2016

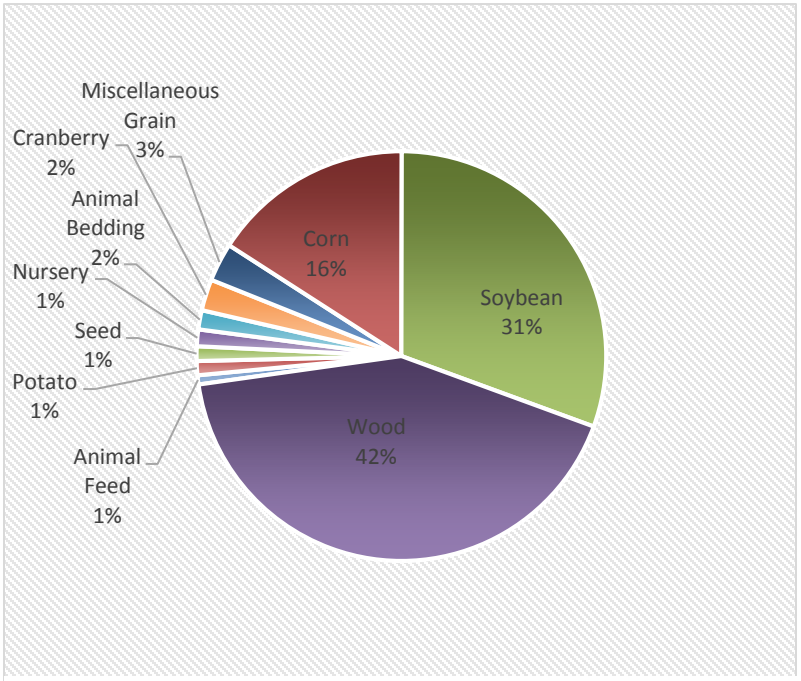
Plant Industry Bureau Annual Report

Wisconsin Department of Agriculture, Trade and Consumer Protection

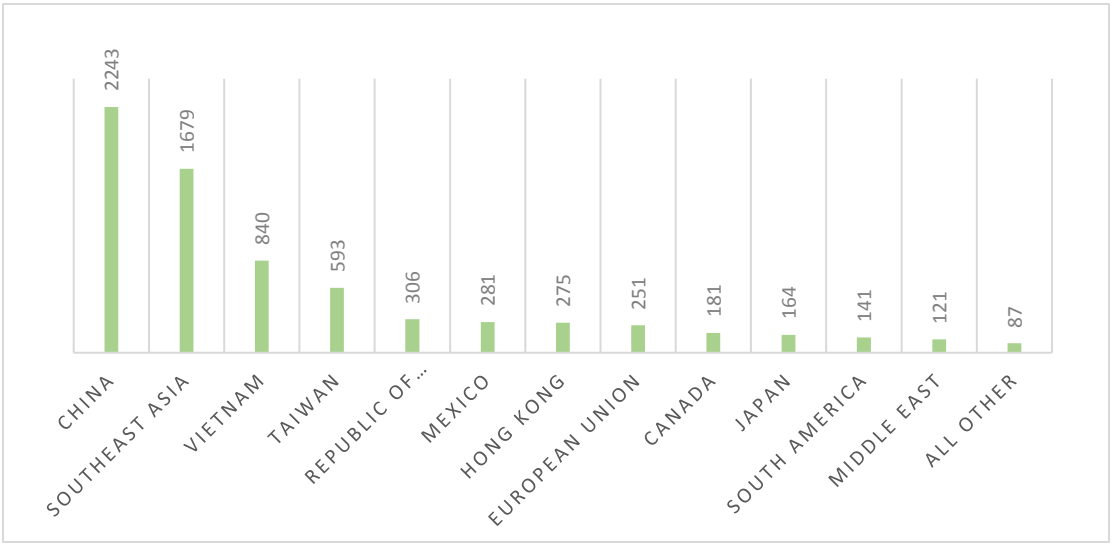
EXPORT CERTIFICATION

PHYTOSANITARY CERTIFICATION PROGRAM: This program serves Wisconsin exporters of plants and plant commodities by certifying their shipments are free from regulated pests.

In 2016 the program was responsible for the export of over $1 billion in plants and plant products. The total number of phytosanitary certificates issued was 7,200. That was an increase of 83 from 2015. China, Southeast Asia (Indonesia, Malaysia, Philippines, Thailand, Vietnam), and Taiwan remained the destination countries for more than 77% of the certificates issued. The export of wood products continued to account for the largest percentage of certificates (42%), followed by soybean products (31%), corn products (16%). No Wisconsin commodities were rejected or destroyed at destination ports in 2016. Plant Industry staff conducted surveys, inspections, and laboratory sampling of cranberry bogs in Northern Wisconsin in order to meet the stringent European Union restrictions regarding leaf scorch *(Xylella fastidiosa)*. The program was able to successfully establish a Pest Free Place of Production (PFPP), which will allow the grower to export cut and baled cranberry vine cuttings for propagation in Poland beginning this year.



COMMODITIES & PHYTOSANITARY CERTIFICATES ISSUED IN 2016



TOTAL PHYTOSANITARY CERTIFICATES ISSUED AND COUNTRY DESTINATIONS

APIARY PROGRAM

POLLINATOR PROTECTION PLAN: In response to risks facing pollinators, DATCP, along with a 35-member stakeholder group, developed the Wisconsin Pollinator Protection Plan. Wisconsin pollinators include managed non-native honey bees; more than 400 species of wild and native bees; and other insects like flies, moths, and beetles. News stories have focused on population declines among managed colonies of honey bees, but some wild pollinators like bumble bees are also declining. Scientific research suggests that a number of factors are in play. For honey bees, the risks include parasites, pathogens, and lack of genetic diversity. Both honey bees and other pollinators suffer from loss of habitat, inadequate forage, and pesticide exposure. This threat to pollinators represents an opportunity for everyone to help. Look into the plan for voluntary actions anyone can take to help pollinators by expanding the quality and quantity of habitat for managed and wild pollinators, minimizing stressors on managed and wild pollinators, improving managed hive health and survival, and providing outreach about pollinator-friendly practices.

APIARY INSPECTIONS: The Apiary Program monitors the apiculture industry to prevent the introduction and spread of harmful honey bee parasites and diseases. Inspectors examine migratory bee colonies and package bees entering Wisconsin in the spring from states such as Alabama, California, Florida, Georgia, Louisiana, Mississippi, Missouri, Tennessee, Texas, and those migratory colonies leaving in fall. Fifty-five apiary inspection certificates were issued for 28,232 migratory hives departing the state last October and November.

