serves as a reference tool for identification and a resource for historical information of Pennsylvania and the surrounding mid-Atlantic states. PDA strives to improve its holdings in both areas of agricultural importance as well as improving holdings in other taxa.

The collection added 9,160 new specimens to the collection in 2022. There was particular emphasis on adding treehoppers (Hemiptera: Membracidae), fruitflies (Diptera), and wood destroying beetles from our cooperative surveys with other states. This gives the collection a broader breadth of diversity outside of Pennsylvania. Another large addition was expanding the collection synoptic set, an inhouse subset of the collection used by staff to verify identifications quickly and to train new staff. The synoptic set allows new staff to quickly appreciate and learn the variation seen within and between species.

A couple of beetles added also stood out. Two specimens of *Taphocerus nicolayi* (Coleoptera: Buprestidae) and specimens of *Dendrobias mandibularis* and *Mallodon dasytomus* were all uncommon additions to our

holdings. The Buprestidae is still unknown from Pennsylvania and the two Cerambycidae are southern US species.

INVASIVE SPECIES HOTLINE, SLF REPORTING APP, AND E-MAIL REPORT SYSTEM (BADBUG@PA.GOV):

In 2022 the invasive species reporting line (1-866-253-7189), the public reporting email badbug@pa.gov, and the SLF reporting tool (<https://services.agriculture.pa.gov/SLFReport/>) generated a total of 57,005 records (2,114 badbug@pa.gov, 523 Reporting line, and 54,368 SLF reporting tool) for all insects. The majority of reports were related to either SLF or Northern Giant Hornet. This was the fourth year PDA Entomology utilized the online reporting tool to track SLF, which 92.4% were made directly by the public with the remaining being entered by PSU Extension staff from additional sources (phone calls, voicemails, walk-ins, etc.). The reporting tool can provide immediate resources to reporters in interested, providing as much service as possible in one stop for the public.

Botany Noxious Weed and Controlled Plant Program 2021

The Department of Agriculture administers the Controlled Plant and Noxious Weed Law and Noxious Weed and Controlled Plant lists and implements federal and state eradication and control programs when a noxious weed of limited distribution in the commonwealth is targeted by federal or state funding for suppression, control or eradication.

The Controlled Plant and Noxious Weed Committee (CPNWC) met four times in 2021 to consider adding additional plants to the state's noxious weed list. Five plants were officially added to the list in 2021 and include Japanese barberry, Japanese stiltgrass, Eurasian watermilfoil, Garlic mustard and Callery pear. There are currently 46 Pennsylvania weeds on the noxious weed list for Pennsylvania (listed by their common names and scientific names):

Class A Noxious Weeds:

Preventing new infestations and eradicating existing infestations of noxious weeds in the class is high priority. The following are Class A noxious weeds:

- Ravenna grass – *Tripsidium ravennae*
- Giant Hogweed - *Heracleum mantegazzianum* (Active Field Program)
- Goatsrue - *Galega officinalis* (Active Field Program)
- Kudzu - *Pueraria lobata* (Active Field Program)
- Palmer amaranth – *Amaranthus palmeri*
- Waterhemp – *Amaranthus rudis*
- Tall waterhemp – *Amaranthus tuberculatus*
- Animated oat – *Avena sterilis*
- Dodder – *Cuscuta spp.* (Except for native species)
- Hydrilla - *Hydrilla verticillata*

- Broomrape – *Orobanche spp.* (Except for native species)
- Wavyleaf basketgrass – *Oplismenus hirtellus*
- European frogbit – *Hydrocharis morsus-ranae*
- European water chestnut – *Trapa natans*
- Water primrose – *Ludwigia grandiflora ssp. hexapetala*
- Brazilian waterweed – *Egeria densa*
- Yellow floating heart – *Nymphoides peltata*
- Wild Chervil – *Anthriscus sylvestris*
- Chocolate vine – *Akebia quinata*
- Japanese privet – *Ligustrum japonicum* (Grace period until January 10, 2025)

Class B Noxious Weeds:

The department may require control of Class B weeds to contain an injurious infestation or may provide education or technical consultation. The following are Class B noxious weeds:

- Common buckthorn-*Rhamnus cathartica*
- Glossy buckthorn – *Frangula alnus* – [Synonym: *Rhamnus frangula*] – (Grace period until April 2023) (Accepting exemption applications for sterile cultivars)
- Callery pear – *Pyrus calleryana* – (Grace period until February 2024) (Accepting exemption applications for sterile cultivars) *(Added 2021)
- Eurasian watermilfoil – *Myriophyllum spicatum* *(Added 2021)
- Bull thistle or Spear thistle - *Cirsium vulgare*
- Canada Thistle - *Cirsium arvense*
- Musk Thistle or Nodding Thistle - *Carduus nutans*
- Johnson Grass - *Sorghum halepense*
- Mile-a-Minute – *Persicaria perfoliata*
- Multiflora Rose - *Rosa multiflora*
- Purple Loosestrife - *Lythrum salicaria*
- Shattercane - *Sorghum bicolor*
- Poison hemlock – *Conium maculatum*
- Tree-of-heaven- *Ailanthus altissima*
- Parrot feather – *Myriophyllum aquaticum*
- Wild parsnip – *Pastinaca sativa* (except for non-wild cultivated varieties)
- Japanese knotweed – *Reynoutria japonica*
- Giant knotweed – *Reynoutria sachalinensis*
- Bohemian knotweed – *Reynoutria x bohémica*
- Japanese Angelica Tree- *Aralia elata*
- Japanese hops- *Humulus japonicus*
- Oriental bittersweet- *Celastrus orbiculatus*
- Black swallow-wort- *Cynanchum louiseae/Vincetoxicum nigrum*
- Pale Swallow-wort- *Cynanchum rossicum/Vincetoxicum rossicum*
- Mugwort- *Artemisia vulgaris*

- Japanese barberry- *Berberis thunbergii* -(Grace period until October 2023) (Accepting exemption applications for sterile cultivars) *(Added 2021)
- Japanese stiltgrass- *Microstegium vimineum** (Added 2021)
- Garlic mustard- *Alliaria petiolata* *(Added 2021)
- Burning bush- *Euonymus alatus* (Grace period until January 10, 2025)
- Chinese privet – *Ligustrum sinense* (Grace period until January 10, 2025)
- European privet- *Ligustrum vulgare* (Grace period until January 10, 2025)
- Border privet – *Ligustrum obtusifolium* (Grace period until January 10, 2025)

Class C Noxious Weeds:

Preventing introduction and eradication of infestations of noxious weeds in this class is the highest priority. Class C noxious weeds are any Federal noxious weeds listed on the Federal Noxious Weed List that are not yet established in the Commonwealth and are not referenced above.

- Water soldier – *Stratiotes aloides*

Controlled Plants:

There is one plant on the Controlled Plant list:

Hemp - *Cannabis sativa* L and any viable part of that plant with a delta-9 THC concentration of not more than 0.3% on a dry weight basis

2022 Hemp Program:

The Certified Hemp Sampling Agent Program continued for a third year, with 36 hemp sampling agents certified. This program provides a useful mechanism to improve customer service for permittees who are required to have their crop sampled in a very short window of time.

For 2022, the Department of Agriculture issued:

- 275 hemp growing permits, including 14 research permits, and
- 53 hemp processing permits, including 2 research permits