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Maryland Department of Agriculture Plant Protection and Weed Management Section
Annual Report to the Eastern Plant Board
St. Michaels, MD - April 2016
Summary of 2015 Activities

<u>Contents</u>	<u>Page #</u>
Apiary Inspection	2
Nursery Inspection and Plant Quarantine	2
Pest Survey	4
CAPS Survey	4
Farm Bill	5
Diagnostic Laboratories	6
Plant Certification	7
Weed Integrated Pest Management (IPM)	8
Noxious Weed Management	9
Other Activities	10
Plant Protection and Weed Management Summary of Activities	10

Submitted by,

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APIARY INSPECTION

MDA's Apiary Inspection Program works with beekeepers, helping to control honey bee diseases, parasitic mites and other pests, to maintain healthy colonies for the pollination of Maryland crops. Honey bees pollinate crops valued at more than \$40 million. Maryland fruit and vegetable growers rent 5,000 colonies a year to improve pollination. Beekeepers' colonies are essential to Maryland because two parasitic mites have nearly eliminated feral bee colonies.

American Foulbrood is the most serious brood disease of honey bees and can destroy a colony in one year. The 9 colonies that inspectors found to have American foulbrood, as diagnosed by the USDA Bee Laboratory in Beltsville, MD, were destroyed to control the spread of this bacterial disease into healthy colonies. The incidence of disease remains relatively low – .4% of the colonies inspected.

Canine Training and Certification: In 2015, the apiary program trained and certified a dog and handler to detect American foulbrood disease in honey bee colonies. Mack is a yellow labrador retriever that has been trained to detect and alert to his handler the presence of American foulbrood disease. Now that he's on the job, Mack will work to reduce the incidence of American foulbrood in Maryland bee colonies during fall and winter when the bees are dormant. A trained dog can inspect 100 honeybee colonies in 45 minutes, an average human inspector can inspect 45 colonies in one day. Early detection of the disease will save Maryland beekeepers substantial monetary loss from eradication of diseased bees and destruction of infected equipment.

Varroa mite (*Varroa destructor*) populations were very high in Maryland in 2015, and brood problems were attributed to this. The varroa mite has been found to be resistant to Apistan®, the primary product used to control this parasite. There are six products available to control varroa mite. One of the serious problems caused by varroa is the transmission of viruses to honey bees, which can cause deadly diseases. Nearly twenty honey bee viruses have been discovered and the majority have an association with varroa mites. Therefore controlling varroa populations in a hive will often control the associated viruses and symptoms of the viral diseases.

Tracheal mite (*Acarapis woodi*) populations, as documented by the USDA honey bee laboratory, continue to be so low that tracheal mite is no longer considered a threat to honey bees if colonies are monitored on a regular basis.

Africanized honey bees (AHB): MDA is working with two groups – the Mid-Atlantic Apiculture Research and Extension Consortium (MAAREC) to provide information to the general public about emergency incidents, and the Apiary Inspectors of America (AIA) for information on the control of AHB movement, other than through natural spread.

The small hive beetle (*Aethina tumida*) was detected in packaged bees and reported or detected in all 23 counties in 2015. Colonies are treated and monitored to ensure successful control of the beetles. There have been reports of larval damage to established colonies. The small hive beetle is a main pest in stored equipment and in honey houses, rendering stored honey in the hive unmarketable.

Apiary Inspection Permits: Twenty-one entry permits were issued for 4,332 honey bee colonies to move into Maryland, primarily for overwintering. Eighteen exit permits were issued for 1,191 colonies to move out of Maryland, primarily for pollination services. For the eighth year, Maryland beekeepers sent colonies to California for almond pollination, 1,834 were transported in the winter of 2015-2016.

Surveys: The apiary inspection program assisted with two surveys in 2015. The survey information can be found listed in the Pest Survey section of this report.