Program statistics showed an increase in imported colonies and nucleuses, from 13,484 in 2015 (including hives imported for pollination) to 34,147 in 2016, and a slight decrease in imported queens and packages, from 65,131 in 2015 to 60,135 in 2016. Colony losses over the winter months were estimated at 48% --an improvement over the 57% winter losses in 2015. Multiple factors—inadequate forage and nutrition, pesticide exposure, parasites, viruses, genetics, and management practices—have been shown to affect hive overwintering.

The apiary program also offers voluntary hive inspections for all Wisconsin beekeepers, from backyard hobbyist beekeepers to commercial and migratory beekeepers. A total of 2,208 hives were inspected this year, including 362 in spring and 1,846 in fall—which is approximately 1,000 more hives than were inspected last fall.

Annual apiary inspections found increases in deformed wing virus, American foulbrood, sacbrood, and small hive beetle this year. Small hive beetle was found in 7.5% (58 hives) from 11 counties: Dane, Fond du Lac, Green, Jefferson, Kenosha, Lafayette, Lincoln, Monroe, Outagamie, Rock, and Walworth. Additionally, hives were examined for a number of other common honey bee pests and diseases, including European foulbrood, chalkbrood, and Varroa mite, as well as exotic pests like the Africanized honey bee and the Tropilaelaps mite. The percentage of hives infested with Varroa mite decreased for the second year in a row from 71% in 2015 to 68% in 2016. No Africanized honey bees, Asian honey bees, or Tropilaelaps mites were detected during apiary inspections.

NURSERY PROGRAM

SYSTEMS APPROACH TO NURSERY CERTIFICATION (SANC): McKay Nursery Company of Waterloo, WI, became the nation's first SANC-certified nursery in August 2016. SANC is a Systems Approach to Nursery Certification. It's a voluntary risk-based, process-oriented alternative to the traditional method of having state nursery inspectors certify individual plants as pest-free for shipping out of state. SANC certifies nurseries to ship plants based on the process they use to produce the plants, rather than how those plants look at the time of the inspection. Eight nurseries nationwide participated in the first phase of the pilot project.

McKay Nursery staff worked closely with DATCP to identify "critical control points" in its operation that pose risks for introducing pests and diseases, and they implemented "best management practices" to reduce those risks. The certification process involved approval of McKay's SANC manual and conducting internal and external systems audits in 2016.

For phase two of the pilot program, DATCP plans to bring on a second nursery in 2017. DATCP will also conduct three surveillance and one systems audit of McKay Nursery in lieu of traditional inspection at that facility. It will likely be several years before SANC expands to a broader portion of the green industry.

For more information, visit: http://sanc.nationalplantboard.org

NURSERY INSPECTIONS: Nursery Program personnel inspected 338 nursery grower fields this year, representing 38% of the fields in production for the 616 licensed nursery growers in the state. Staff also conducted inspections at 515 sites (25%) selected from Wisconsin's 1,127 licensed nursery dealers. The top 10 insect and plant diseases found in 2016 were, by total number of detections: viruses, leafspots, powdery mildew, Japanese beetle, non-viable stock, mites, aphids, rust, apple scab, and chlorosis/nutrient deficiencies. Inspectors issued 151 Plant Health Certificates for the shipment and export of nursery stock.

INVASIVE SPECIES RULE: DATCP inspectors documented violations of the NR 40 invasive species rule at 27 individual nursery locations this season. Most of these locations had multiple restricted or prohibited plant species onsite. Phase-out plants were noted on inspection reports at 133 locations. However, no violations were issued because the phase-out period is still in effect. A total of 283 instances of NR 40 plants were found being offered for sale. There were 36 instances of prohibited plants being offered for sale, 7 first round restricted plants, and 240 restricted plants from the second round—which were allowed a phase-out period. The most frequently found invasive species were Japanese barberry (85), Bishops goutweed (34), burning bush (19), woodland forget-me-not (17), ribbon grass (12), black alder (11), aquatic forget-me-not (9), and Siberian pea shrub (8).

ROOT AND COLLAR ROT: White root rot, also known as *Dermatophora* root rot, was identified as the cause of mortality in white spruce trees at a Chippewa County nursery. In addition, Swiss pines from Washington County exhibiting root collar rot were infected with *Phytophthora kelmania*, a pathogen first associated with declining fir Christmas trees in Grant and Manitowoc counties in 2010. Pine is a new host of this pathogen in Wisconsin.

LECANIUM SCALE: Populations of lecanium scale were extremely heavy on a wide variety of hardwood trees across the northern region of the state in June and July. Severe branch mortality, crown dieback, and honeydew accumulation on branches and leaves were reported in Brown, Door, Kewaunee, Langlade, Lincoln, Marinette, Oconto, Oneida, Shawano, St. Croix, and Vilas counties. Another species of soft scale, magnolia scale, was also abundant on magnolia trees and shrubs for the second year in a row.

PLANT INDUSTRY LABORATORY

The Plant Industry Bureau (PIB) Laboratory provides plant disease diagnostic services to the Christmas tree, nursery, and pest survey programs. The laboratory also performs testing for phytosanitary certification necessary for domestic and international export of certain plants and differentiates disease from chemical injury for the Environmental Enforcement Section of the Agrichemical Management Bureau. Plant samples with diseases caused by bacteria, fungi, nematodes, and viruses are submitted to the laboratory by DATCP field specialists.

In 2016, a total of 1,260 samples were submitted, compared to 687 samples submitted in 2015. Survey summaries are below and at the website: https://datcp.wi.gov/Pages/Programs_Services/PlantIndustryLab.aspx

SUDDEN OAK DEATH SURVEY

USDA accredited the PIB lab for "Sudden Oak Death" (SOD) testing through the National Plant Protection Laboratory Accreditation Program (NPPLAP). The Nursery inspectors inspected ornamentals at 157 nurseries and dealers, with an emphasis on cultivars of high-risk plant genera: rhododendron, camellia, viburnum, pieris, and kalmia. A total of 108 plants (21 genera) with signs of leaf necrosis and/or shoot blight were submitted to the PIB lab for diagnosis. Samples were collected from 51 nurseries in 27 counties.

Pytophthora ramorum was not found in any of the screened nursery stock. However, five other species of *Phytophthora* were found in nine of the samples. Rhododendron were infected with *P. cactorum, P. nicotiana, P. syringae* and *P. chlamydospora*. Lilac, honeysuckle, and forsythia were affected by *P. nicotiana, P. cactorum* and *P. citrophthora.*

RHODODENDRON WITH PHYTOPHTHORA LEAF AND SHOOT BLIGHT

GREENHOUSE VIRUS TESTING OF ORNAMENTALS

Plant viruses in the potygroup, tobacco rattle virus (TRV), and hosta virus X (HVX) were the most frequently found disease-causing viruses at greenhouses, nurseries, and retailers. The PIB Lab screened 253 symptomatic samples from nursery inspection collections at 64 businesses. A total of 162 ornamental samples tested positive for a least one of ten viruses listed in table 1. TRV was frequently found in bleeding heart samples (17 of 20), followed by barrenwort (9 of 9), astilbe (7 of 13), clematis (2 of 18), hosta (2 of 6), coral bell, lily and peony (1 each).

Iris were very prone to potyvirus infections (76 of 78). Sequencing identified iris severe mosaic virus (ISMV) in Iris with leaf mottle symptoms. Other plant genera with potyvirus were belamcanda, canna, dracaena, lilac with lilac leaf chlorosis virus, horseradish, sedum, tradescantia, and wisteria.

Fourteen clematis were diagnosed with clematis chlorotic mottle virus (ClCMoV), one with a mixed infection with TRV. Lilacs with virus-like symptoms that have been observed for several years were diagnosed as lilac leaf chlorosis virus (LLCV), by USDA ARS researchers using next generation sequencing. All virus-infected plant materials were removed from sale.

LILAC WITH LILAC LEAF CHLOROSIS VIRUS

2016 Test Results Viruses of Ornamentals	Total Tests	Total Positives
Arabis mosaic virus (ArMV)	9	0
Cucumber mosaic virus (CMV)	38	4
Clematis chlorotic mottle virus (ClCMoV)	18	14
Dahlia mosaic virus (DMV)	1	1
Hosta virus X (HVX)	30	9
Impatiens necrotic spot virus (INSV)	33	3
Potygroup viruses	102	87
Tobacco mosaic virus (TMV)	30	2
Tobacco rattle Virus (TRV)	91	40
Tomato spotted wilt virus (TSWV)	32	2

IRIS WITH SYMPTOMS OF IRIS SEVERE MOSAIC VIRUS

NOTABLE DISEASES ON ORNAMENTALS

Impatiens downy mildew was found on *Impatiens walleriana* in a Kenosha retail store in June and promptly removed from sale.

Hanging baskets with red and apricot flowering calibrachoa plants were removed from an Outagamie greenhouse because of powdery mildew (*Podosphaera xanthii)*. This powdery mildew can also affect verbena, petunia, and cucurbits.

Boxwood blight, a major concern for the nursery industry, was not detected in any of the samples submitted for testing in 2016. This disease has not been found in Wisconsin to date.

IMPATIENS WITH IMPATIENS DOWNY MILDEW

FALL CORN SURVEY

Fall inspections screened for two new diseases**,** tar spot of corn (*Phyllachora maydis)* and Xanthomonas blight (*Xanthomonas vasicola* pv. *vasculorum*)**.** A total of 105 fields throughout Wisconsin were visited from August 5 to September 15, 2016.

Tar spot was detected in Green County on September 12 by the pest survey team and found in Iowa County on September 20 by UW-Madison. The USDA mycologist confirmed this first detection of tar spot disease in Wisconsin.

Xanthomonas blight was not observed in Wisconsin in 2016. Samples were screened at the PIB lab and a suspect sample was sent to the USDA identifier in Kansas and was determined to be negative.

The corn survey detected Southern rust (*Puccinia polysora*) in Lafayette (September 9) and Grant counties (September 15). Prior to that, UW-Madison reported it in Rock County (August 25). Southern rust is rare in Wisconsin. It does not overwinter but occasionally it can be blown up from the southern United States and the tropics. Rust spores that arrive after corn is in the milk stage (R3) pose less of a threat to production.

CORN LEAF WITH BLACK SPOTS CAUSED BY TAR SPOT DISEASE

SEED FIELD INSPECTION PROGRAM

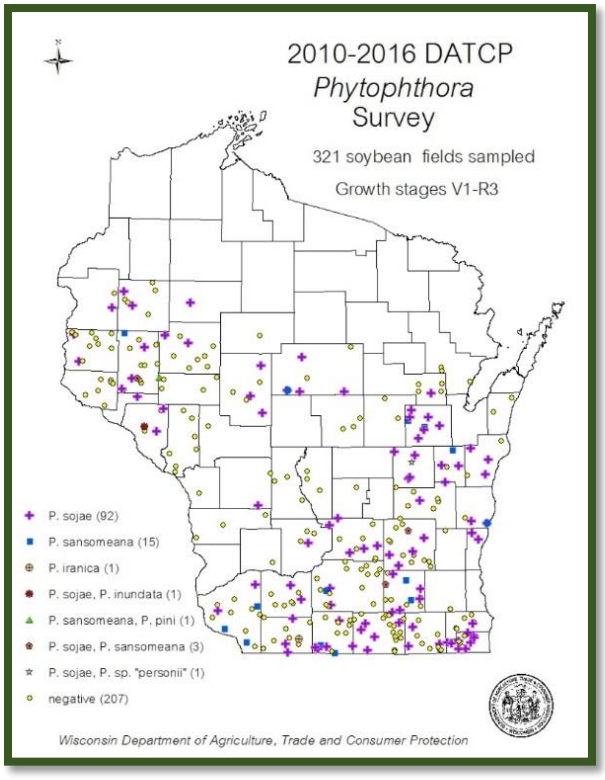
Crops grown for seed export (corn, garden bean, onion, soybean, and tomato) are inspected by DATCP during the growing season for pests and diseases of regulatory significance. Field inspection services are provided to seed companies and growers requesting assistance to meet the phytosanitary requirements of their international customers. In 2016, 142 seed production fields on 1,015 acres were inspected. 128 samples were collected and tested for a range of bacterial, fungal, and viral diseases.

GOSS'S WILT OF CORN: This disease was detected in six Wisconsin counties (Dane, Fond du Lac, Eau Claire, Grant, Pierce, and Walworth) during seed corn field inspections in August. This bacterial disease caused by *Clavibacter michiganensis nebraskensis* was confirmed in 11 of 78 (14.1%) samples at PIB lab compared to 15 of 39 (38.5%) in 2015. Stewart's wilt (*Pantoae stewartii*) was not detected. Northern corn leaf blight (*Exserohilum turcicum*), common rust (*Puccinia sorghi*) and anthracnose (*Colletotrichum graminico*la) were the most common diseases.

Virus screening of corn continues to show no evidence of high plains virus (HPV), wheat streak mosaic virus (WSMV), or maize chlorotic mottle virus (MCMV) in Wisconsin. Three fields in Dane County tested positive for sugarcane mosaic virus (SCMV), formerly called maize dwarf virus (MDMV).

POTATO BLACKLEG DISEASE: This is an emerging potato disease in North American potato growing areas including Wisconsin. In collaboration with the UW-Madison Seed Potato Certification Program, the PIB lab tested for it in 2016. Growers requested testing to assure access to markets following a 2015 disease outbreak on the East Coast and in the Midwest. The *D. dianthicola* bacteria cause stem blight on potato plants and tuber soft rot, which is visually indistinguishable from the established tuber soft rots. Testing will continue until all seed lots have been screened by spring of 2017. The PIB lab has processed 356 potato samples so far.