NURSERY INSPECTION and PLANT QUARANTINE

The Maryland Nursery Inspection Program serves the state's nursery and greenhouse industry which continues to be a leading part of Maryland's number one industry, agriculture. The green industry in Maryland currently ranks second among commodities, with a total of approximately \$960 million in farm income. Other horticultural products and services boosted total gross receipts to more than \$1.96 billion. A primary goal of

state plant protection and quarantine efforts is to facilitate the production, sale, and distribution of Maryland nursery stock. This is accomplished in large part by inspection and certification activities conducted on-site by Maryland Department of Agriculture Plant Protection & Weed Management staff. Maryland law and reciprocal agreements with other states require annual production facility and sales location licensing for all producers and suppliers of nursery stock in the state. Production nurseries are inspected, at minimum annually, to ensure that plant material is free of dangerously injurious plant pests. Additionally, plant dealers are inspected regularly to insure plant materials are received and maintained in a healthy and pest-free condition for wholesale and retail sale.

In 2015, the Maryland Nursery Inspection Program licensed 315 nurseries, as well as 1,315 plant dealers and plant brokers. In 2015, 9,494 acres of nursery stock and nearly 10,000,000 square feet of greenhouse production were certified. Plant Protection & Weed Management staff performed routine inspections at 569 Maryland locations. The general health of Maryland-produced nursery stock was found to be excellent. In addition certification activities for 2015, shipment specific inspections were performed and 169 state phytosanitary certificates were issued to 14 states and U.S. territories to assure Maryland agriculture and green industry compliance with established U.S and state domestic quarantines and phytosanitary requirements for Maryland produced plant material and grains. In 2015, 76 shipment specific inspections were performed and federal phytosanitary certificates were issued to export Maryland grown and produced plant material and grain to 7 different foreign countries, assuring Maryland produced agricultural commodities meet international quarantine regulations.

Specific events of note:

2015 presented many challenges for the Nursery Inspection Program staff. The effort to prevent introduction and slow the spread of boxwood blight (*Calonectria pseudonaviculata*) occupied hundreds of hours of staff time throughout the season. Staff was involved not only in the process of inspecting for evidence of the disease at the majority of establishments visited, but was also engaged in issuing condemnation/seizure and treatment orders when infected plant material was found, and tasked with overseeing the destruction of boxwoods infected with this highly destructive, infective and easily spread disease. Other plant pests were detected that required similar actions, if on a smaller scale. Most notable were an early season ambrosia beetle (family Scolytidae) outbreak in container nursery stock at regional general dealers (chain stores) and a recurrence of chrysanthemum white rust, *Puccinea horiana*, a serious disease of garden and show chrysanthemums. Serious plant pests and diseases are, on occasion, introduced into Maryland on plant material that is not directly regulated by our Plant Pest/Disease Control laws. In addition to chrysanthemum white rust, past examples of serious plant pathogens and pests introduced into Maryland on unregulated nursery stock such as tropical plants and annual or herbaceous plant material include: bacterial wilt, *Ralstonia solanacearum* race 3, biovar 2, daylily rust, *Puccinea hemerocallidis*, daylily leafminer, *Ophiomyia kwansonis*, imported fire ant, *Solenopsis invicta*, and spotted wing drosophila, *Drosophila suzukii*. There are many other plant pest and diseases that could easily go undetected if the host material is not subject to scrutiny of inspection regulations. MDA PP&WM staff are aware of this inadvertent gap in the Maryland Plant Pest/Disease Control laws and regulations, and is on the lookout for pest and disease problems on unregulated plant material in addition to plants that are required by law to be inspected and certified. (The narrow definition of plant material that requires licensing for sale and/or distribution in Maryland as: "any hardy plant or plant that survives Maryland winters" overlooks the possibility of plant pest and/or disease introduction on herbaceous annual, and certain perennial and tropical plants.) Staff was also involved in the eradication of imported fire ant, *Solenopsis invicta*. This activity is now an almost annual event due to the fact that this pest, a serious threat to human, animal and environmental health, is regularly re-introduced into Maryland in the soil or root masses of infested tropical plant material (especially palm trees) arriving for seasonal outdoor decorative purposes. Staff continues to be vigilant and participates in inspections and surveys aimed at early detection and slowing the spread of serious pests and diseases such the insect pests; Asian Longhorned Beetle, *Anoplophora glabripennis* and spotted lanternfly, *Lycorma delicatula*, and the plant diseases; sudden oak death, *Phytophthora ramorum*, and Thousand cankers disease of Walnut, *Geosmithia morbida*.

Additionally, field and clerical staff work year-round to ensure that licensing and compliance statutes are met by industry.

PEST SURVEY

The Cooperative Agricultural Pest Survey (CAPS) and Farm Bill surveys are joint projects between MDA and USDA's Animal and Plant Health Inspection Service (APHIS) and USDA Plant Protection and Quarantine (PPQ). The USDA recommends specific pests of quarantine export significance as survey priorities and provides funding for these surveys. These cooperative survey programs provide necessary data used to certify Maryland products for export to many countries. These surveys also allow for continued outreach and education.

CAPS and Farm Bill surveys document the presence or absence of exotic pests in Maryland, support PPQ exotic pest survey activities and provide state-specific data for exotic pests in the United States. Early detection of exotic pests before they become established aids in eradication or control efforts, and protects Maryland agriculture, nursery stock and the environment from potential devastating losses. Federally funded CAPS surveys include: exotic wood borers, soybean commodity, imported fire ant (*Solenopsis invicta*) and emerald ash borer (*Agrilus planipennis*); the farm bill surveys include: *Phytophthora ramorum* (nursery), Asian giant hornet (*Vespa mandarinia*), national honey bee, and grape commodity.

In 2015, MDA deployed and monitored 491 insect traps and, from these various traps, collected 2906 samples. Survey and trapping techniques vary, depending on the pest being surveyed for. Some trapping devices include purple prism traps, bucket traps, delta traps and Lindgren funnel traps. All traps include an attractant; lure, food bait and host volatiles are some examples. There were eight extensive surveys targeting 52 exotic pests that impact trees, apiaries, fields, vineyards and nursery stock.

CAPS SURVEYS

Red Imported Fire Ant - The red imported fire ant (IFA), *Solenopsis invicta*, a stinging insect native to South America, is occasionally shipped out of its regulated area in the southern United States. Despite its quarantine, which requires a wide variety of commodities to be treated or certified free of fire ants before being transported, some nursery stock has made its way into Maryland infested with fire ants. The yearly fire ant survey focuses on tropical plants arriving from the southern United States. In 2015, ninety-eight sites were surveyed and five were found positive for IFA. Four of the positive sites were retail establishments and one was part of a conservation project. All sites were issued eradication treatment orders under an MDA Treatment Order; all have completed the treatments, have been resurveyed and were found free of IFA.

Emerald Ash Borer - The emerald ash borer (EAB), *Agrilus planipennis*, has been in Maryland since 2003. Presently, EAB has been found in seventeen of Maryland's twenty-three counties, including three on the Eastern Shore. In 2015, Baltimore, Dorchester, Harford, Queen Anne's, and Talbot counties were added to that list. The 2015 survey consisted of 135 trap sites with 110 of the sites having purple prism trap sites and the other 25 having green Lindgren funnel traps. This survey ran from early May into late August, and found 20 sites positive for EAB. Presently, only 6 counties on Maryland's Eastern Shore are negative for EAB. Due to the presence of EAB in three Eastern Shore counties (Dorchester, Queen Anne's and Talbot), the federal quarantine was expanded to include the entirety of Maryland in August 2015.

MDA, along with USDA APHIS PPQ, participated in parasitoid releases. Presently, there are three parasitoids approved for release and MDA has released all three since 2009. In 2015, 79,864 parasitoids were released at seven biocontrol sites in five counties. All three introduced parasitoids have been recovered in Maryland.

Soybean Commodity – Soybean is the second most valuable crop grown in Maryland, behind corn. For this reason, ensuring that our state is free of known exotic pests of this commodity is of great importance. This survey was conducted from mid-June through early October in five counties known to have high production rates of soybean, based on harvested acreage in previous years. Four sites with planted soybeans were located within each county, and four yellow bucket traps were placed at each of these sites, for a total of 80 traps. Each of the bucket traps was baited with a pheromone lure known to be an attractant of a potentially destructive exotic moth pest. None of the targeted pests were found to be present in any of the traps

throughout the sampling period. Additionally, a visual survey was conducted for *Megacopta cribraria*, the bean plataspid, a true bug of particular concern within Maryland, and a known pest of soybean. A visual survey was conducted at each site on a bi-weekly basis, and resulted in the finding of a single bean plataspid, in a county where it had been previously discovered.