POTATO TUBERS WITH SOFT ROT



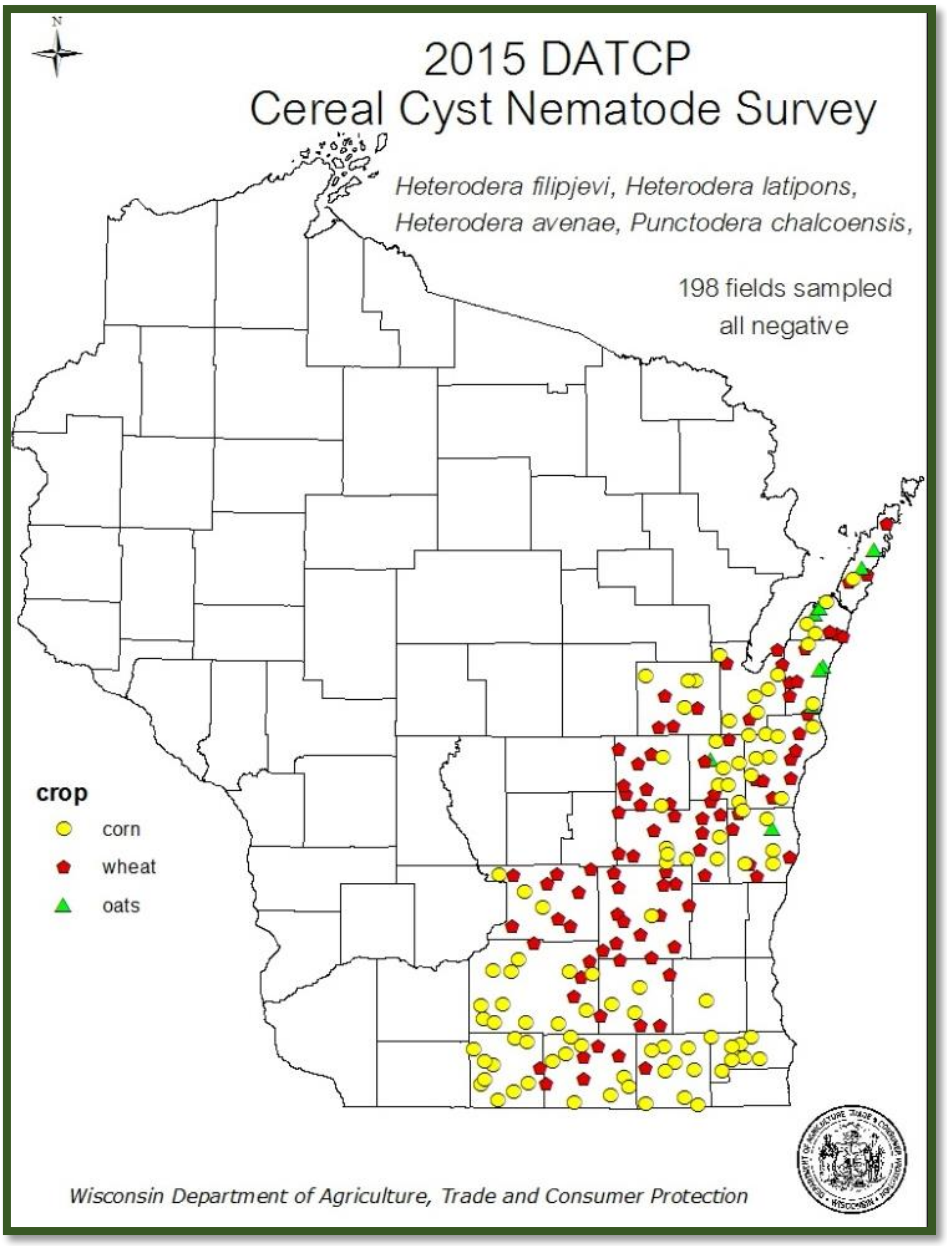
EARLY SEASON SOYBEAN PHYTOPHTHORA ROOT ROT SURVEY: The annual early season survey of soybean fields continues to show a high prevalence of *Phytophthora* root rot caused by *Phytophthora sojae,* with 38% in both 2015 and 2016. A total of 53 fields were sampled from June 7 to July 13. This fungus-like pathogen that causes soybean damping-off was detected in 12 counties: Barron, Columbia, Crawford, Dodge, Dunn, Green, Jefferson, Marathon, Outagamie, Racine, Rock, and Walworth.

In addition, five other *Phytophthora* species have been identified: *P. sansomeana, P. pini,* P. sp. "*personii*", *P. inundata* and *P. iranica*. *P. sansomeana* were detected in soybean roots from a Dunn County field this year. At least some isolates of *P. sansomeana* have been reported to be pathogenic on soybean and corn. It has also been found on Christmas trees in Wisconsin.

CEREAL CYST NEMATODE SURVEY: As part of the USDA's Cooperative Agricultural Pest Survey (CAPS) program, this survey was conducted to detect exotic cyst nematodes in wheat and corn producing fields of Wisconsin. CAPS-targeted nematodes were *Heterodera filipjevi*, the cereal cyst nematode; *Heterodera latipons*, the Mediterranean cereal cyst nematode; and *Punctodera chalcoensis*, the Mexican corn cyst nematode. Any of these nematodes could potentially impact crop production, management practices, and trade if they were accidentally introduced into the state.

The survey team collected 198 soil samples (15-20 cores per field); 98 samples were collected from corn, 91 from wheat, and nine from oat fields (April 17 to November 2, 2015). Soil samples were processed at the PIB lab. All soil samples tested negative for the three exotic cyst nematodes. The map shows the surveyed field locations by crop.

Results showed 28% of soil samples contained cyst nematodes often found in Wisconsin fields. Soybean cyst nematode (*Heterodera glycines*), which is a common pest in soybeans, was found in 29 fields. Clover cyst nematode (*H. trifolii*) was detected in five fields, and *Cactodera* spp. in 12 fields. Clover cyst nematodes infest corn or cereals. *Cactodera* cysts are usually found on non-crop hosts, but one sample was determined to be *Cactodera rosae,* reported to be a pest of barley in Mexico. Identification was confirmed by the USDA nematologist. This is a first detection of *Cactodera rosae* in the United States.



CHRISTMAS TREE PROGRAM

Wisconsin's Christmas Tree Program licenses Christmas tree growers and inspects and certifies Christmas trees as being reasonably free of damaging insects and diseases. The program provides a valuable service to interstate and international shippers of Christmas trees who require an inspection certificate prior to shipping. Growers who sell Christmas trees locally also benefit by receiving inspections to inform them of pests and diseases affecting their trees. In addition to trees, staff inspect wreath and roping producers in the state who request plant health certificates.