Exotic Wood Boring Beetles - USDA regulations require all imported wood packing material to be treated, so that any insect living in the wood should be killed. However, some packing material is not properly treated, which can cause exotic wood borers to be shipped to the US, and thus be introduced into our environment. Bark beetles can be extremely destructive and in parts of the world have been known to destroy large acreages of forest. In 2015, ten sites that receive goods packed with wood dunnage were surveyed for exotic wood boring bark beetles. During the bi-weekly trap checks, a visual survey for spotted lanternfly (*Lycorma delicatula*), a newly introduced invasive insect from Asia, was also completed. This survey ran from mid-March until late October. Each site had four black Lindgren funnel traps, and each of these traps had a specific lure used as an attractant to one or more of the exotic beetles being surveyed for. All samples were negative for the species being targeted. However, there was a finding of *Cnestus mutilatus*, the camphor shot borer, is native to Southeast Asia, had not been previously found in Maryland. It was found at one survey site in Wicomico county. Additionally, one of the sites surveyed for EWBB pests also housed a blacklight trap. The blacklight trap is used for long-horned beetle detection, and this trap did not detect any of the high priority pests for which it was surveying.

FARM BILL

Asian Giant Hornet – The Asian Giant Hornet (*Vespa mandarinia*) (AGH) is the largest hornet known in the world. In their native region, these hornets can have devastating effects on honeybees, as they will seek out hives and systematically kill every bee, from larva to adult, to feed their own colonies. Additionally, AGH will prey on many other native insect populations, including other pollinators, which can have major impacts on agriculture. Although AGH has not been found outside of Asia, it is important to have a plan in place to survey for this pest, and to deal with it should it appear, to prevent it from becoming established. Seven sites were selected Maryland. Particular emphasis was put on sites near transportation routes or other high-risk pathways, which are known as possible areas of introduction for foreign species. From late July until mid-October, modified bottle traps were placed at each site and examined bi-weekly for the presence of any pests, particularly *Vespa* species. No target hornet species were found, although a few *Drosophila suzukii*, an invasive fruit fly, were captured. This survey was conducted by the apiary inspection staff.

National Honey Bee Survey – Since 2009, USDA-APHIS, in conjunction with Bee Informed Partnership, have sponsored the National Honey Bee Survey (NHBS), a comprehensive examination of colony health among apiaries across the country. Maryland has been a participant in the NHBS since 2011. At each apiary surveyed, samples of bees are collected from eight different hives; half of these bees are kept alive and half are preserved in ethanol, then both live and preserved samples are sent off for further testing. In addition, comb debris is collected from all eight hives, preserved in ethanol, and submitted for further testing. The samples were submitted to the USDA Beltsville and the University of Maryland bee labs. Results from these samples have not yet been received. While samples are being collected, any visible signs of disease or distress are also noted. These visual observations have noted symptoms of chalk brood, parasitic mite syndrome, deformed wing virus, small hive beetle infestation, and malnutrition. An additional objective of this survey is a colony pesticide analysis to assess both the variety and quantity of pesticides present in honey bee hives. The apiary inspection staff completed 3 surveys in the fall of 2015 and plans to survey 8 more sites in the spring of 2016.

Grape Commodity Survey – Vineyards and wineries are growing industries in the state of Maryland. However, as vineyard acreage increases, it also increases the opportunities for invasive pests to be introduced and become established. This survey was conducted from mid-June until mid-October in 15 vineyards, covering eleven Maryland counties, in order to confirm the absence of invasive moth pests. At each vineyard, two standard bucket traps and two delta sticky traps were placed, and each trap was baited with a lure attractive to a different moth of concern. These traps were checked on a bi-weekly basis throughout the sampling period, and no target species were discovered. During the bi-weekly trap checks, a visual survey for spotted lanternfly (*Lycorma delicatula*), a newly introduced invasive insect from Asia, was also done, although none

were found to be present. An additional part of this survey involved a visual survey of grape vines, looking for a grape phytoplasma and a fungal disease, brown rot. Both were surveyed for by PP&WM's plant disease specialist. There were no symptomatic vines observed during this survey.

Phytophthora ramorum Nursery Survey – The *P. ramorum* survey covered nurseries, garden centers, and landscape sites. Staff visited 11 nurseries and garden centers receiving plant material from Oregon, California, and Canada and inspected 342,406 azalea, camellia, kalmia, pieris, rhododendron, and viburnum plants. Less than 1% of plants examined exhibited symptoms similar to those caused by *P. ramorum*. Two hundred sixty-six symptomatic samples of different plant species were collected and tested for *Phytophthora* spp. by ELISA kit and 14% of samples were found positive. Of these samples, rhododendron had the highest percentage (41%) of *Phytophthora* infection and azalea and camellia were free from the pathogen. All *Phytophthora* spp. positive samples were submitted to the Cornell University Diagnostic Clinic for *P. ramorum* confirmation. All samples tested negative for *P. ramorum*. Staff visited five suspect homeowner properties, inspected 78 plants, and collected 20 suspect/symptomatic samples to test for *P. ramorum*. They were tested for *Phytophthora* spp. by ELISA kit, and none were positive for the fungus. The PP&WM plant disease specialist supervised and conducted this survey.

Diagnostic Laboratories

The Plant Protection and Weed Management Section laboratories provide testing, analyses and identifications to support MDA programs as well as providing answers to inquiries from outside the department.

Entomology Laboratory: Among the usual nursery, other agency, and homeowner samples which were received in 2015, there were several interesting submittals. Horsehair worms, Nematomorpha, harmless 4" internal parasites of grasshoppers, cockroaches and other insects, startled a homeowner when they emerged from a cricket. There were a few sightings of giant psocid barklice, *Cerastipsocus venosus*, on rocks and trees, and two large land planarians, *Bipalium adventitium*, which feed on earthworms, were submitted from a backyard garden. Some recently-dead meloid beetles, *Tegrodera erosa erosa*, the iron cross blister beetle, turned up in a bag of salad greens. They are native to California and Arizona.

This year, almost 200 tick samples were submitted for identification. Most were lone star ticks, *Amblyomma americanum*, with deer ticks, *Ixodes scapularis* replacing them in fall samples. Also, a pepper seed removed from someone's ear was submitted as a tick. Mite samples included Lewis spidermites, *Eotetranychus lewisii*, found in a poinsettia production greenhouse, and an as yet, unnamed species of tiny eriophyid mite, designated the "coneflower rosette mite", which causes leaf reversion in echinacea flowers. A single disk flower in a flower head may contain hundreds of these microscopic acarines.

Other novelties including a mole cricket, Gryllotalpidae, which has digging front legs like a mole, and a colorful caterpillar with stinging hairs, the crowned slug, *Isa textula*, were among this year's samples.

Plant Pathology Laboratory: The plant pathology diagnostic laboratory provides testing, analysis, and recommendation services for problems caused by biotic pathogens such as fungi, bacteria, viruses, and nematodes, as well as abiotic, such as soil and environmental related problems, to support MDA programs. It also provides answers to inquiries from outside the department. MDA's plant disease specialist continued relocation, refitting, and updating of equipment in the laboratory as well as obtaining, collecting, maintaining, and calibrating equipment plus updating and improving the lab's molecular capabilities. The pathology laboratory received more than 120 samples for diagnosis and management solutions during the 2015 growing season. A majority of the samples came from nursery inspectors, some from pesticide inspectors, landscapers, and homeowners. About 10% of samples received were abiotic-related, such as watering issues, soil management, cold damage, etc., while the other problems were caused by biotic pathogens, such as fungi, bacteria, viruses and nematodes. The majority of samples received involved fungal pathogens. Management strategies based on an integrated pest management approach were recommended for these problems.

The exotic disease, boxwood blight, *Cylindrocladium buxicola* (syn. *Calonectria pseudonaviculata*) remained a high priority. Several samples were received to confirm absence of *C. buxicola* fungi from a boxwood nursery

and plantation. The plant disease specialist also visited nurseries to investigate the disease in the field and took extensive samples. Complete destruction of boxwood plants was recommended to a nursery because of continued presence of the pathogen and a potential danger of spreading it by human activities.

In 2015, the plant diagnostic laboratory obtained two government fundings: (1) survey of *Phytophthora ramorum* in nursery stocks and (2) surveys of grape vineyards for grape phytoplasma and brown rot, a fungal disease, based on symptoms. All survey information is found in the Pest Survey section of this report.