Christmas tree field inspection finds, 2012-2016.

Year	Fields Inspected	Fields with Gypsy Moth	Fields with Pine Shoot Beetle
2012	702	6	6
2013	767	10	0
2014	667	11	2
2015	679	10	6
2016	553	15	5

Inspections of Christmas trees begin once the gypsy moth egg mass laying is complete, typically after September 1. In addition to Christmas trees, staff inspect fence rows and woodlots adjacent to each field for evidence of gypsy moth life stages and indicators of pine shoot beetle. Christmas tree growers who plan to ship trees interstate and/or request a plant health certificate are the focus of high-priority inspections.

Support from the Gypsy Moth Trapping Program provides county-level gypsy moth trap count maps that are used to prioritize inspections and inform growers of gypsy moth populations in the area. Field inspection reports of pest incidence and severity levels are provided to growers, along with diagnoses for symptomatic plant samples submitted to the DATCP Plant Industry Lab.

Eastern Spruce Gall Adelgid on Norway Spruce

The most commonly detected diseases and abiotic factors included: frost damage (181 fields), *Rhizosphaera* on fir (65), *Lirula* needlecast (50), white pine blister rust (50), *Rhizosphaera* on spruce (32), deer damage (23), broom rust on fir (22), chlorosis (20), root rot (18), and brown spot (15).

The most commonly detected insect pests were: balsam twig aphid (115 fields), white pine weevil (96), balsam gall midge (44), Eastern spruce gall adelgid (24), pine needle scale (17), Zimmerman pine moth (15), aphids (8), Pales weevil (6), root collar weevil (4), and white pine bark adelgid (4).

Right: A total of 553 fields were inspected by DATCP staff in 2016.

SEED CONTROL PROGRAM

The Seed Control Program monitors and enforces labeling, germination, and purity requirements to assure quality agricultural seed is sold in Wisconsin. Seed that does not conform to the standards of the state's seed law may be removed from the marketplace and sellers may be subject to other penalties. Field inspectors in the program perform a range of duties, such as evaluating labels for compliance, issuing stop sale orders, and collecting official samples for analysis.

In 2016, DATCP had 728 licensed seed labelers. A total of 219 *(28%)* licensed labelers were inspected and 116 *(16%)* labelers were sampled for a total of 374 samples. The overall violation percentage of 4.8% is about the same as last season. Three Technical, five Minor, and 10 Serious violations were issued. Thirteen seed lots were relabeled and two lots were removed from sale by the labeler. One lot was returned to the labeler and two lots were planted before compliance actions could be taken.

The goal is to collect samples and/or inspect all licensed labelers in the state on a three-year rotation while targeting labelers with a violation trend exceeding the current state violation average. An average of 31% of the licensed labelers are inspected and 13.46% are sampled annually. Collecting a sufficient number of samples is necessary to substantiate developing cases that may result in a compliance conference.

A new rule has been proposed that would modify Wisconsin rules governing the sale and labeling of agricultural and vegetable seed to require non-commercial seed sharing entities to meet basic labeling requirements and to be licensed. This rule is expected to be finalized in 2017.

SEED LABELER STATISTICS FROM 2016

Year	Number of Labelers	Number of Samples	Number of Violations	% Violation	% Labelers Inspected	% Labelers Sampled
2002	695	319	66	20.69%	25%	12%
2003	691	349	66	18.91%	33%	11%
2004	700	406	53	13.05%	37%	14%
2005	691	340	44	12.94%	36%	15%
2006	689	333	37	11.11%	30%	14%
2007	685	332	40	12.05%	36%	17%
2008	690	242	24	9.92%	33%	11%
2009	675	280	27	9.64%	34%	15%
2010	685	308	38	12.34%	33%	15%
2011	725	336	33	9.82%	23%	13%
2012	729	335	38	11.34%	30%	12%
2013	725	375	30	8.00%	26%	14%
2014	730	341	18	5.30%	29%	12%
2015	725	343	16	4.66%	33%	14%
2016	728	374	18	4.8%	28%	16%

FIREWOOD AND FOREST PEST PROGRAMS

MOUNTAIN PINE BEETLE

(JAVIER MERCADO, COLORADO STATE UNIVERSITY, BUGWOOD.ORG)

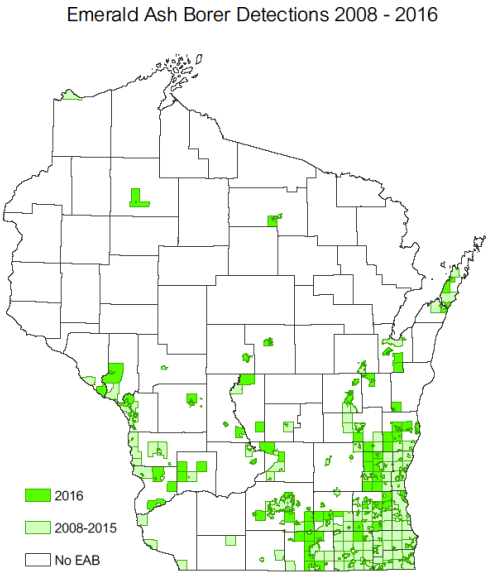
FIREWOOD CERTIFICATION PROGRAM: The movement of firewood into Wisconsin and within the state's borders is regulated to limit the spread or introduction of invasive insects and diseases. Transporting firewood into State Parks and other state-managed lands from locations farther than 10 miles away is prohibited, unless the firewood has been treated and is obtained from a certified firewood dealer.

Under the voluntary Firewood Certification Program, firewood is treated using one of two approved treatment methods: heat treatment or seasoning. Heat treatment requires heating the firewood to an internal temperature of at least 140°F (60°C) for at least 60 minutes; seasoned firewood is stored on the dealer's premises for at least two years before it can be sold or distributed as certified firewood in Wisconsin. DATCP certified 26 firewood dealers in 2016. A total of 78 companies have been certified to sell firewood in Wisconsin since the rule was enacted in 2007.

FOREST REGULATORY PROGRAM

Members of DATCP's Plant Protection Section work with members of the forest products industry to facilitate compliance with state and federal quarantine regulations related to the movement of certain forest products. They work with individual businesses and enter into compliance agreements, which have limited exemptions to certain parts of the regulation, in exchange for implementing practices designed to mitigate risk. To that end, DATCP has entered into 48 Gypsy Moth compliance agreements and over 300 Emerald Ash Borer compliance agreements (and co-signed hundreds more comparable Federal compliance agreements) to date.