The laboratory is expanding its diagnostic services to include nematode identification for Maryland growers.

Greenhouse Laboratory: Mile-a-minute (MAM) weed plants (*Persicaria perfoliata*) were produced for the integrated pest management and biological control program for insect colonies that require food and plant material for research. 1,700 MAM stem cuttings were taken and 1,432 plants were transplanted and grown in the greenhouse to be used as food for colonies of the stem boring weevil, *Rhinoncomimus latipes*.

Four hundred twenty five tropical ash, *Fraxinus uhdei*, continued to be grown and maintained in the greenhouse in support of the EAB biological control program. Leaves were used on a weekly basis, here at the MDA headquarters rearing facility. These trees were also used to support the USDA APHIS EAB rearing facility in Brighton, Michigan. Two hundred leaves were shipped weekly to Michigan to feed adult EAB, assisting in the rearing of parasitoids used in the biological control effort against EAB. To support the continued healthy growth of these trees in our greenhouse, biological controls were released on a regular basis to control outbreaks of various greenhouse pests. The thrips predator, *Neoseiulus cucumeris*, and the spider mite predators, *Mesoseiulus longipes* and *N. californicus*, were used throughout the year.

Virus testing was conducted on five varieties of strawberry plants. Indicator strawberry plants are maintained throughout the year to support this testing.

A variety of support programs takes place at the greenhouse on a yearly basis. These include plants produced to support MDA displays at the Maryland Flower and Garden Show as well as the Maryland State Fair. Plants are also grown and maintained in support of the Certified Professional Horticulturist (CPH) exam which is given at MDA headquarters twice a year and proctored by PP&WM staff in cooperation with the MD. Nursery, Landscape, and Greenhouse Association.

PLANT CERTIFICATION

The **Maryland Ginseng Management Program** protects American ginseng, *Panax quinquefolius*, by monitoring the harvest, and by licensing diggers and dealers of wild, wild-simulated, woods-grown and cultivated ginseng. MDA conducts a management program in cooperation with the U.S. Fish and Wildlife Service (FWS) that follows established protocols and Convention on the International Trade in Endangered Species (CITES) regulations to ensure the continued viability of this potentially threatened native resource and to protect it from over-harvest. Harvested ginseng is certified through this program to enable licensed dealers to sell this wild-harvested plant product in international markets. MDA also works with growers of wild-simulated and woods-grown ginseng to allow them to market and export their highly valued crops. The dried roots are highly prized, especially in China and Korea, for properties that putatively promote good health. High quality native ginseng root continues to be in great demand on the international market, and prices for wild American ginseng continue to increase. Again in 2014, prices at times surpassed the \$1,000 per pound mark of dry ginseng. During the 2014-2015 season, the program licensed 15 ginseng dealers and 257 ginseng collectors in the state. For the 2015-2016 season those numbers are 19 and 247 respectively. Licensing for ginseng dealers and collectors starts after July 1st of each year as the season doesn't begin until September 1st. The harvest season ends December 15th and the sales season ends March 31st of the following year. The harvest numbers reported below are for the program season beginning September 1st, 2014 and ending March 31st, 2015. Over the 2014-2015 harvest and sales season, the certification program inspected, collected size and age data from, weighed, and certified 196.12 pounds of dry wild ginseng root, 5.65 pounds of green (fresh) wild ginseng root, 69.5 pounds of wild simulated dry ginseng root, and 288 pounds of wild simulated green ginseng root. (For the purpose of this report, both artificially propagated and wild simulated ginseng harvests are being recorded as artificially propagated. Both artificially propagated and wild simulated ginseng, distinctions

recognized by the U.S. Fish and Wildlife Service and CITES, are being grown as alternative agricultural crops in Maryland).

The 2014-2015 wild harvest and certification numbers are about 37% greater than the numbers for dry wild ginseng and 44% greater than those for artificially propagated dry ginseng as compared to numbers recorded for 2013-2014. The amount of green ginseng root certified in the 2014-2015 season represents a nearly 62% decline compared to 2013-2014. As reported in 2014, changes in the market for green (fresh) ginseng likely parallel demand for the domestic use of fresh ginseng in the U.S. market and the rise of a relatively novel type of ginseng buyer that has more recently started obtaining a state ginseng dealer's license. When root is sold in a green (fresh) condition, it generally weighs about 3 times the weight of the same root when dried. As is generally the case, fluctuations in the amount of Maryland ginseng certified and sold likely reflect the demand and pricing on the international market, (and more recently a specialty sector in the domestic market) and do not necessarily directly reflect the status or abundance of wild American ginseng in Maryland. As is done each year, harvest and sales data were gathered and reported in accordance with U.S. Fish and Wildlife Service (USF&WS) and CITES requirements. The USF&WS, Office of Management Authority continues to find Maryland's wild ginseng harvest as sustainable and "non-detrimental" to wild American ginseng populations in Maryland.

WEED INTEGRATED PEST MANAGEMENT (IPM)

Maryland Department of Agriculture (MDA) **Plant Protection and Weed Management Section** entomologists and staff continued to work with the Maryland Department of Transportation; State Highway Administration (SHA) to conduct an IPM program aimed at providing biological control for certain targeted weed species on SHA right of ways. Weed IPM research and demonstration activities were continued on SHA right of ways, using funding from SHA and the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA APHIS). MDA weed management and biological control research and demonstration projects have been conducted over each of the past 17 years under current management, and have involved cooperation with the Maryland State Highway Administration, the Howard County Department of Recreation and Parks, the Maryland National Capitol Park and Planning Commission, the Maryland Department of Natural Resources, the U.S. Department of Agriculture (both the Agricultural Research Service (ARS) and APHIS), the U.S. Forest Service, The U.S Fish and Wildlife Service, the U.S. Geological Survey and, in certain cases, private Maryland businesses and landowners.

Integrated pest management investigations now target the suppression of mile-a-minute weed, *Persicaria perfoliata*, through use of biological control. MDA personnel rear, release and monitor biological control agents for this problematic weed species. Purple loosestrife, *Lythrum salicaria*, a target of earlier biological control work by MDA, continues to be monitored by MDA Plant Protection and Weed Management program staff.

Currently MDA is focused on biological control of mile-a-minute weed, using very specific insect biological control agents. MDA is in the second year of a two year agreement with the Landscape Operations Division of the Maryland State Highway Administration to administer a program to continue biological control driven suppression of mile-a-minute weed on state highway right of ways. This program includes lab and greenhouse rearing and field release and monitoring of the weevil, *Rhinoncomimus latipes*. Funding for rearing and release of the weevil is provided in part by SHA. An additional source of funds for this project comes from a cooperative agreement with USDA APHIS that has been renewed on an annual basis.

In 2015, MDA staff continued the program of rearing the mile-a-minute weevil, *Rhinoncomimus latipes*. This program involves greenhouse growing of the host plant, mile-a-minute weed, as well as laboratory rearing of the weevil. The host plants are grown in the MDA greenhouse in Annapolis, MD. In 2015, nearly 1,500 *P. perfoliata* plants were grown. At the MDA Plant Protection and Weed Management Section Insect Rearing Lab, MDA staff reared 8,215 weevils in 2015. Release numbers were supplemented by 4,000 additional weevils acquired from the NJ Dept of Agriculture, Phillip Alampi Beneficial Insects Laboratory. In 2015, 9,880 adult weevils were released at a total of 21 sites statewide, 7 of which were new site locations.

Rhinoncomimus latipes has now been released by MDA staff and is established in at least portions of the following Maryland counties: Allegany, Anne Arundel, Baltimore, Carroll, Cecil, Charles, Frederick, Garrett, Howard, Montgomery, Prince George's, Queen Anne's, Somerset, Washington, and Wicomico.

NOXIOUS WEED MANAGEMENT

This program supports the control and eradication of designated noxious weeds in order to reduce their economic and aesthetic impact on farmers and landowners. Noxious weeds (Johnsongrass, shattercane, thistles, and multiflora rose) cause losses in excess of \$25 million annually to Maryland agriculture due to reduced quality and yields of crops and forages, increased control costs, and increased roadside and development property management cost.