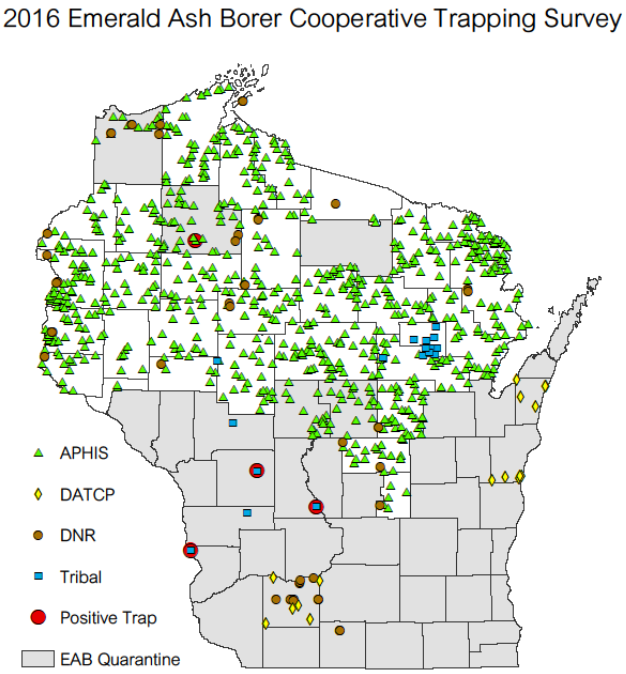
In additional to internal forest pest quarantines, DATCP also uses external quarantines to prevent the introduction of deleterious pests and diseases like Thousand Canker Disease (TCD), Asian Longhorned Beetle (ALB), Hemlock Woolly Adelgid (HWA), and Sudden Oak Death (SOD) into our state.



EMERALD ASH BORER: Emerald ash borer (EAB) remains the greatest invasive insect threat to Wisconsin's ash trees. Ash mortality in southeastern and central Wisconsin saw a 45% increase since 2015, although only 30% of Wisconsin's total ash volume is located in this region. In the nine years since the first confirmed detection of EAB, this destructive pest has been found in 275 municipalities, with the majority of infestations located in southern counties.

The 2016 EAB trapping survey was a collaborative, interagency effort between DATCP, the USDA Animal and Plant Health Inspection Service (APHIS), the Department of Natural Resources (DNR), the Ho-Chunk Nation, and Menominee Tribal Enterprises. The survey consisted of 818 baited purple traps set across 38 counties, with the majority of traps located in non-quarantined counties in the northern half of the state. Four traps, one each in Crawford, Juneau, Monroe, and Sawyer counties captured EAB adults.

In addition to purple trap detections, new EAB locations were found in 2016 due to the identification of symptomatic infested trees and adult beetle sightings. There were a total of 98 new municipal detections, doubling those of 2015 and increasing the total number of infested municipalities across the state to 15%.



By the end of 2016, all townships in Kenosha, Milwaukee, Ozaukee, Racine, Walworth, and Washington counties have been confirmed infested with EAB. Further signs of EAB-infested ash trees also continued to develop across south central and western Wisconsin, with the expansion of previous detections into adjacent townships. However, there were few new detections in the north, with one new EAB detection occurring in Sawyer County (Town of Radisson) and an expansion of the Oneida County infestation beyond the city limits of Rhinelander and out into the Town of Crescent. Much of the north, where 60% of ash tree volume is located, is still considered free of EAB.

DATCP expanded the EAB quarantine in 2016 to include Portage, Sawyer, and Wood counties in central and northern Wisconsin. New EAB detections were also found in Juneau and Manitowoc counties, which were previously quarantined due to their close proximity to known EAB infestations. The EAB quarantine now includes 42 Wisconsin counties. An estimated 35% of Wisconsin's ash volume is found within the EAB quarantine area and just under 25% of the quarantined area has been confirmed infested.

MOUNTAIN PINE BEETLE: The mountain pine beetle, *Dendroctonus ponderosae*, has been described as the most destructive pest of mature pine trees in North America. It has not been found in Wisconsin. Department staff solicited stakeholder and public input and obtained DATCP board approval on an exterior quarantine for mountain pine beetle. The quarantine, expected to be finalized in 2017, is designed to restrict imports of firewood, pine wood or plant parts, and dimensional pine lumber with bark attached from infested areas in order to protect our native red, jack, and eastern white pine forests.

THOUSAND CANKERS DISEASE: In 2016 walnut twig beetle (WTB) and *Geosmithia morbida* detections occurred for the first time in Michigan and Illinois, respectively, inching the insect vector and fungal component of thousand cankers disease (TCD) even closer to Wisconsin. Thousand cankers disease continued to spread in already infested eastern states, including Indiana, Ohio, Maryland, North Carolina, Pennsylvania, Tennessee, and Virginia, therefore heightening the risk of introduction into Wisconsin along forest product pathways.

Monitoring efforts targeting both the insect and fungal components of TCD continued for the fifth consecutive year. The survey included 25 pheromone baited funnel traps paired with black walnut branch cuttings. Traps and baited branches were deployed in Chippewa, Crawford, Dane, Grant, Iowa, Jefferson, La Crosse, Richland, Rock, Sauk, Trempealeau, Vernon, and Walworth counties. Survey locations included wood disposal sites and sawmills receiving black walnut logs from TCD-infested states. No walnut twig beetles were captured in survey traps, and no signs of *G. morbida* fungus or WTB galleries were found beneath the bark of walnut branches.

EXOTIC BEETLE SURVEY: Despite existing sanitary and quarantine regulations, an unintended consequence of global trade is the potential pathway it provides for wood-inhabiting organisms to move long distances across land and from one continent to the next. In order to monitor for potential introduction of non-native insects at Wisconsin's commercial ports, an exotic beetle detection survey was conducted for the first time since 2009. The survey targeted seven wood-borer and bark beetle species that have not been detected in Wisconsin, however interceptions have occurred at other United States ports of entry.

Detection surveys focused on one metallic wood-borer, three bark beetle, two ambrosia beetle, and two longhorned beetle species. One baited trap per target species was deployed at each of 10 eastern Wisconsin ports in Brown, Door, Kenosha, Kewaunee, Manitowoc, Marinette, Milwaukee, Ozaukee, Racine, and Sheboygan counties. Trap locations included the immediate port vicinity, as well as nearby urban forests and parks. Trap catch samples were collected biweekly, May through September, and all were negative for target exotic species.

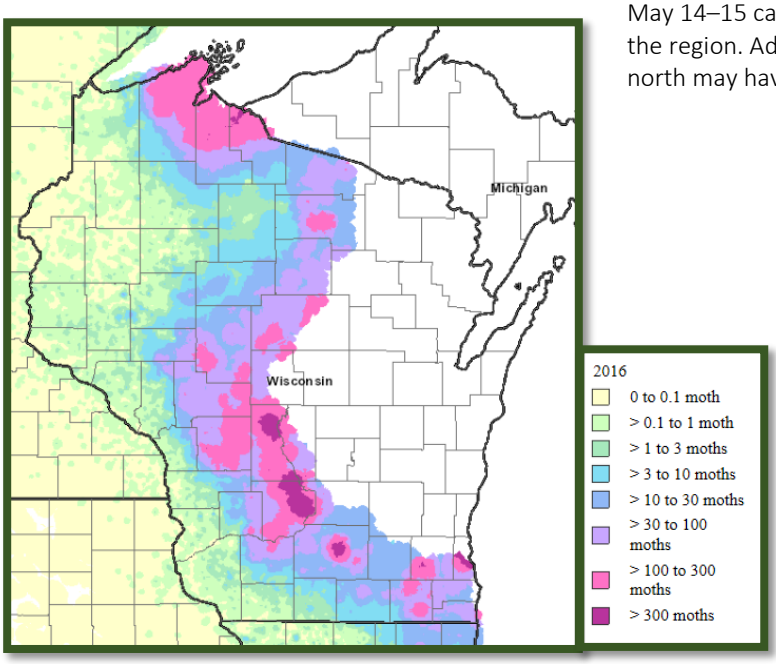
GYPSY MOTH PROGRAM

The annual gypsy moth trapping survey showed an 11% decrease in male moth counts compared to 2015 catches. A total of 86,462 male moths were captured in 11,383 traps in 2016, compared to 97,505 moths in 11,712 traps in 2015. Non-regulated counties saw lower widespread counts of moths and fewer isolated high counts. Many regulated counties remained at 2015 levels or showed slightly higher moth captures. Fall egg mass surveys were conducted at 276 sites in 23 non-regulated counties. Twenty-six positive sites were found mainly in the west central and southwestern part of the state. No additional counties were quarantined for gypsy moth in 2016.

In 2016, the Slow the Spread (STS) Program treated 86 sites, totaling 202,664 acres. Al's Aerial Spraying of Ovid, MI applied all Btk and mating disruption (MD) products. Btk applications began May 12 and ended June 2. Foray 48B was applied to 26,822 acres at 58 sites in 21 counties. No Gypchek was applied in 2016. The Forest Service's MD applications occurred from June 27 to July 18. A total of 175,842 acres across 28 sites were treated with MD in western Wisconsin. Approximately 25% of the acreage was treated with the liquid formulization of MD (SPLAT), with the remainder treated with the polymer-based product (Disrupt II). Post-treatment evaluations indicated treatments were highly effective; there were no treatment failures; five treatments were evaluated as partially successful.

GYPSY MOTH CATERPILLAR

Cooler conditions during the early spring in southern Wisconsin resulted in delayed hatch and leaf development in 2016, with some sites in the south treated at the same time or after sites in central Wisconsin. Larval hatch was first observed in several counties in the central and southern regions on April 25, only a few days later than normal in recent years. Developmental weather conditions in the spring were cool and wet, particularly in northern Wisconsin. Conditions across the state were good for *Entomophaga maimaiga* and NPV infection, with mortality from both being present, but variable, in populations in the southern regions. Low populations of gypsy moth in north prevented observation of disease mortality. Severe weather in 2016 has likely played a role in gypsy moth survivorship. A late cold snap in northwest and west-central regions on May 14–15 caused considerable frost damage primarily to developing oak in the region. Additionally, multiple intense July rainfall and storm events in the north may have affected late instar, pupal, and adult survivorship.



2016 GYPSY MOTH SPREAD MAP

MALE (BROWN) AND FEMALE (WHITE) ADULT GYPSY MOTHS

PEST SURVEYS

EXOTIC PEST
Survey

LILY LEAF BEETLE: This newly-established invasive pest was found in early August by a resident of Plover in Portage County, marking the southernmost detection of lily leaf beetle in the state. The northernmost record of the beetle is from Merrill in Lincoln County. Lily leaf beetle was first discovered in Wisconsin in 2014 and reproducing populations of this striking red insect currently exist in Lincoln, Marathon and Portage counties.

TWO-BANDED JAPANESE WEEVIL: A new state record was established in Dane County on August 5 following a Madison resident's report of numerous specimens on various ornamental plants. This detection marked the first confirmed account of the invasive Asian beetle in Wisconsin. The weevils were observed on columbine, coral bells, Japanese anemone, ligularia, pulmonaria, Siberian bugloss, snow-on-the-mountain, spirea, rock iris, and assorted weeds. There has been no indication that infestations have spread beyond the Madison area.

FIELD CROP PEST
Survey

CORN PESTS

EUROPEAN CORN BORER: An increase in conventional corn acreage due to lower commodity prices apparently favored larval populations this fall. The 75th annual survey in September and October found a state average of 0.11 borers per plant, an increase from last year's historical low of 0.02 borers per plant. Minor population increases from 2015 were documented in seven of the nine crop districts, all except the east-central and northeast regions. Larval densities in the central area rose to 0.24 borers per plant, or 24 per 100 plants, the highest average recorded in that area since 2007. Although more sites had economic averages above 1.0 larva per plant than in recent years, and second-generation larvae were detected in 49 of the 229 fields (21%) surveyed compared to 14% in 2015. The very low state average of 0.11 borers per plant indicates that Bt corn continues to suppress corn borer populations and reduce the pest status of this insect in Wisconsin.

CORN ROOTWORM: Review of annual beetle survey data shows that populations decreased from 2015 levels across southern, central and east-central Wisconsin, while beetle counts in the west-central and northern counties were markedly higher. Averages declined in five of the nine crop districts and increased in four. The largest decreases were found in the south-central and southeast districts where averages fell sharply from 0.8 to 0.4 beetles per plant and from 0.7 to 0.2 beetles per plant, respectively. By contrast, the survey found substantially higher averages in west-central and northern Wisconsin, particularly in the northeast where the district count more than tripled from 0.2 to 0.7 beetles per plant. Despite regional increases, the 2016 state average of 0.5 beetles per plant still represents a decrease from the 2015 average of 0.6 per plant. Results of the survey suggest a greater threat of larval rootworm damage to non-Bt continuous corn in the northern and west-central counties next season, while beetle pressure may be lower across the southern, central, and east-central areas.

BLACK CUTWORM: Migrants began arriving in the state by March 29 and an initial cutting date of May 20 was anticipated based on an April 17 biofix. The spring trapping survey registered 1,835 moths in 43 traps from March 15 to June 1, with a peak from April 21 to May 4. Light infestations developed in corn by early June as a result of the migration and favorable field conditions, but significant injury was not reported or observed.