A weed control advisory committee has been established in each of 17 participating counties, with representatives from farming organizations, governmental agencies, local farmers and other property owners. Each committee provides advice on planning the noxious weed control program in that county. A county weed control coordinator, usually employed on a part-time basis, determines the degree of noxious weed infestations within the county, locates uncontrolled infestations, provides information on currently recommended control practices, and initiates agreements with landowners to implement a control program. In many counties, the local weed control coordinator also performs herbicide treatments on roadsides, in cooperation with the Maryland State Highway Administration, to help eliminate Johnsongrass or thistles and to control noxious weeds on private or public lands for a fee. In counties with no weed control coordinator, MDA Weed Control Program employees handle complaints.

In 2015, noxious weed advisory notices were mailed to 361 managers of property infested with noxious weeds. Generally these notices were effective in obtaining compliance. When necessary, MDA sent follow-up correspondence, mostly resulting in compliance.

The weed control program responds to citizens' requests for technical assistance in controlling invasive, difficult to control, persistent weeds such as phragmites, kudzu, callery pears, and bamboo.

Giant hogweed (*Heracleum mantegazzianum*) is a federal noxious weed that was first detected in Maryland in 2003, at 29 sites in Baltimore and Harford counties. In 2005, eight additional sites in Garrett County were added to this list, as was one additional site in 2007. There are currently 10 sites in Garrett County that have undergone several years of treatments. In 2015, six sites needed treatment, four in Baltimore County, one in Garrett County, and one in Harford County were treated. Frederick County's weed control program treated the hogweed plants in Baltimore County and the Montgomery County weed control program provided the spray crew and materials to treat the hogweed in Garrett County. Harford County's Weed Control Program accomplished the Harford County applications. Eradication is a multi-year effort and the Weed Control Program is looking to curtail hogweed treatments in 2016.

The weed control staff partnered with the Maryland Department of Natural Resources (DNR) for the 15th year in providing a phragmites management program. Upon request from landowners or managers, the Weed Control Program staff supplied technical and spraying assistance for control. The DNR provided 100 percent of the herbicide (Rodeo®) applied in the nine Eastern Shore counties for spraying phragmites. Total spray revenue for phragmites control was more than \$100,000 for treating approximately 103 acres at 160 locations in 19 counties. The spray programs pay for the regulatory and non-regulatory work of the weed control program in the counties.

In all counties, the noxious weed control program's spraying service was offered to landowners participating in the Conservation Reserve Program (CRP) or Conservation Reserve Enhancement Program (CREP). It is thought that seed contamination at planting is responsible for the occurrence and spread of noxious weeds in these plantings. Due to the likelihood of weed problems occurring on land in these programs, spraying services were offered for noxious weed control.

OTHER ACTIVITIES

During 2015, MDA continued to administer basic and specialist examinations for the Maryland Certified Professional Horticulturist program. This program was developed by the Maryland Nursery, Landscape and Greenhouse Association (MNLGA) to raise and improve the professional standards of Maryland's nursery, landscape, and garden center industry by giving special recognition to individuals who have shown a high level of competence in the principles and practices of this industry. Certification also allows this high level of attainment to be recognized by the gardening public.

PP&WM also worked with MNLGA on a large landscaping project here on the grounds of MDA. MNLGA along with PP&WM staff worked for two days to remove aging trees, weeding and trimming and replanting. The hard work resulted in a beautifully landscaped headquarters building.

MDA PP&WM staff also continues to take a leadership role in the Maryland Invasive Species Council (MISC), a forum for information exchange and consensus building among diverse interests in public and private agencies or organizations concerned with invasive species. Several MDA staff members were directly involved with MISC. Participation in MISC allows for cooperation through many state agencies, private industry and the public. Through MISC, MDA has been able to disseminate information on many of the serious pests cited in this report.

Plant Protection and Weed Management Summary of Activities

	CY2013	CY2014	CY2015
Beekeepers Registered	1,821	1,838	1,895
Honeybee Colonies Registered	14,711	14,412	14,594
Honeybee Colonies Inspected	2,993	4,515	2,224
Ginseng Dealers Registered	19	15	19
Ginseng Collectors Licensed	186	257	24
Nurseries Certified	326	309	315
Plant Dealers and Brokers Licensed	1334	1349	1315
Phytosanitary Certificates Issued	693	466	247
Plant Pest Surveys # target pests	71	41	52
Plant Pest Surveys # samples processed	4,874	2,656	2,906
Target Pests Detected	26	2	9
Number of noxious weed advisory notices issued	222	303	361