WESTERN BEAN CUTWORM: Moth counts increased moderately after a three-year collapse. The state cumulative capture of 1,530 moths in 75 traps (20 per trap) was a substantial increase from the 644 in 96 traps (seven per trap) moths collected last season, yet moderate in comparison to counts registered during the 2007-2012 surveys and the 12-year average of 23 moths per trap. The highest individual count for the nine-week monitoring period was 145 moths near Markesan in Green Lake County. Larvae were also

more common than anticipated this season and infested approximately 9% of the 458 corn sites surveyed in August and September. Damage to both traited and non-traited corn hybrids was reported.

CORN EARWORM: A late-season migration yielded a cumulative total of 6,402 moths in 16 traps, with a well-defined peak from August 18-31. Almost one-third of the moths (31%) were captured at the Ripon monitoring site during the last week of August. Compared to 2015, the migration was larger and lengthier, with the heaviest flights concentrated in Columbia and Fond du Lac counties. Late sweet corn and other susceptible crops such as tomatoes and snap beans remained under a moderate to severe threat until mid-September.

SOYBEAN PESTS

SOYBEAN APHID: The annual survey found a statewide average count of eight soybean aphids per plant. This average compares to 35 aphids per plant last year and is only marginally higher than the record-low count of seven aphids per plant documented in 2012. One hundred and seventy soybean fields in the R2-R5 growth stages were sampled during a three-week period from July 25-August 15. Aphid densities were below 151 per plant in all fields, and the majority of sites had counts of fewer than 25 aphids per plant. No field sampled had an average exceeding the 250 aphid-per-plant treatment threshold. Results of the survey suggest that aphid populations remained low or moderate in most soybean fields this season and widespread treatment for aphid control was not required.

JAPANESE BEETLE: Defoliation was observed in about 74% of the soybean fields examined in late July and August, indicating that Japanese beetle injury was more widespread than ever. Defoliation estimates were mostly below the 20-30% treatment threshold, but chemical intervention was justified in some instances. Once primarily a fruit and landscape pest, the Japanese beetle has become an increasingly serious threat that more soybean and corn growers now have to manage for the first time.

OBLIQUEBANDED LEAFROLLER: This generalist leafroller was common in Wisconsin soybean fields for the second year in a row. Larvae began emerging by early June and were prevalent in fields throughout July. Most of the larval population pupated by early August. Despite their abundance, the OBLR damage to soybeans observed in 2015 and 2016 was minor and not of economic importance.

FRUIT PEST

Survey

BLUEBERRY MAGGOT: Survey work conducted by DATCP resulted in the first confirmed detection of adult flies in Adams and Sauk counties on August 2, and a new state record. The specimens were captured on yellow sticky board traps set in wild blueberries. Reported from Maine and New Hampshire in 1914, this native fruit fly is an important pest of commercial blueberry crops in the eastern and southern U.S. and eastern Canada. Its larvae, or maggots, develop entirely within the blueberry fruit, causing berries to become soft, watery, and unmarketable. This detection could have economic implications for exporters of blueberry plants and fruits to Canada, where it is a regulated pest. Additional survey traps were set in Jackson, Juneau, Marinette, Monroe, and Oconto counties. All had negative results.

BROWN MARMORATED STINK BUG: DATCP, UW-Madison, and the IPM Institute carried out the state's first collaborative BMSB monitoring program in 2016. The program consisted of 51 pheromone traps distributed in 12 counties. Juvenile stink bugs were observed in the Allen Centennial Garden on UW-Madison's campus on July 15 and three nymphs were later collected there in a trap on July 27, marking the first time BMSB had been trapped in Wisconsin. BMSB captures were documented at six sites in Dane County and one in Rock County this season. The positive sites included urban areas, apple orchards, and pumpkin plantings. As of late November, the total number of BMSB specimens collected was 185, with a high cumulative count of 80 stink bugs in an orchard near Verona. Peak activity and trap counts occurred from October 5-19. All Wisconsin apple growers are urged to plan for BMSB scouting as part of their IPM programs for 2017.

JAPANESE BEETLE: Reports indicated higher-than-normal populations this year. Neem oil applications made before most of the beetles began emerging in July provided temporary repellent activity in orchards, but conventional contact pyrethroid insecticides were also required for control. Beetles remained abundant for 10 weeks. The largest numbers appeared during the latter half of July into August and a decline was not noted until September.

VEGETABLE AND POTATO PEST Survey

LATE BLIGHT: The state's first case of potato late blight in 2016 was confirmed by UW-Madison on a Polk County farm on August 15, much later than the June 23 first detection in 2015. Two additional cases were found in August: one in Dane County on August 18 (tomato) and another at a Polk County farm on August 22 (tomato). No new finds were reported until September 24, when a tomato plant from Juneau County tested positive. Late blight was subsequently confirmed in Crawford County on October 3 (potato and tomato). This disease was relatively rare in 2016 and did not develop in the state's main potato growing areas. Only four counties had confirmed reports this year, far fewer than the 23 counties with documented cases in 2015.

POTATO ROT NEMATODE: There are 3,048.95 total acres with a history of Potato Rot Nematode, with 95% of the acres located in Langlade County. Priority fields are inspected which include new fields going into seed production for the first time and previously infested fields with a current crop of potatoes. Fields are released from quarantine after two successive potato crops that show no evidence of Potato Rot Nematode. Fumigation has been proven to be an effective control of the nematode, and so fields that have been fumigated followed by two successive crops of potatoes with no evidence of Potato Rot Nematode, are released for certified seed potatoes. There has never been a report of an interception in-state or out-of-state of seed potatoes, or commercially grown potatoes, with evidence of Potato Rot Nematode. Fields going into seed potato production for the first time are high priority for inspection of Potato Rot Nematode. In the last 10 years, an average of seven fields are inspected per year and there have been six positive finds of Potato Rot Nematode.

Potato Harvest Inspection Results for 2016

Six potato fields, totaling 385.5 acres, were inspected for Potato Rot Nematode in 2016. Five fields were new to seed potato production and found to have no evidence of Potato Rot Nematode. One field with a prior history was found negative after fumigation and the second successive potato crop was grown on the field. This field was released to seed certification.

Number of Fields, Acres by County, and Current Status

County	Current Status	Sum Of Acres	Count Of Field
Forest	Released not used for potato	15	1
Kenosha	Released not used for potato	1	1
Langlade	Released/table stock/seed pending	41	2
Langlade	Infested	397.3	18
Langlade	Released not used for potato	197.77	9
Langlade	Released/certified seed	1701.94	49
Langlade	Released/table stock	538.04	23
Lincoln	Released/certified seed	37	1
Manitowoc	Released/certified seed	9.3	1
Marathon	Infested	8.4	1
Marathon	Released/certified seed	64.5	2
Portage	Released/table stock	38.2	1